Jan. 5, 1954 J. GIANNELLI 2,665,134

AUTOMATIC PHONOGRAPH

Filed April 22, 1947 4 Sheets-Sheet 1

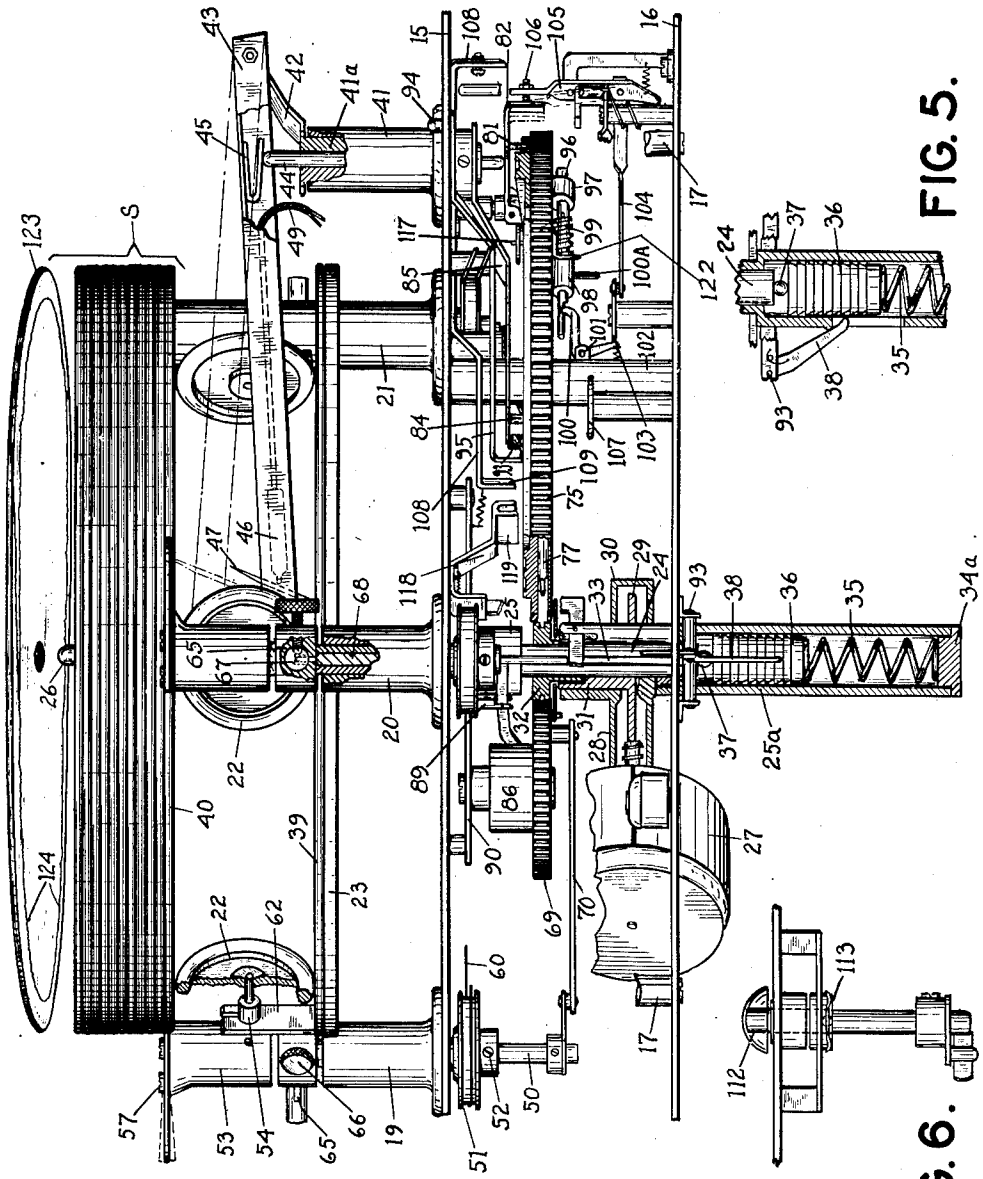


FIG. 1.

FIG. 5.

FIG. 6.

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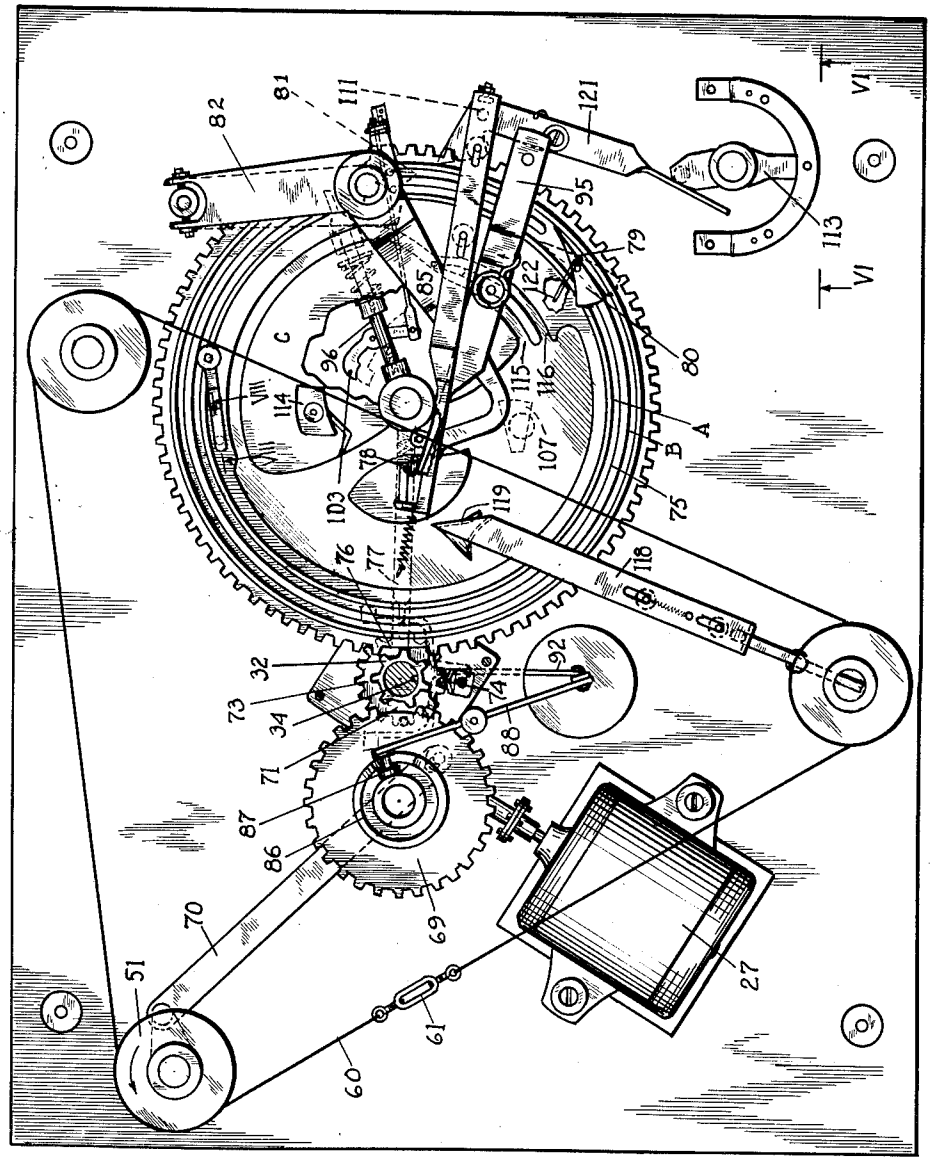


FIG. 2.

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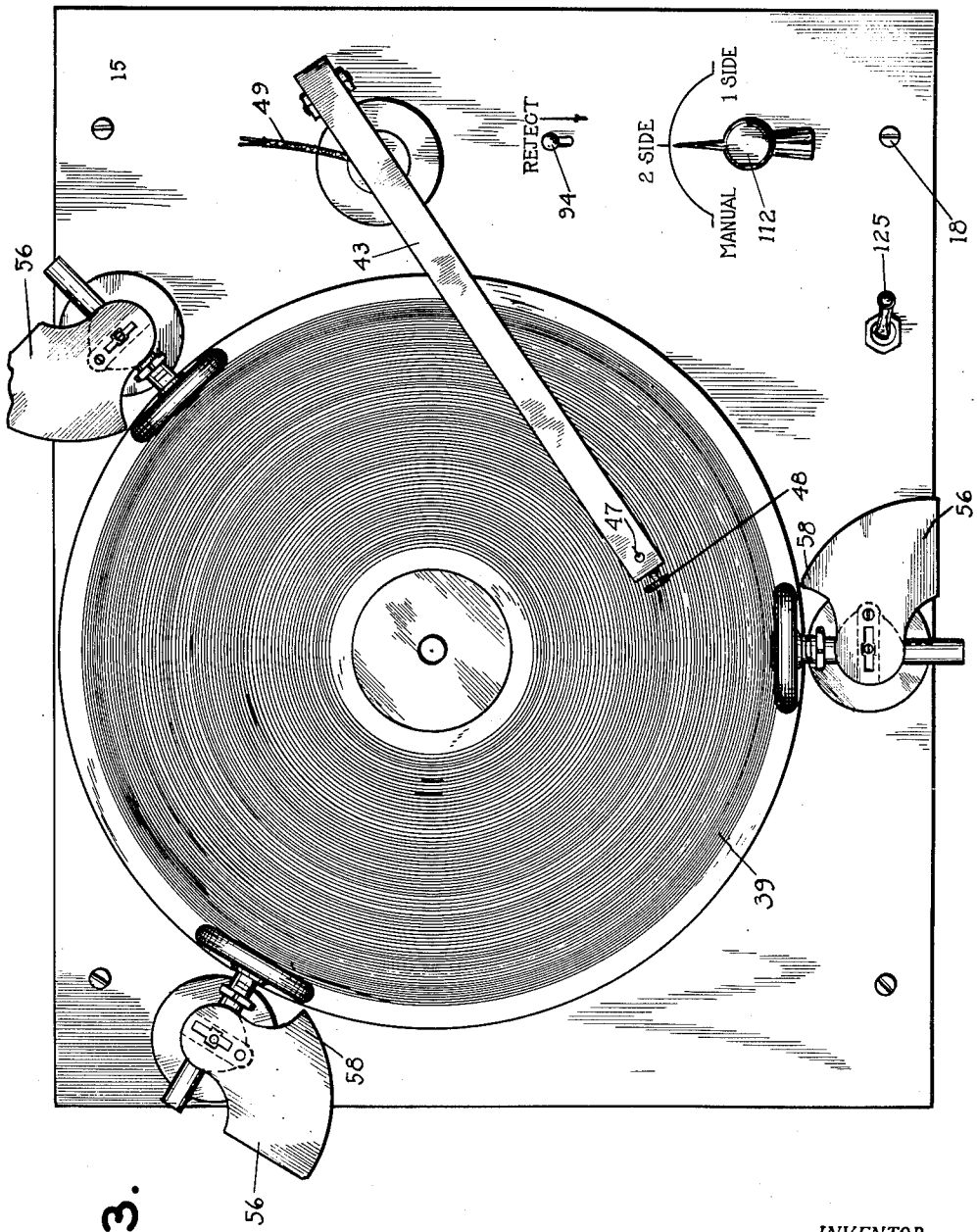


FIG. 3.

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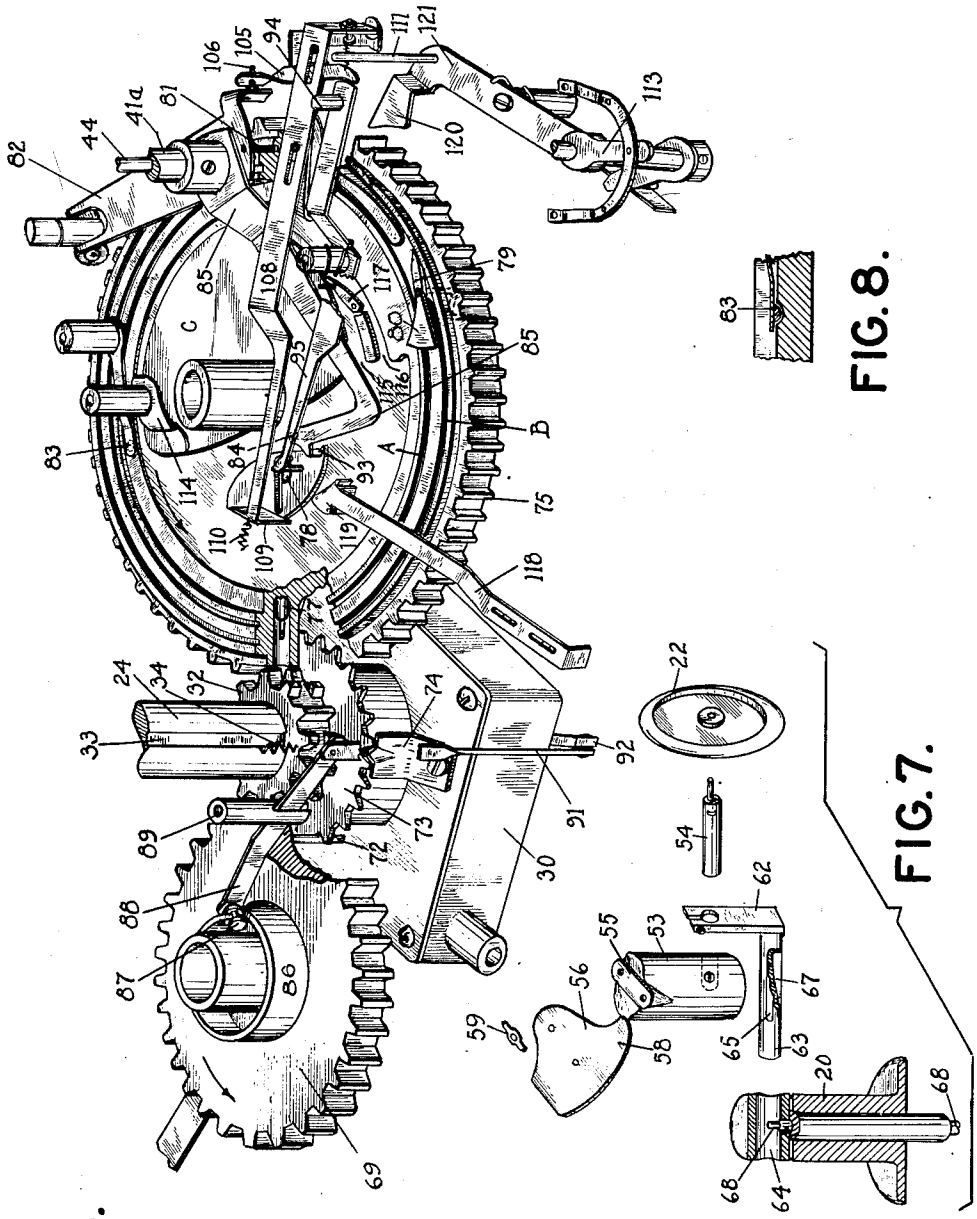


FIG. 4.

FIG. 8.

FIG. 7.

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UNITED STATES PATENT OFFICE

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AUTOMATIC PHONOGRAPH

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Application April 22, 1947, Serial No. 743,004

7 Claims. (Cl. 274—10)

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This invention relates to automatic phonographs and particularly to phonographs of the type in which a plurality of stacked records are played automatically in sequence after the operation of the mechanism is manually initiated.

Various machines of this general type have been suggested in the prior art but so far as I am advised all machines on the market have either required that the records be turned over manually or mechanically in order to play them on both sides, or the arrangement has been complicated and, hence, unduly expensive.

The object of the present invention is to construct a highly simplified machine, capable of playing records on both sides in any desired sequence automatically without the records being turned over. One important advantage of the present invention is that a single driving motor, a single needle and a single reproducer mechanism may be employed. Furtherfore, the mechanism is fully operative and independent of variation in thickness of the records or of a slightly warped condition of the same.

A further important object of the invention is to provide a mechanism which is selective in operation so as to take care of manual control, playing of both sides of a record in sequence, or playing of one side only at the will of the operator. The machine is also provided with means for rejecting any particular record face without otherwise affecting the playing sequence.

While it has been proposed in the prior art heretofore to play both sides of a record in sequence without turning the record over, it has been necessary either to incorporate in the machine some means for reversing the direction of rotation of the record, as in shifting from one side to the other, or to provide mechanism for lifting a record from a turntable to another support when the bottom face of the record is to be played, or to use a plurality of tone arms. Such arrangements not only cause undue complication of the structure but are subject to failure when employed in connection with warped records or with records of varying thickness as in records of different diameter. The present invention overcomes all of the disadvantages above enumerated and at the same time simplifies the mechanism greatly.

Numerous other objects and advantages will be apparent from the following specification when it is read in connection with the accompanying drawings in which:

Figure 1 is a side view, with parts in section,

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of a complete phonograph structure embodying the present invention;

Fig. 2 is a plan view of the machine with the top plate of the frame removed to expose the control mechanism;

Fig. 3 is a top plan view of the complete machine showing a record in playing position on the turntable with the stacked records removed;

Fig. 4 is an isometric view of the gearing and control mechanism isolated from the supports, turntable and the like;

Fig. 5 is a detailed sectional view of a portion of the means for adjusting the turntable height;

Fig. 6 is a sectional view on line VI—VI of Fig. 2, showing the control means provided to permit selectively, manual operation of the machine or playing either one or both sides of the stacked records;

Fig. 7 is an exploded view of a portion of the structure provided for transferring a record from the bottom of the stack to the turntable, and including a portion of the adjustment used to permit the playing of records of different diameters; and

Fig. 8 is a detailed sectional view of a brake for holding the driving gears in neutral position during the playing of a record, so as to avoid premature shifting of the tone arm from playing position, the section being taken on line VIII—VIII of Fig. 2.

Before describing the invention in detail it is desired to point out that the present invention for the first time permits sequential operation of an automatic phonograph employing a single tone arm and reproducer mechanism so as to play opposite sides of records without turning them over, and to take care of different types of recordings as in playing large operas or suites composed of double face records.

Briefly stated the mechanism consists of a turntable driven through reduction gearing by a small electric motor. Placed around the periphery of the turntable at intervals of 120° are posts each carrying blade devices for lowering records from a stack on the top faces of three drive wheels which are supported, respectively, for rotation on each of the posts, and driven by engagement with the flat surface of the turntable or with the flat surface of a record carried by that turntable. A stack of records is supported by the three wheels so as to be rotated in a direction opposed to that of the turntable and from the bottom of which the records are removed automatically by the blade mechanism carried by the three posts after

the playing of the bottom surface of the bottom record in the stack has been completed.

A tone arm is pivotally mounted outside of the area occupied by the turntable and this tone arm carries a single reproducer mechanism at its inner end, and associated with it, a double-ended needle which can be moved so that its upper end engages the bottom surface of the bottom record of the stack or its lower end, when the tone arm is lowered, may engage the top surface of a record carried by the turntable. Suitable control mechanism is provided to sequentially swing the tone arm in position to play the bottom record of the stack and then to swing the tone arm and the drive wheels out so as to permit the bottom record of the stack to drop and then to swing the drive wheels back to position under the stack at the same time bringing the tone arm in a position to play the top surface of the record which has been lowered on to the turntable. A suitable mechanism is provided to permit the operator of the machine to cause both sides of the records in the stack to be played in sequence as indicated, or to play one side only, namely the bottom sides of all the records in the stack but omitting the top sides of those records. Means is also provided in the control whereby the machine may be operated manually with the automatic mechanism rendered ineffective, and likewise means for rejecting any record the playing of which has been commenced or is about to be commenced, with only a momentary interruption of the playing sequence.

It will be clear that by use of the three drive wheels which actuate the stack of records by engagement with that stack, and with the turntable, all bevel gearing for driving purposes is eliminated. The driving is effective in spite of a warped condition of the records and the provision of a single tone arm using a single cartridge with a double ended needle materially reduces the number of parts required, and the control is therefore greatly simplified. It is also possible by a simple manual adjustment of the three posts upon which the drive wheels are mounted to condition the mechanism to play either ten or twelve inch records at will.

The mechanism which is now to be described in detail will ordinarily be used in conjunction with suitable electronic amplifying means. Inasmuch as amplifiers of this character are well known and standard equipment to which no claim is made herein, the description will be confined to the record actuating and playing mechanism which forms the basis of the present improvement.

Referring now to Figure 1 of the drawing in which the operating mechanism of the machine is shown in side elevation, the reference characters 15 and 16 designate top and bottom plates, respectively, for supporting the mechanism and holding it in proper relation. As here illustrated the two plates are held in spaced relation by a plurality of spacers 17 to which the plates are screwed, one spacer being adjacent each corner of the assembled frame made up of the plates and spacers, and others suitably located to provide proper support. Reference to Figure 3 of the drawing will show certain of the screws 18 which secure the top plate 15 to the spacers. Between the two plates is placed the driving and control mechanism for the machine, with the turntable and the record supporting means and tone arm mounted above the top plate.

The top plate carries three posts 19, 20 and 21, spaced relatively at 120 degrees, each adapted to carry an adjustable drive wheel 22 having a rubber coated periphery and serving concurrently as a supporting means for a stack of records indicated by the reference character S, and as a driving means for that stack through its contact with turntable 23.

The turntable 23 is located centrally with respect to the posts 19, 20 and 21, and carries a central shaft 24 which passes through the top plate 15 being journaled in a tubular bearing member 25 supported by a plate 90 which is suspended from and below top plate 15. The reduced end 26 of the shaft 24 extends upwardly above the turntable and serves as a centering means for the stack of records.

Actuation of the turntable is accomplished through an electric motor 27 resiliently mounted on the bottom plate 16 so as to drive the shaft 24 by a worm 28 and a worm gear 29, the gear 29 being journaled in a housing 30 which also encloses the worm 28. The worm gear 29 carries a tubular extension 31 to which is secured a driving gear 32, hence the driving gear rotates with and at the same speed as worm gear 29. In practice this speed may be 78 revolutions per minute. The shaft 24 which is attached to the turntable has a vertical spline 33 which in cooperation with a pin 34 permanently attached to the gear 32 forms a driving connection between the gear 32 and the turntable 23 while permitting free longitudinal movement of the shaft 24 without interrupting the driving connection. This permits the turntable to be moved downwardly as records are placed on the turntable, and maintains a fixed angular relation between the needle and the records.

The tubular guide 25^a is closed at its lower end by a plug 34^a upon which is supported a spring 35 for exerting constant upward pressure against the shaft 24, acting through a ratchet member 36 and a thrust ball 37 which is held in a socket in the lower end of shaft 24 this ball bearing upon the top flat face of ratchet member 36. It will be obvious from this description that the turntable 23 with its shaft 24 may be moved down against the resiliency of spring 35, by action of a pawl 38 which cooperates with the ratchet member 36. With this arrangement of the ratchet mechanism as it is shown in detail in Fig. 5, the member 36 together with the shaft 24 and turntable 23 may move downwardly against the spring 35 without encountering opposition from the pawl 38 but opposite movement is precluded, except as the pawl 38 is actuated by a cam mechanism controlled by gear 69 which will be described subsequently. The effect of this arrangement is to bias the turntable 23 upwardly against the drive wheels 22 so that as the turntable 23 rotates these wheels 22 will rotate and, at the same time, induce rotation of the record stack S.

As shown in Figure 1, a record 39 rests on the turntable 23 in position to be played, while the bottom record 40 of the stack S rotates in such a direction that it may be played when the needle engages its lower exposed face. As a consequence of this arrangement the distance between the turntable 23 or the top face of a record upon it, and the bottom face of the record 40 remains constant. Both records are driven concurrently at the same speed but in opposing directions and no changeover mechanism is required. Consequently, it is possible to utilize a single tone arm

having a single reproducer which cooperates with a double ended needle, the playing angle with respect to the records remaining constant regardless of the number of records played and of their thickness.

The tone arm and its operating mechanism will now be described. Carried by the top plate outside of the area of the turntable is a hollow cylindrical post 41 containing a spool 41a having secured to it a bracket 42 on which is pivotally mounted a tone arm 43. The tone arm may swing in a horizontal plane as the spool moves in the post and in a vertical direction about the horizontal pivot. This tone arm is controlled through a pin 44 passing centrally through the spool 41a and extending below the top plate 15 to engage and cooperate with certain control mechanism 82 which will be described in detail later. At its upper end the pin 44 engages a leaf spring 45 which is secured to the tone arm and provides a resilient connection between the arm control mechanism and the arm. Mounted within the tone arm, adjacent to its free end, is a reproducer mechanism 46 of any usual form, shown in dotted lines, and designated as associated with a double ended needle 47 which is held in place by a set screw 48. In the use of the device suitable amplifying mechanism will be used and electric connection to it is carried out by means of leads 49 connected to the reproducer 46. The latter may in practice be a known type of crystal cartridge. It will be clear from examination of Figure 1, therefore, that with the tone arm 43 in the full line position, the lower end of needle 47 will play the record 39, whereas movement of the tone arm to the dot-dash line position will cause the upper end of the needle to play the lower face of record 40.

So far, it has been pointed out how the turntable is driven concurrently with the stack of records, and how a single arm serves to play either the top face of a record on the turntable, or the bottom face of a record on the bottom of the stack. It will now be indicated how a record is transferred from the bottom of the stack to the turntable. Each of the posts 19, 20 and 21 has mounted in it and depending below it, a rotatable shaft 50 which carries a pulley 51 secured to the shaft as by set screw 52. Secured to each post is a blade support 53 and a journal 54 for a drive wheel 22. The details of the blade supports are best shown in Figure 7, where it is indicated that each support 53 carries an elongated fulcrum member 55 adapted to receive a blade 56 secured to it by screws 57. Inasmuch as the function of this blade is to enter between the two lowermost records in the stack, and to prevent chipping or splitting of those records, it is important that the front end 58 of this blade be carefully shaped and positioned to perform its function, and that the blade have a slight resilient rocking movement so that it may accommodate itself to the curved edge of a record without splitting or chipping the same. For this reason the fulcrum 55 is provided, and underneath one of the screws 57 which holds the blade in place, is a bow spring 59 which provides the necessary resiliency to permit the blade to act as indicated by the dotted lines in Figure 1. The position of the bow spring 59 with respect to each blade, is clearly indicated in Figure 3 of the drawings. From this view it will be evident that the positioning of the fulcrum is such that the blade 56 can rock toward and from the records about the fulcrum 55 in order to accommodate itself to

the records with which it is to cooperate. While but one of these blades has been described they are all the same.

The three pulleys 51 extend below the top plate 15 and are secured together for common actuation by a cable 60, the ends of which are held together by a turnbuckle 61 to permit any necessary adjustment. The cable preferably makes one or more turns around each of the pulleys 51 so that when one pulley is actuated to swing the blades 56 and the drive wheels which are carried with them, all three blades and all three wheels will be swung at the same time. The blades pass between the two lowermost records of the stack, while the drive wheels swing outwardly beyond the turntable in a counter-clockwise direction, as indicated in Figure 3, to permit the bottom record 40 on the stack to drop to the turntable while the other records are supported by the blades 56. When the pulleys 51 are rotated in the opposite direction the blades are swung outwardly in a clockwise direction, as seen in Figure 3, and the drive wheels are returned to the position shown in Figure 3 to again support the stack of records, and form a driving connection between the top record on the turntable and the bottom record of the stack. Concurrent actuation of the three pulleys is accomplished by means of an eccentric connection to a gear 69, as will be pointed out when the control mechanism is described in detail hereinafter.

As indicated above, the mechanism of the present invention is capable of playing records of various diameters, and the adjustments so far indicated are concerned with the playing of any standard record. The parts are shown in position for playing twelve inch records, but it is possible to play ten inch records by a minor adjustment which moves the drive wheels 22 radially inward from the position shown. This adjustment is performed by the mechanism which appears in detail in Figure 7, and is also shown in Figure 1. Each blade support 53, as well as the journal 54 for the drive wheel is carried by an upright 62 attached to a rod 63 adapted to slidingly engage an opening 64 in post 20. The rod 63 contains a lateral slot 65 which cooperates with the end of an adjusting screw 66 threaded into the post. The rod 63 may be slid endwise until the end of the adjusting screw 66 engages one end or the other of the slot 65 for the two adjustments provided. While the adjusting mechanism associated with posts 19 and 21 is identical, that associated with post 20 differs in that it includes means for altering the control mechanism to take care of the changeover from one diameter to another. As indicated in Figure 7, this makes it necessary to provide a bottom slot 67 in the rod 63, and pin 68 in post 20 has a reduced upper end projecting into the opening 64 and cooperating with that slot 67 to adjust certain leverage to vary the angle of horizontal swing of the tone arm for different diameter records. This will be described in connection with the control mechanism.

It has been pointed out above how the motor 27 drives the gear 32 and serves to actuate the turntable 23. In addition, it performs the function of actuating the pulleys 51 to remove a record from the stack and to control the movements of the tone arm 43 to bring it, in proper sequence, from playing position adjacent a record on the stack, to playing position with respect to a record on the turntable, and to move it out of the space between the stack and the turntable when a

record is to be transferred from the stack to the turntable.

Rotatably mounted and suspended from the top plate 15, by means of plate 90, is a mutilated gear 69 which is normally held with its mutilated portion adjacent to the gear 32. The gear 69 is eccentrically connected by means of a rod 70 to the shaft 50 carrying the pulley 51 associated with post 19, so that when the gear 69 is driven, the parts are actuated to remove a record from the bottom of the stack, deposit it on the turntable, and then return the drive wheels to the position shown in Figure 1.

Secured to the top face of gear 69 is a cam 86 which serves to cause the turntable to move down each time that the gear 69 is driven in lowering a record from the stack to the turntable. As best shown in Figure 4, a cam follower 87 is carried at the end of lever 88 fulcrumed on post 89. Post 89 is secured to a fixed portion of the frame, in this case on plate 90 (Figure 1) secured in turn to cover plate 15 and serving to support the journal for gear 69 and tubular bearing member 25 for shaft 24. The end of lever 88 remote from the cam follower 87 is pivoted to a vertical link 91 which actuates a lever 92 fulcrumed at 93 to support the pawl 38 in operative relation to ratchet device 36. When gear 69 is idle the follower 87 rests in the low point of the cam 86, holding the ratchet 36, as indicated in Figure 5, but rotation of the gear lifts the follower to move pawl 38 down, and with it the ratchet member 36 against spring 35. The turntable and its drive shaft follows the member 36 down to make room for the record which is lowered onto the turntable. At the completion of the lowering cycle the turntable is held in its new position by the drive wheels engaging the top of the topmost record on the turntable and the follower again rests in the low spot of cam 86.

Depending from the lower face of gear 69 in alignment with its mutilated portion 71 is a pin 72 which serves by its engagement with the teeth of an idler gear 73 to hold that gear in fixed position, and this position is also maintained by means of a friction tooth 74 shown in Figure 2. The idler gear 73 is journaled on a sleeve depending from the gear 32, and never moves except for the purpose of transferring a record from the stack to the turntable and under the actuation of a bolt device depending from the tone arm gear 75 which performs a major function in the operation of the control mechanism, and particularly of the tone arm and its relation to the turntable and the record stack.

The tone arm gear 75 is of the mutilated type and during the playing of a record is stationary with its mutilated portion 76 in alignment with gear 32 so that it is not driven. Slidably mounted in a bore in the gear 75 and radial with respect to its mutilated portion is a pin 77 biased in an outwardly radial direction by a spring (shown in dotted lines in Figure 2) and normally held in retracted position by a trigger 78. This trigger is held in a notch in the gear 75 adjacent the bore for pin 77. When this pin is released by striking the trigger, the spring projects the pin outwardly until it engages a recess in the gear 32 to produce a driving engagement with gear 75 and to bring the two gears into mesh, whereupon gear 75 completes a full revolution until it stops again with its mutilated portion 76 in alignment with gear 32. This rotation of gear 75 takes place each time that the tone arm 43 is to be positively moved, as distinguished from movement which it executes through its playing connection with a groove in a record. The tone arm is guided in its movement by a guide pin 84 on lateral arm 85 attached to the lower end of spool 41a. Pin 84 is controlled in its movement by a cam track around cam C on the upper face of the gear 75.

The operation of the control mechanism centers about certain cam devices which are associated with the gear 75. For example, the upper face of this gear contains an inner track A which has a high spot across from the mutilated portion 76, to cause lifting of the tone arm to a position for playing the bottom surface of a record in the stack, whereas an outer track B contains a low spot in similar location for positioning the tone arm to play the top surface of a record on the turntable. Transfer of the tone arm from one position to the other is accomplished by a switching mechanism which is quite analogous in its operation to that of a railroad switch. For example, as seen in Figure 4, a switch 79 is pivoted between the two interosculating tracks A and B. It carries a wedge shaped portion 80 which may cooperate with and be actuated by a plow 81 carried by the inner end of a pivoted member 82. The horizontal portion of the pivoted member 82 engages the bottom end of tone arm pin 44 so that the pin 44 raises and lowers the tone arm in response to movements of the plow 81 as it travels in one of the tracks A or B. As shown in Figure 4, the gear 32 is always driven in a clockwise direction as indicated by the arrow, consequently the gear 75 is always driven in a counter-clockwise direction, and when the mutilated portion 76 of gear 75 is in its idle position, and is held there by brake 83, the details of which are shown in Figure 8, the plow 81 is at the highest point in the track A to hold the tone arm in its uppermost position. If, on the contrary, with a similar relative position of gears 32 and 75 the plow 81 is in the track B it will occupy the low spot in that track, holding the tone arm in a position to play the top surface of a record on the turntable. Transfer of the plow from one track to the other is accomplished by rotation of the gear 75 by actuation of the switch 79 when the plow 81 strikes the wedge shaped portion 80.

Reference has already been made to the trigger 78 associated with the gear 75, and the arm 85 carrying guide pin 84 which moves around cam C. The arm 85 also carries at its free end adjacent to its pin 84 a tripping dog 93 which is capable of striking the trigger 78, as shown in Figure 4, when the arm 85 is moved in a clockwise position around its pivot axis provided by the post 41 within which the spool 41a moves. As pointed out before, the arm 85 is rigidly connected to the tone arm so as to move with it and cause rotation of gear 75 at the proper time to shift the tone arm from one playing position to another, or to shift it beyond the confines of the turntable in order to permit transfer of a record from the bottom of the stack to the turntable.

At this point it might be indicated that the so-called reject lever shown at 94 in Figure 3, serves normally to actuate the arm 95 which strikes the trigger 78 to cause the gear 75 to be sent through a cycle when a record face is to be rejected. In other words, instead of the mechanism awaiting a complete playing of a record face when the tone arm would actuate the arm 85 to strike the trigger, the reject lever can ac-

complish this result at any point in the traverse of the tone arm across a record face during a playing operation, so that the playing operation is interrupted and the next playing operation is started. If, for example, the tone arm is in upper position, playing the bottom of a record on the stack, and the operator decides that he is not interested in this record the reject lever 94 is pushed downwardly as indicated by the arrow in Figure 3, causing the gear 75 to execute one complete rotation during which time the tone arm is moved to a mid-position between the two records, is swung beyond the periphery of the turntable, gear 69 is actuated to move the blades, and the drive wheels to drop a record from the stack to the turntable, and restore the blades and drive wheels to their normal position contacting both the last record which was dropped onto the turntable, and the bottom record of the stack which is now exposed for the playing operation. The tone arm will then take a position to play the top surface of the record which has been dropped onto the turntable.

It has been indicated above that gear 69 is normally idle, and can be actuated only when the idler gear is actuated to bring the teeth of gear 69 in mesh with the teeth of gear 32. This step can be brought about through the action of a bolt mechanism carried by the bottom face of gear 75, as shown in Figure 1. Bolt 96 is slidably carried in guides 97 and 98, and is embraced between them by a coiled spring 99 which biases the bolt in an outward direction where its end will strike the teeth of idler gear 73, when the gear 75 is rotated to bring the bolt into contact with the idler gear. This bolt 96 may be held in retracted position by a pivoted dog 100 which engages in a notch in the inner end of the bolt. The dog 100 is pivoted at 101 on the rotating sleeve 102 attached to gear 75. Release of the bolt 96 is accomplished through a cam 103 pivotally connected to lever 104. Lever 104 is, in turn, pivoted to vertical bar 105 carrying an adjustable stop 106 for cooperation with a depending portion of the member 82. For example, when the machine is playing both sides of records in normal sequence, the bolt 96 will be released only during alternate cycles of rotation of gear 75, because gear 69 should only be actuated to lower a record after the playing of the bottom surface of a record on the stack. The pivoted member 82 controls the position of lever 104 and hence of the cam face 103 to bring this about. After the bolt 96 has engaged the idler gear 73 to cause actuation of the record lowering means, and the gear 75 continues its rotation, the bolt is reset when the depending pin 100A on bolt 96 strikes a cam 107 which extends upwardly from the bottom plate 16, as best shown in Figure 1. The cam 107 appears in dotted lines in Figure 2. When the playing of the top surface of a record on the turntable is completed, the tone arm is moved to neutral position, and then to its upper position to play the bottom record on the stack, the gear 75, of course, completes one cycle of rotation but the bolt 96 is held in retracted position because the cam 103 occupies the full line position of Figure 2. During the next cycle of the gear 75, when a record is to be lowered onto the turntable, the cam 103 will occupy the dotted line position of Figure 2.

It has been pointed out that the arm 85 carries a guide pin 84. It also carries a tripping dog 93 which serves to engage the trigger 78 and to release it when the tone arm has swung inwardly at the completion of the playing of a record, so as to initiate a cycle of the gear 75 to re-position the tone arm for the next playing cycle and, when necessary, to cause transfer of a record from the stack to the turntable.

When the mechanism is to be set for manual operation, there is no necessity for causing gear 75 to pass through a cycle, hence the mechanism includes an arm 108 carrying at its inner end a depending plate 109 spring-biased to the left by spring 110. When the arm 108 is moved to the right in Figure 4 under the actuation of a manually controlled rod 111, the plate 109 prevents the trigger 78 from being released, and hence, prevents the pin 77 from being projected into engagement with gear 32.

At this point, it will be indicated how the control mechanism on the top of the cabinet serves to accomplish the three types of possible playing operation. Referring now to Figure 3, the indicator button 112 can be set to cause the machine to position itself for manual control or for two-side sequence playing or for one-side playing. When the button is swung to the "manual" position the arm 113, shown in Figure 4, will occupy the right hand position moving the rod 111 to the right in Figure 4 or moving arm 108 radially to prevent actuation of trigger 78. With the arm 113 in the mid-position as shown in Figure 4, the arm 108 will be inoperative and the cam 103 will be controlled by member 82 and arm 85 as the playing sequence is carried out. With this adjustment, alternate cycles of gear 75 will cause actuation of gear 69 to lower a record from the stack to the turntable. During each cycle of gear 75, the trigger 78 will be released to produce driving operation between gear 75 and gear 32. Each time that the gear 75 makes a complete rotation, the trigger will be reset by cam 114 which depends from the top plate 15 (Figures 2 and 4).

It has been indicated above that the guide pin 84 associated with arm 85 follows a cam track which surrounds the cam C. A portion of the travel of this guide pin 84 has two branches as indicated in Figs. 2 and 4. The branch 115, for example, being that in which the guide pin 84 travels when a ten inch record is being played. On the other hand, the guide pin 84 follows a cam track 116 during the playing of a twelve inch record. These two tracks are separated by a switch member 117, similar in character to switch 79 associated with the tracks A and B. The switch 117 in Figure 4 is shown in the position which it occupies when twelve inch records are being played. When ten inch records are to be played, adjustment of the drive wheels will cause actuation of lever 118, whereby the cam 119 strikes the switch 117 to change its position to suit the new operation. As indicated above, the lever 118 is under control of the drive wheel adjustment associated with post 20.

Referring now to the details of the post 20, it has already been pointed out how the cam slot 67 serves to actuate the pin 68. When twelve inch records are being played, the point of the shaft 68 as shown in Figure 7 occupies the deepest portion of slot 67, so that the linkage is actuated to drive the lever 118 inwardly, whereby the cam surface 119 positions the switch 117 as indicated in Figure 4, and guide pin 84 follows cam track 116. When, however, the drive wheels are moved radially inward, the tip of pin 68 occupies the shallow portion of slot 67 to drive the arm 118 radially outward, bringing the cam surface 119 to a point where it positions the

switch 117 to cause drive pin 84 to follow the track 115 instead of track 116 as shown.

When the indicator lever 112 occupies the "one-side" position, the striking portion 120 of control arm 121 will be positioned to strike the depending tail 122 of switch 79 to restore that switch to the position of Fig. 4 and repeat a playing sequence directed to the bottom face of the record stack by reason of the plow 81 being caused to remain in track A. As the gear 75 completes each cycle of rotation, the plow 81 will strike the wedge shaped member 80 to direct the next cycle of travel onto track B, but immediately following this movement of switch 79 resulting from engagement between plow 81 and wedge 80, the tail 122 will strike the striking portion 120 to restore the switch to the position shown in Figure 4, and the playing arm will always occupy its uppermost position to play a record on the bottom of the stack so long as the indicator 112 occupies the "one-side" position. The tone arm will, of course, move from between the records periodically following the playing of a single record face in order to permit transfer of records from the stack to the turntable.

When the machine is set for automatic operation either on two sides or one side, the records will all be played in sequence until the stack S is exhausted. In order to indicate when the last record has been played, it may at times be desired to place a dummy record 123 on the top of the stack. This dummy may have in it, a groove 124 in which is recorded some signal such as the continued ringing of a bell which will warn the operator of the machine, that the stack of records has been exhausted. The dummy 123 also provides weight when the bottom face of the last record in the stack is being played, and would otherwise tend to be displaced upwardly by the arm 43.

The starting and stopping of the motor 27 will normally be under the control of a manual switch 125, shown in Figure 3. While it has been indicated that a dummy record may be employed for the purpose of indicating when a record sequence has been played, it is also possible, within the scope of the present invention, to adopt any automatic stopping mechanism which is well known in the art. For example, when the last record has been played and the tone arm again assumes its top position in the absence of a record means may be provided for interrupting the electric circuit, utilizing for this purpose any suitable means known in the art.

It is believed that the operation of the machine will be clear without any further description. It is to be understood that the embodiment described and claimed herein, is subject to modification, within the scope of the appended claims, without departing from the spirit and scope of the invention.

What is claimed is:

1. In an automatic phonograph mechanism of the type in which a stack of records is supported by drive wheels engaging a turntable, a turntable shaft, a driving gear carried by the turntable shaft, a plurality of mutilated gears mounted adjacent to said driving gear with their mutilated portions normally in registry with the driving gear so they remain stationary, a tone arm pivoted for movement between the record stack and the turntable, cam means driven by one of said mutilated gears for controlling said tone arm, cam means driven by the other mutilated gear for causing delivery of a record from said stack to said turntable in timed relation to the movement of said arm, and means actuated by the tone arm for at times bringing one or the other of said mutilated gears into mesh with said driving gear.

2. In an automatic phonograph mechanism including a rotatable turntable having a shaft, a driving gear fixed to said shaft, a plurality of mutilated gears mounted adjacent to said driving gear with their mutilated portions normally in registry with the driving gear so they remain stationary, a plurality of wheels in driving engagement with said turntable and supporting a stack of records thereon, a tone arm pivoted for movement between said stack and said turntable, cam means driven by one of said mutilated gears for controlling said tone arm, cam means driven by the other mutilated gear for causing delivery of a record from said stack to said turntable in timed relation to the movement of said arm, and manually operable means for preventing operating of said mutilated gears when automatic operation is not desired.

3. In an automatic phonograph mechanism in which a stack of records on top of a plurality of rotatable drive wheels is driven by a turntable on which the wheels rest, a tone arm pivoted radially beyond the space between the stack and the turntable, cam means for controlling movements of the tone arm, said means comprising two concentric circular tracks, one having a high spot and the other a low spot, means connected to the tone arm for sliding movement in either of said tracks to position the tone arm in playing relation to the stack when the sliding means is on the high spot of one track and to position the tone arm in playing position to a record on the turntable when the sliding means is on the low spot of the other track, and switch means actuated by said sliding means for directing said sliding means from one track to the other.

4. In an automatic phonograph mechanism in which a stack of records on top of a plurality of rotatable drive wheels is driven by a turntable on which the wheels rest, a tone arm pivoted radially beyond the space between the stack and the turntable, cam means for controlling movements of the tone arm, said means comprising two concentric circular tracks, one having a high spot and the other a low spot, means connected to the tone arm for sliding movement in either of said tracks to position the tone arm in playing relation to the stack when the sliding means is on the high spot of one track and to position the tone arm in playing position to a record on the turntable when the sliding means is on the low spot of the other track, and manually operable means for causing restoration of said switch after its actuation by the sliding means, for causing the arm to repeat playing operations on the bottom of the stack.

5. In an automatic phonograph of the type in which a stack of records is driven by wheels engaging a turntable below said stack, and a tone arm between said stack and said turntable carries a double-ended needle for engagement either with the top of a record on the turntable or the bottom of a record on said stack, a rotatable turntable for records, a turntable shaft extending above said turntable, means above said turntable for supporting a stack of records threaded on said shaft, resilient means engaging the bottom end of the turntable shaft for biasing it upwardly and for holding said turntable in driving relation with the wheels during a playing opera-

tion, ratchet means rendered effective by the transfer of a record from said stack to said turntable for moving said turntable downward a distance determined by the thickness of the record transferred, and means actuated by movement of said wheels during removal of records from said turntable for releasing said ratchet means to permit upward movement of the turntable.

6. In an automatic phonograph of the type in which a stack of records supported by a plurality of wheels driven from a turntable below said stack are played sequentially by a single tone arm, a turntable, a plurality of wheels above said turntable and constructed and arranged to support a stack of records, means for pivotally supporting said wheels, means for adjusting said wheels radially when changing from one diameter of record to another, a tone arm, blade means connected to and movable with said wheels to support said stack when the wheels are moved out to permit transfer of a record from the stack to the turntable, and means controlled by movement of the tone arm for controlling the positioning of said blades and wheels with respect to said stack.

7. In an automatic phonograph mechanism of the type in which a plurality of spaced wheels support a stack of records and drive said stack through a turntable upon which the wheels rest, means for maintaining said turntable in driving engagement with said wheels during a playing operation, means for supporting said stack and swinging said wheels away from the stack when a record is to be transferred from the stack to the turntable, means for holding said turntable in a fixed plane when said wheels are out of contact with the stack, and means for releasing the turntable and bringing the transferred record on the top of the turntable into driving engagement with the wheels when they are returned into contact with said stack.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,438,000	Underhill	Dec. 5, 1922
1,547,768	Little	July 28, 1925
2,307,030	Erwood	Jan. 5, 1943
2,318,654	Wissner	May 11, 1943
2,320,877	Manson	June 1, 1943
2,332,650	Knox et al.	Oct. 26, 1943
2,376,741	Weaver	May 22, 1945
2,398,010	Johnson	Apr. 9, 1946
2,506,926	Johnson	May 9, 1950
2,515,283	Wissner	July 18, 1950
2,550,794	Fisher	May 1, 1951
2,555,895	Lynch	June 5, 1951
2,570,040	Thorens et al.	Oct. 2, 1951
2,601,986	James et al.	July 1, 1952
2,639,155	Groves	May 19, 1953

FOREIGN PATENTS

Number	Country	Date
340,711	Great Britain	Jan. 8, 1931
377,173	Great Britain	Jan. 16, 1931
472,135	Great Britain	Sept. 17, 1937
541,156	Great Britain	Nov. 14, 1941
111,950	Sweden	July 27, 1944
239,044	Switzerland	Apr. 1, 1946