Nov. 21, 1933. J. R. MITCHELL ET AL 1,936,335

AUTOMATIC PHONOGRAPH

Filed June 23, 1932 3 Sheets-Sheet 1

FIG. 1

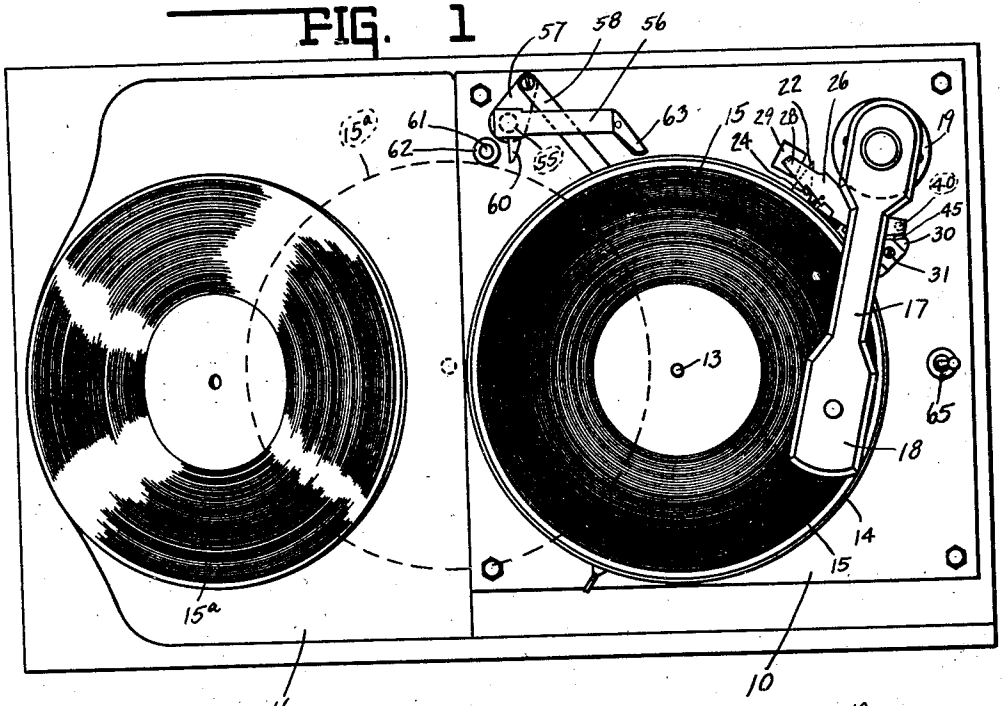


FIG. 2

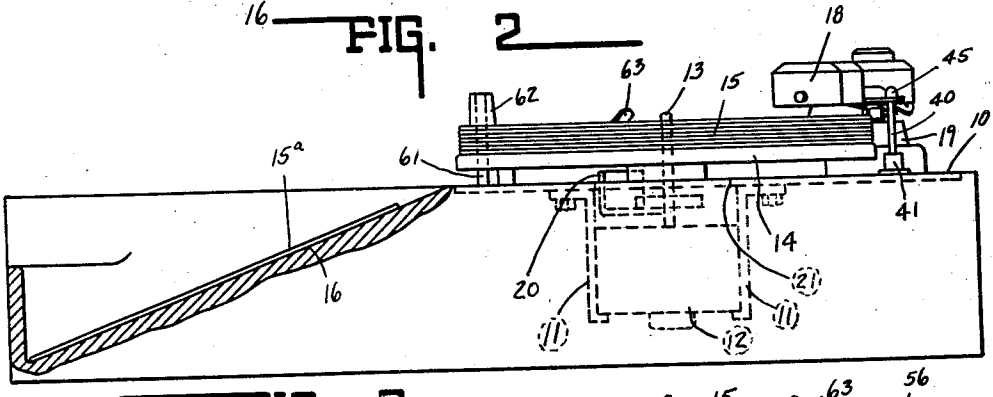


FIG. 7

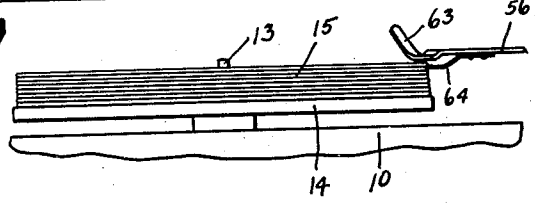
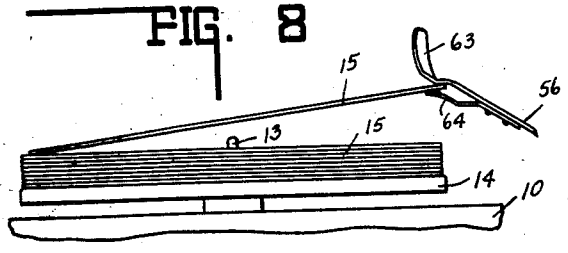


FIG. 8



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FIG. 3

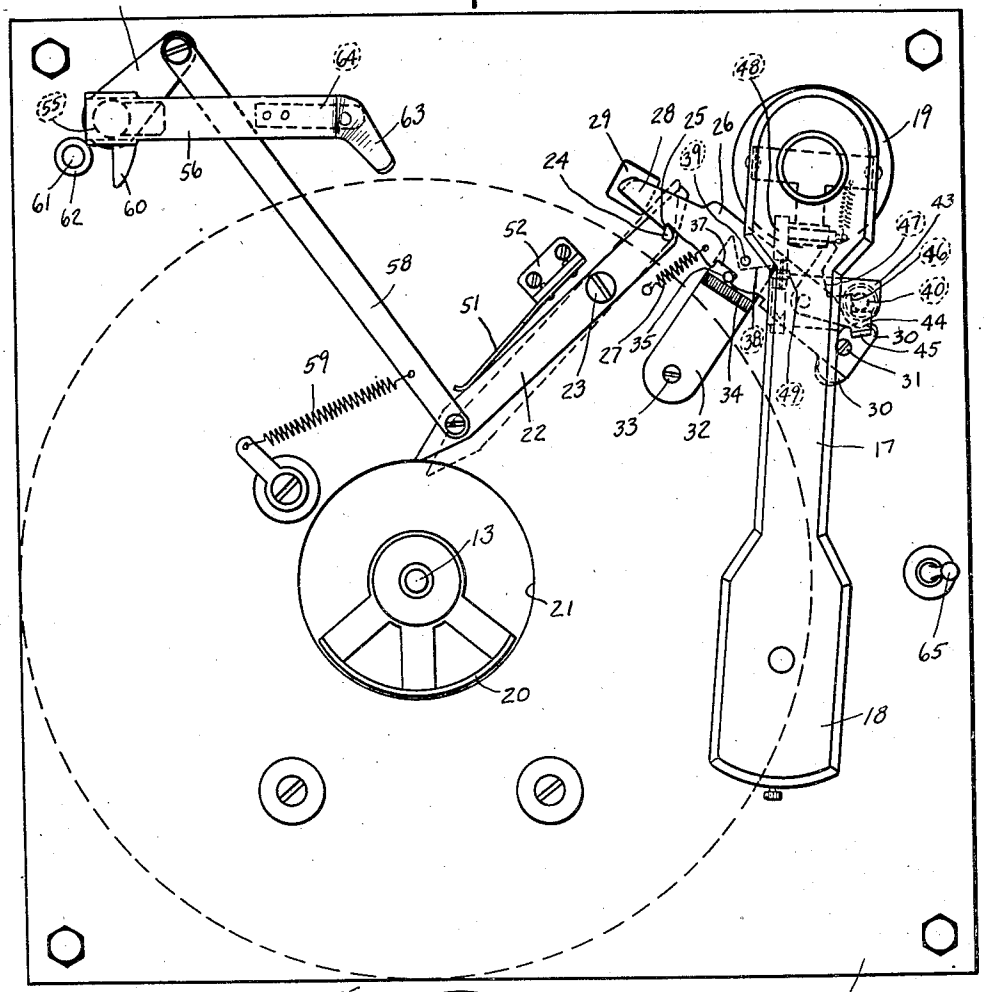


FIG. 4

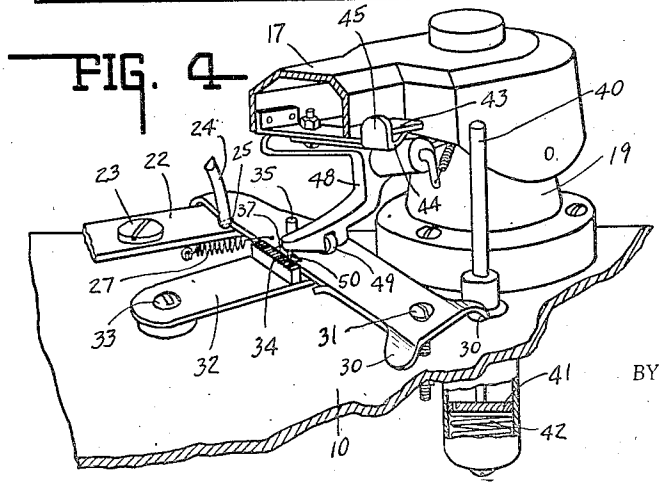
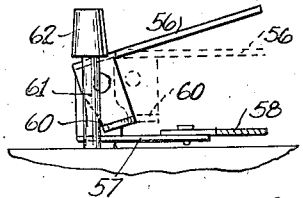


FIG. 9.



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FIG. 5

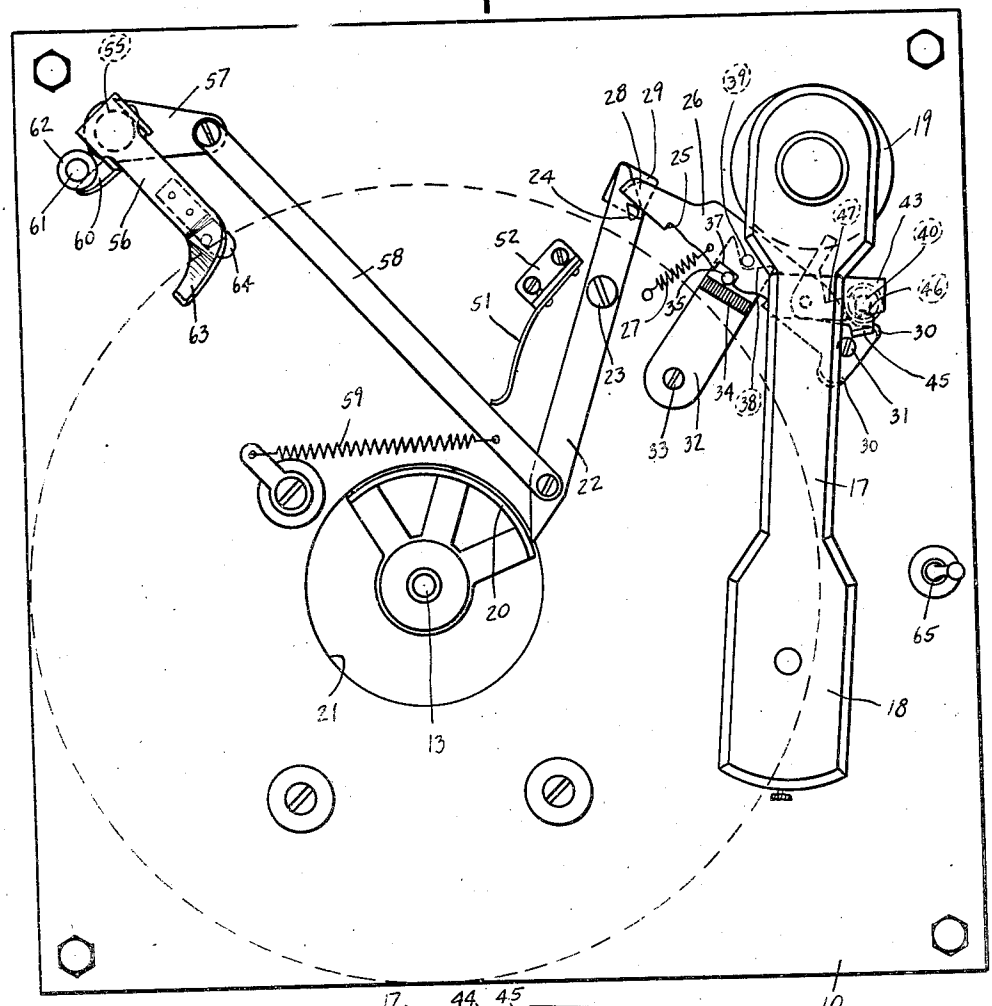
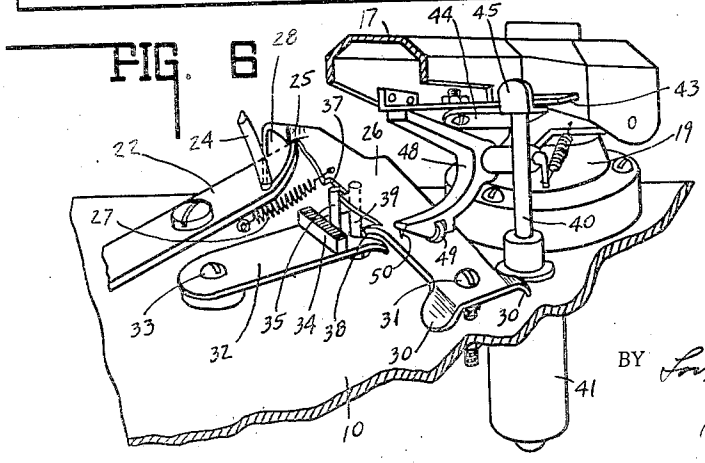


FIG. 6



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UNITED STATES PATENT OFFICE

1,936,335

AUTOMATIC PHONOGRAPH

John R. Mitchell, Fort Wayne, and Paul U. Lannerd, Huntington, Ind., assignors, by mesne assignments, to Royal National Company, Inc., a corporation

Application June 23, 1932. Serial No. 618,330

15 Claims. (Cl. 274—10)

This invention relates to an automatic phonograph and particularly the record changing mechanism and control therefor.

The principal object of the invention is to produce an automatic phonograph having a record changing mechanism of such simple and compact form as to enable it to be produced economically and housed in a minimum of space. The construction, as hereinafter described, permits of a plurality of records of one size, such as ten-inch records, being mounted on the turntable in a stack, the records being reproduced and discharged from the turntable into a pocket for played records until the last record of the stack which is then repeated until the operation is manually discontinued. However, records of a different size, such as twelve-inch records, may be played manually and repeated. Thus, the mechanism is capable of reproducing and repeating the reproduction of records of different size such as ten or twelve-inch records, but will automatically play a plurality of such records only of one size.

The principal feature of the invention resides in the provision of means for lifting a reproduced record over a fixed and non-retractable centering pin of the turntable so that the record may be rolled off of the turntable by the rotating movement thereof, whereupon the next following record on the turntable is exposed for reproduction. This is accomplished specifically by a movable bifurcated arm adapted to engage and grasp the peripheral edge of the top record on the stack upon completion of the reproduction, lift said record upwardly to a point above the upper end of the centering pin while permitting it to be discharged laterally by the rotating movement of the remaining group of records.

Another feature of the invention resides in the mechanism for actuating the record elevating means upon completion of a record, said mechanism being designed to occupy a minimum of space and be of simple and economic structure, as well as positive in its action.

Another feature of the invention resides in the means for controlling the discharge mechanism, elevating the reproducer and moving it to the beginning of a record upon completion thereof, irrespective of the record having a spiral or eccentric lead-in groove.

Another feature of the invention resides in a dash pot construction for lowering the reproducer gradually and gently onto the record at the beginning thereof while at the same time acting as a stop for positioning the reproducer at the beginning of the record.

The full nature of the invention will be more clearly understood from the accompanying drawings and the following description and claims:

Fig. 1 is a plan view of the mechanism showing in dotted lines one position of the record being discharged. Fig. 2 is the same as Fig. 1 showing a side elevation. Fig. 3 is a plan view with the turntable and records removed showing the actuating and control mechanism when in playing position, and showing in dotted lines the control mechanism in position to discharge a record. Fig. 4 is a perspective view of the reproducer arm control mechanism with the reproducer in playing position. Fig. 5 is the same as Fig. 3 with parts removed and showing the mechanism in record changing position. Fig. 6 is the same as Fig. 4 showing the reproducer being returned to starting position. Fig. 7 is a side elevation of the stack of records on the turntable with the uppermost record about to be removed. Fig. 8 is the same as Fig. 7 showing the uppermost record removed from the stack in position to be discharged. Fig. 9 illustrates the action causing elevation of the record lifting arm.

In the drawings there is shown an automatic phonograph having a supporting table 10 from which depends the bracket 11 for supporting the turntable motor 12. Extending upwardly from the motor and driven thereby, there is a rotatable but non-retractible centering pin 13 over which the turntable 14 is mounted and frictionally secured for rotation therewith. A stack of records 15 to be reproduced are manually positioned over the centering pin upon the turntable, there being a pocket or reservoir including the inclined support 16 positioned at one side of the turntable into which the records 15*a* are discharged after reproduction.

Pivotally mounted upon the support 10 so as to swing horizontally over the turntable in the usual manner, there is a reproducer arm 17 having a reproducer 18 supported upon the boss 19 so as to swing either horizontally or vertically.

Control for reproducer

Secured to the centering pin 13 or the driving shaft therefor, there is a control member or cam 20 rotatable within an opening indicated at 21 formed eccentrically in the table 10 about the centering pin, the surface of the cam 20 extending slightly above the upper surface of the table 10 in position to engage the pointed end of a lever 22 fulcrumed to the table 10 at 23. Said lever is

provided with an upstanding pin 24 adapted to normally engage the notch 25 on the tilting arm 26. The notch 25 is normally held in engagement with the pin 24 by the spring 27 having one end connected with the arm 26 and the other end anchored to the table 10. One end of the arm 26 is turned downwardly as at 28 through the opening 29 in the table 10 immediately adjacent the end of the lever 22. The other end of the arm 26 is provided with curved ears 30 bearing upon the surface of the table 10 so as to rock thereon. Adjacent the ears 30, said arm 26 is pivotally connected to the table by the pin 31, Thus, the arm 26 may swing horizontally about the pin 31, and tilt vertically upon the bearings of the curved ears 30. The plate 32 extends at right angles to the arm 26 immediately therebelow so that said arm is slidable on its free end, said plate being pivotally connected at 33 to the table 10. Secured on the upper surface of the plate 32 adjacent the arm 26, there is a toothed rack 34 and an upstanding pin 35, said pin lying within a recess or notch 37 in the adjacent edge of the arm 26. The free end of the plate 32 has a centrally positioned recess as shown at 38 in which the pin 39 is adapted to seat, said pin being secured to the under surface of the arm 26.

Adjacent the pivotal mounting of the arm 26, there is a dash pot plunger 40 extending downwardly through the table 10 into the dash pot 41 depending from the under side of said table, there being provided a spring 42 for normally holding the plunger in upper position. Thus, the plunger 40 may be forced downwardly against the tension of the spring 42 and retarded in its downward movement by the dash pot 41.

The reproducer arm 17 is provided with a laterally extending ear 43 so positioned as to extend over the dash pot plunger when the arm 17 is swung toward the periphery of the records. At the completion of such swinging movement, said ear engages and rests upon the plunger 40 so that the weight of the tone arm gradually forces the plunger downwardly against the tension of the spring 42 and resistance of the dash pot 41 until the reproducer engages the edge of the record.

Extending under the ear 43 and pivotally connected to the under side of the reproducer arm, there is a stop member 44 having an upstanding finger 45 to permit it to be conveniently and manually swung to different positions. Said member is provided with a forward shoulder 46 adapted to engage the plunger 40 and limit the outward swinging movement of the reproducer arm so as to position it at the beginning of a ten-inch record. Said member is also provided with a rear shoulder 47 which may be positioned to engage the plunger 40 when it is desired to have the reproducer arm swing outwardly to engage the beginning of a twelve-inch record.

Secured to the under side of the reproducer arm, there is a U-shaped support 48 having a roller 49 on the under side thereof in position to engage the upper surface of the arm 26 so as to support the reproducer arm thereon and permit it to freely roll lengthwise of the arm 26. On the forward free end of the lower leg of the U-shaped member, there is a trip pin 50 adapted to ride over the teeth of the rack 34 as the tone arm moves inwardly, and engage with said teeth to swing the plate 32 about its pivotal mounting when the movement of the reproducer arm is reversed by the eccentric lead-in groove on the record. The pin 35 mounted on the plate 32 is so positioned as to be engaged by the lower leg of the member 48 when the reproducer arm is swung a predetermined distance inwardly by a spiral lead-in groove. Such engagement with the pin 35 likewise swings the plate 32 about its pivotal mounting. The swinging movement of the plate 32 in either direction forces the pin 39 outwardly, carrying with it the arm 26 so that the shoulder 25 thereof disengages the pin 24 to release the lever 22. Upon release of the pin 24, the pointed end of the lever is caused to swing inwardly under the tension of the flat leaf spring 51 which is secured to the table 10 by the block 52. Upon the pointed end of the lever 22 swinging inwardly through its release by the arm 26 and the pressure of the spring 51, it extends in the path of the rotary movement of the cam 20 which engages it and causes it to swing in the direction of rotation of the turntable.

Such swinging movement of the pointed end causes the opposite end of the lever to swing outwardly against the downwardly curved portion of the arm 26, thus forcing the arm 26 upwardly so as to tilt it about the curved bearings 30 and thereby cause it to slope downwardly from the free end toward the pivoted end. The upward movement of the arm upon which the roller 49 rides raises the reproducer arm 17 so that the reproducer will disengage the record, whereupon the roller 49 will roll down the inclined arm, swinging the tone arm with it until one of the shoulders 46 and 47 engages the dash pot plunger 40 which arrests such swinging movement so as to position the reproducer at the beginning of the record. The ear 43 will have passed over the top of the plunger 40 so as to rest thereon, at which time the arm 26 is again lowered to its normal horizontal position by release of the lever 22, leaving the tone arm supported entirely by the dash pot plunger. Thereupon, the dash pot plunger will gradually lower the reproducer arm under its own weight until the reproducer again engages the beginning of the record for reproduction thereof.

Record changing mechanism

The record changing mechanism is actuated by the lever 22 through the medium of the reproducer arm control as above described. Pivotally mounted to one side of the turntable on a pivotal support 55 mounted on the table 10, there is a laterally swinging arm 56. A crank arm 57 is connected therewith having the free end thereof pivotally connected to the lever 22 by the rod 58. The spring 59 connects the rod with the table 10 so as to normally hold the mechanism in inoperative position. A finger 60 extends outwardly from the pivoted end of the arm 56 in position to engage a fixed pin 61 secured to the table 10 and having a rubber bumper 62 on the upper end thereof. The free end of the arm 56 is curved to one side and upwardly as indicated at 63 and has associated therewith on the under side a spring finger 64.

As the record changing mechanism is actuated by the lead-in groove of the record as above described, the movement of the lever 22 by the cam 20 will cause the arm 56 to swing upon its pivotal mounting through the medium of the rod 58. This swinging movement will cause the free end to engage the uppermost record on the stack and by reason of the upturned end will cause it to slide upwardly until the spring finger 64 which is spaced therefrom substantially the

thickness of a record is moved inwardly under the edge of said uppermost record.

It is to be noted that the arm 56 is pivoted on the support 55 for both horizontal and vertical swinging action. Thus, through the medium of the upturned end 63, the arm will automatically elevate its end to the plane of the uppermost record, whether there be two or more thicknesses of records on the turntable. The edge of the uppermost record having been grasped between the end of the arm and the spring 64 when the arm is swung inwardly, the continued inward movement of the arm causes the finger 60 to engage the fixed pin 61 which acts to swing the arm vertically upwardly about its horizontal pivotal mounting. Such upward movement of the arm lifts one edge of the grasped record upwardly so as to free the center hole thereof from the centering pin. The opposite edge of the record, however, will continue to rest upon the rotating group of records. The rotating movement of the group of records will carry the unsupported edge of the grasped record with such velocity as to throw it from the turntable and the grasp of the arm 56 onto the support 16, thereby completely removing it from the turntable.

As illustrated in Fig. 9, the arm 56 is swung horizontally until the finger 60 engages the post 61. In that position, the upturned end has engaged the edge of the record, as shown in Fig. 7. Continued movement of the lever 58, however, will react on the finger 60 and lever 56 to tilt them by reason of engagement with the pin 61, which tilting movement elevates the lever about its horizontal pivotal mounting to raise the record from the stack over the centering pin, as illustrated in Fig. 8.

Operation

In operation, a stack of records of a given diameter (such as ten-inch records) are stacked on the turntable to the extent of the height of the centering pin. The member 45 is manually set for that diameter of record (ten-inch record) so that the outer shoulder 46 will engage the plunger 40. The reproducer is then placed upon the outer edge at the beginning of the uppermost record. The switch 65 is then operated to energize the motor to cause the rotation of the turntable and thereby the reproduction of the record through the usual amplifying circuit and loud speaker or any mechanical or electrical sound reproducing means well known in the art.

The cam 20 rotates with the turntable, but fails to engage the pointed end of the lever 22 which is held in inoperative and non-engaging position by the shoulder 25 of the arm 26.

When the reproducer runs into the lead-in groove at the end of the record, the member 48 will either engage the pin 35 (spiral groove) and force the plate 32 counterclockwise, or the pin 50 mounted thereon will engage one of the teeth 34 and swing the plate 32 clockwise (eccentric groove). Either of these movements will force the pin 39 and its associated arm 26 outwardly against the tension of the spring 25 so that the shoulder 25 will release the pin 24, permitting the spring 51 to swing the pointed end of the lever 22 inwardly into the path of the rotating cam 20. When the cam 20 strikes the end of the lever 22, it acts both to raise and return the reproducer and simultaneously elevate and remove the uppermost record as follows.

Reproducer.—The opposite end of the lever 22 will move against the downwardly curved end of the arm 26 so as to force said arm upwardly about the rocking bearing 30 to an inclined position, carrying upwardly with it the reproducer arm 17 through the medium of the roller 49 whereby the reproducer will become disengaged from the record. Owing to its inclined position the roller will roll down the inclined arm, swinging the reproducer to the periphery of the record until the shoulder 46 or 47 engages the plunger 40 with the ear 43 extending thereover. Thereupon, the cam will have passed the lever 22 which, through the medium of the springs 59 and 27, will return to inoperative position through reengagement of the shoulder 25 with the pin 24 and will have dropped down again to its horizontal position. But the reproducer arm will be supported on the plunger, which through the dash pot action, will gradually and gently lower the reproducer into engagement with the record at the beginning thereof.

Record changer.—Simultaneously with the above action, the movement of the lever 22 will swing the arm 56 toward the records, the upwardly bent end 63 thereof engaging the periphery of the upper record so as to raise the arm until the spring 64 is positioned to slide under the top record. Continued inward movement will cause the spring 64 to separate the top record from the one immediately below and in a manner grip the peripheral edge thereof in conjunction with the arm 56. Continued inward movement of said arm will cause the finger 60 to engage the pin 61 and swing the arm vertically so as to lift the edge of the record, arresting its rotation with the other records until the center opening therein is free from the upper end of the centering pin. However, the opposite sides of the edge of the record will remain in engagement with the group of records. The speed of rotation of the group of records will throw the engaging edge of the elevated record outwardly and away from the turntable, such movement throwing the record free from the turntable and the arm 56 against the rubber bumper 62 which will guide it in its movement onto the support 16 or reservoir for played records. Immediately upon the cam 20 having passed the lever 22, the spring 59 and relatching of the lever 22 will return the arm 56 to its normal position.

The above cycle will apply to each of the records of the stack in turn, the lever 56 being low enough to engage the next to the bottom record, as well as the top record of the stack, it being elevated to the varying level of the stack by the upturned end 63. When the last record has been reproduced, the arm 56 will fail to engage it so that it will not be removed from the turntable. However, the cycle of movement of the reproducer will cause it to be returned to the beginning of the record in the manner above described. Thus, the last record on the turntable will not be removed but will be repeated continuously until the motor is stopped.

Whereas the operation of the mechanism has been described as applying to a group of records of the same diameter, whether a group of ten-inch records or a group of twelve-inch records, a record of a different diameter may be manually played by placing it on the turntable and setting the member 44. However, no provision is made for automatically changing such record of a different diameter, it being reproduced in the same manner as above described, the reproducer going through the same cycle of movements and also the record changing arm 56 performing as above described with the exception

that it will not engage and remove said record, being the only and last record upon the turntable.

The invention claimed is:

1. A record changing mechanism for phonographs including a rotatable turntable, means for rotating said turntable, a centering pin fixed relative thereto, said turntable being adapted to receive a stack of records to be reproduced with their center openings surrounding said centering pin, a member movable into engagement with the edge of the uppermost record and elevating it for freeing it from said centering pin while permitting the opposite edge to be moved by the continued rotation of the turntable to discharged position, and an upwardly turned end on said member for engaging the edge of the uppermost record and moving said member upwardly into engagement therewith to accommodate it to the varying heights of the stack.

2. In a phonograph, the combination with a turntable adapted to receive a record for reproduction and means for rotating said turntable, of a reproducer, a reproducer arm therefor pivotally mounted to return said reproducer from the ending to the beginning of a record, a dash pot positioned under said arm, and a plunger extending upwardly therefrom in position to receive said arm and support it in its elevated position over the beginning of the record, said dash pot permitting the gradual lowering of the plunger and arm by reason of the weight thereof to gently place the reproducer in engagement with the record.

3. In an automatic phonograph, the combination with a turntable adapted to receive a record thereon for reproduction, and a reproducer, of means for automatically removing said record from the turntable upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a member positioned free of the path of movement of said projection during the reproduction of the record and movable into the path of movement thereof upon completion of the reproduction, whereby said member will be engaged and moved to operative position by the rotation of said projection after reproduction of the record, and mechanism associated with said member and controlled thereby for removing a record from the turntable upon said member being engaged by said projection.

4. In an automatic phonograph, the combination with a turntable adapted to receive a record thereon for reproduction, and a reproducer, of means for automatically removing said record from the turntable upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a member positioned free of the path of movement of said projection during the reproduction of the record and movable into the path of movement thereof upon completion of the reproduction, whereby said member will be engaged and moved to operative position by the rotation of said projection after reproduction of the record, mechanism associated with said member and controlled thereby for removing the record from the turntable upon said member being engaged by said projection, and means for returning said member and mechanism to inoperative position upon disengagement by said projection.

5. In a phonograph, the combination with a turntable adapted to receive a record thereon for reproduction, and a reproducer, of means for automatically returning said reproducer to the beginning of a record upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a member normally positioned free of the path of movement of said projection during the reproduction of the record so as not to be engaged thereby, means for moving said member into the path of movement of said projection upon completion of the reproduction, and mechanism associated with said member and controlled thereby for raising the reproducer from the record and returning it to the beginning thereof whereby said record will be repeated.

6. In a phonograph, the combination of a turntable adapted to receive a record thereon for reproduction, and a reproducer, of means for automatically removing said record from the turntable upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a member positioned free of the path of movement of said projection during the reproduction of the record and movable into the path of movement thereof upon completion of the record, whereby said member will be engaged and moved to operative position by the rotation of said projection, and means controlled by the movement of said member for simultaneously removing the reproducer from the record and the record from the turntable.

7. In a phonograph, the combination with a turntable adapted to receive a record thereon for reproduction, and a reproducer, of means for automatically removing said record from the turntable upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a pivoted lever having one end thereof extending toward said projection but normally free of its path of movement, means for moving said lever into the path of movement of said projection upon completion of the reproduction whereby said lever will be engaged and moved about its pivotal mounting, and means controlled by said movement for simultaneously removing said reproducer from the record and the record from the turntable.

8. In a phonograph the combination with a turntable adapted to receive a stack of record thereon, the uppermost record being exposed for reproduction, and a reproducer, of means for automatically removing the uppermost record from the turntable upon completion of the reproduction thereof, said means being so arranged as not to remove the last record on the turntable and comprising a projection rotatable with said turntable, a member normally positioned free of the path of movement of said projection during the reproduction of a record, means for moving said member in position to be engaged by said projection and moved to operative position upon completion of the reproduction of said record, and mechanism associated with said member and controlled thereby for returning the reproducer to starting position and simultaneously removing the uppermost of the plurality of records from the turntable.

9. In a phonograph, the combination with a turntable adapted to receive a stack of records for reproduction, and a reproducer, of means for automatically removing the uppermost record upon completion of the reproduction thereof comprising a projection rotatable with said turntable, a pivoted lever positioned with one end normally held out of the path of movement of said projection, means for releasing said lever actuated by the reproducer reaching the end of

the record, means for moving it into position for engagement with and further movement by said projection, mechanism connected with said lever and actuated by its movement to lift and permit the discharge of said record from the turntable, and mechanism simultaneously actuated thereby for raising the reproducer from the record and returning it to starting position.

10. In a phonograph, the combination with a turntable adapted to receive a record thereon for reproduction, a reproducer and reproducer arm, of means for automatically returning said reproducer to starting position including a member pivotally mounted and fulcrumed at one end, a roller support on said reproducer arm adapted to ride upon said member, and means for raising the free end of said member to incline the same upon completion of the reproduction for elevating said reproducer arm to disengage the reproducer from the record and cause it to move by gravity down said inclined member to reposition the reproducer at the beginning of the record.

11. In a phonograph, the combination with a turn-table adapted to receive a record thereon for reproduction, a reproducer and reproducer arm, of means for automatically returning said reproducer to starting position including a member pivotally mounted and fulcrumed at one end, a roller support on said reproducer arm adapted to ride upon said member, means for raising the free end of said member to incline the same upon completion of the reproduction for elevating said reproducer arm to disengage the reproducer from the record and cause it to move by gravity down said inclined member to starting position, and a dash pot positioned to receive and support the reproducer arm to gently lower the reproducer into engagement with the record.

12. In a phonograph, the combination with a turn-table adapted to receive a record thereon for reproduction, a reproducer and a reproducer arm, of means for removing the record, a single member actuated by the reproducer arm upon reproduction of the record being completed for releasing said means to operative position, the operative position of said means causing said member to elevate said reproducer and return it to starting position.

13. In an automatic phonograph, the combination with a turntable adapted to receive a stack of records, and a reproducer, of means for removing the uppermost record from the stack upon completion of the reproduction thereof including an arm pivoted adjacent the turntable, means actuated upon completion of the record for swinging said arm laterally into engagement with the uppermost record of the stack, and means for elevating said arm upon the continued movement of said means for raising said uppermost record to permit the discharge thereof.

14. In an automatic phonograph, the combination with a turntable adapted to receive a stack of records, and a reproducer, of means for removing the uppermost record from the stack upon completion of the reproduction thereof including an arm mounted adjacent the turntable for lateral and upward pivoted movement, said arm having a laterally and upwardly curved end portion adapted to engage the edge of the uppermost record to be swung upwardly thereby, a finger associated with the end portion and spaced therefrom substantially the thickness of a record adapted to be positioned by such upward movement to engage under the edge of the uppermost record and grasp the same during the continued lateral swinging of said arm, a projection on said arm for limiting the lateral swinging movement thereof and causing said arm and the record engaged thereby to be elevated, and means actuated upon completion of the record for swinging said arm to engaging and elevating position.

15. In an automatic record changing phonograph, the combination with a turntable adapted to receive a stack of records for reproduction, a centering pin fixedly associated with said turntable for centering said records, means for continuously rotating said turntable, a projection rotatable with said turntable, a lever normally positioned outside the path of movement of said projection, an arm mounted for tilting movement normally holding said lever in inoperative position, a record engaging and elevating member cperatively connected with said lever, means actuated by the reproducer reaching the end of the reproduction of a record for causing said arm to release said lever to permit its movement into the path of the projection whereby it will be engaged thereby and moved to operative position, means for causing the operative position of said lever to raise said arm to inclined position and move said member into position for engaging and raising the uppermost record from the stock for discharge therefrom, and means associated with said reproducer adapted to be engaged by said arm when in inclined position to return the reproducer to starting position.

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