April 10, 1934. L. L. JONES 1,954,246

PHONOGRAPH

Filed Feb. 19, 1929 4 Sheets-Sheet 1

Fig. 1.

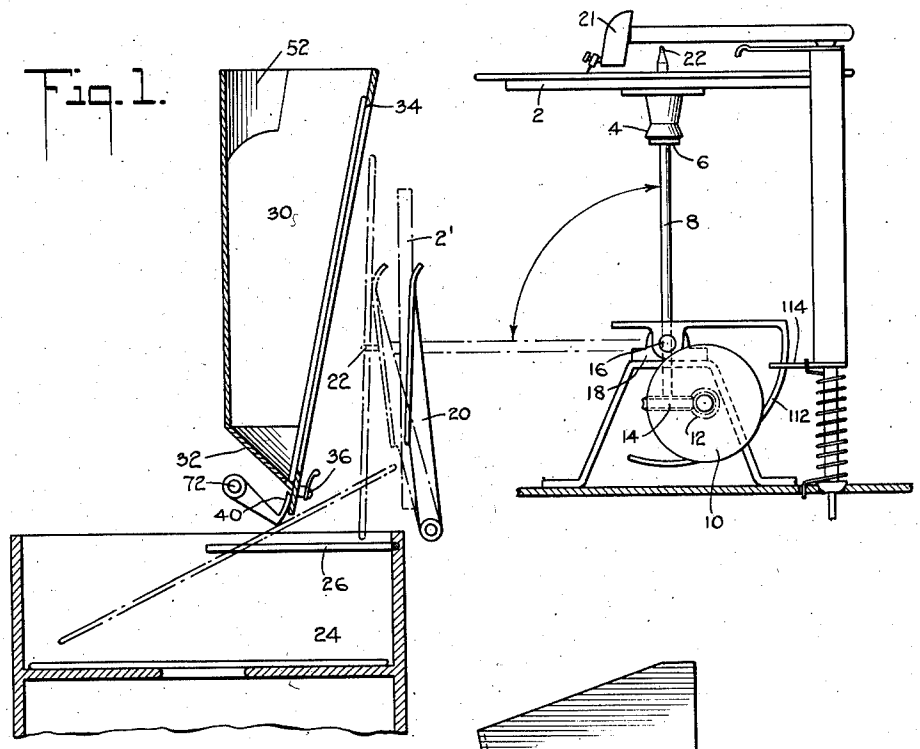


Fig. 4.

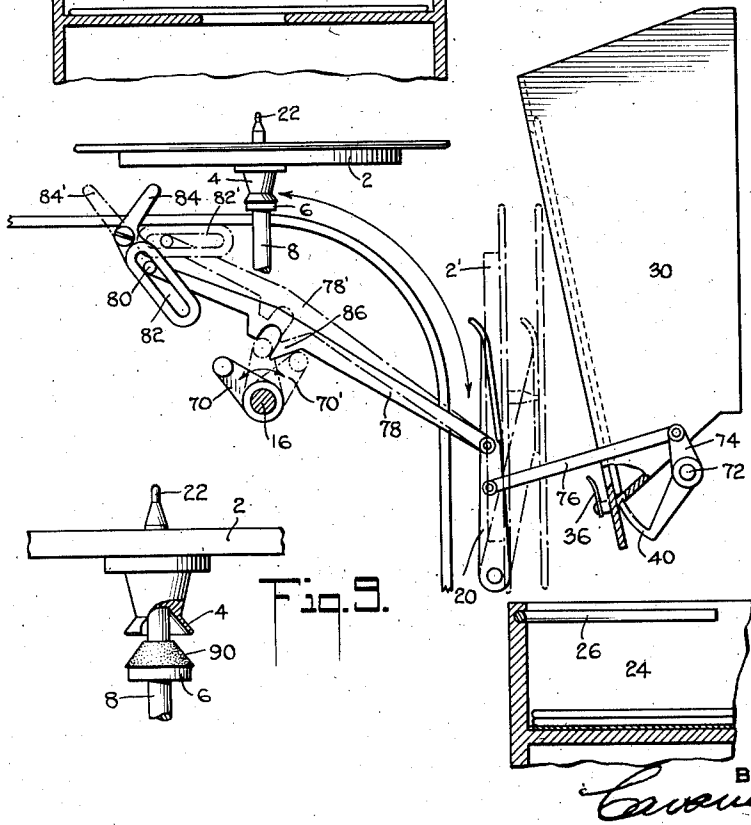


Fig. 9.

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April 10, 1934. L. L. JONES 1,954,246

PHONOGRAPH

Filed Feb. 19, 1929 4 Sheets-Sheet 2

Fig. 2.

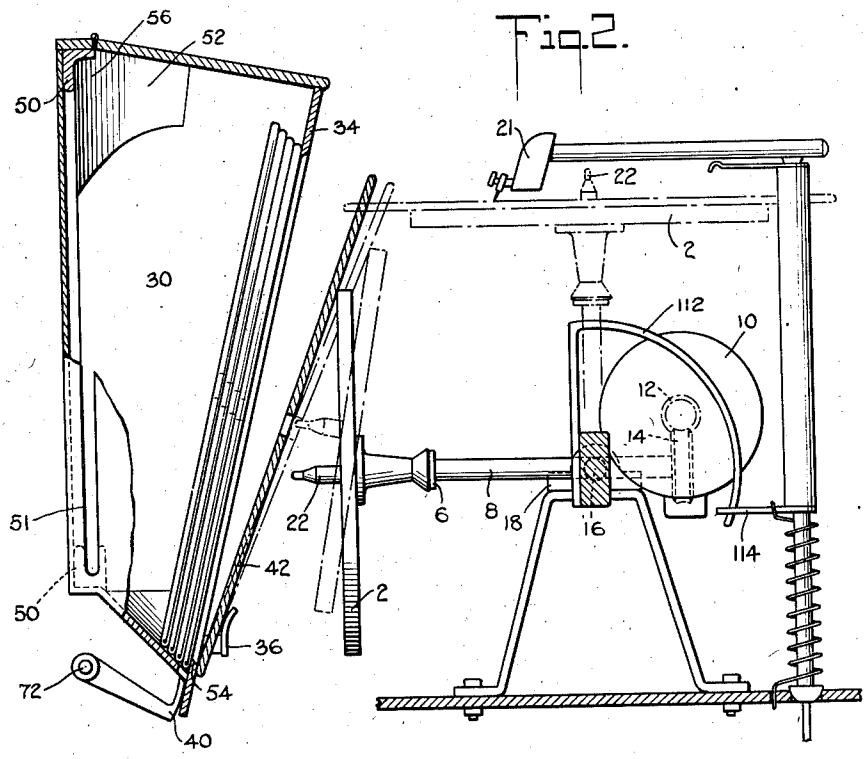
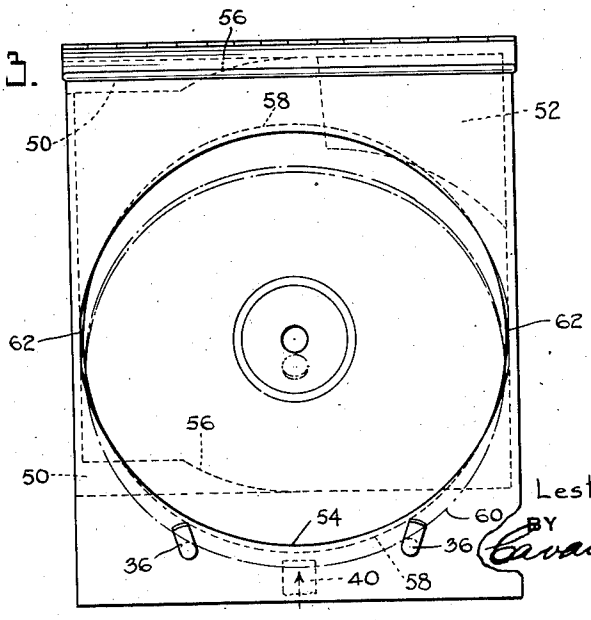


Fig. 3.



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PHONOGRAPH

Filed Feb. 19, 1929 4 Sheets-Sheet 3

Fig. 5.

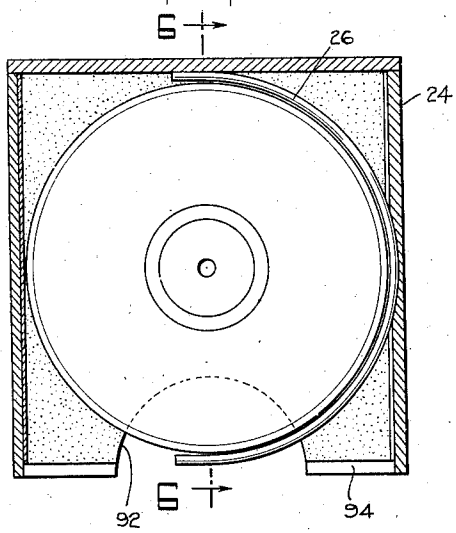


Fig. 6.

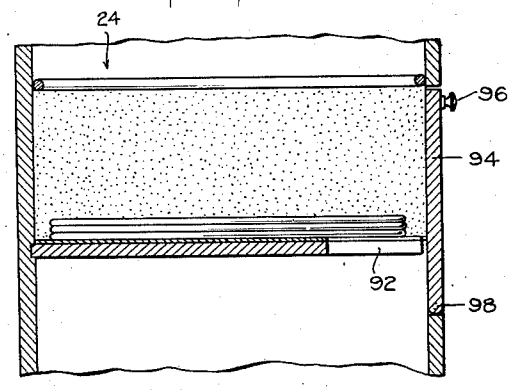


Fig. 7.

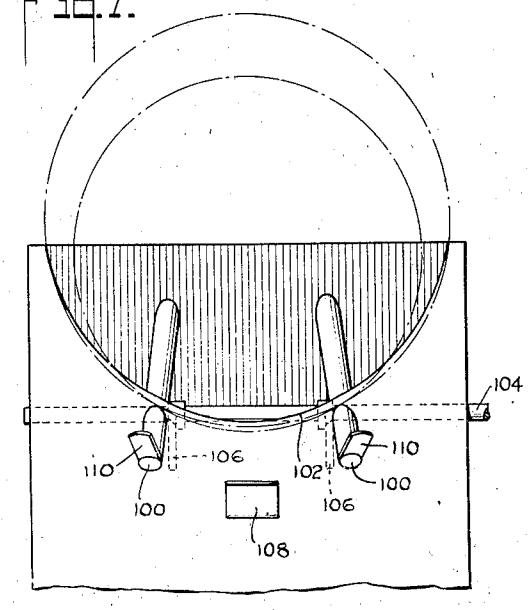
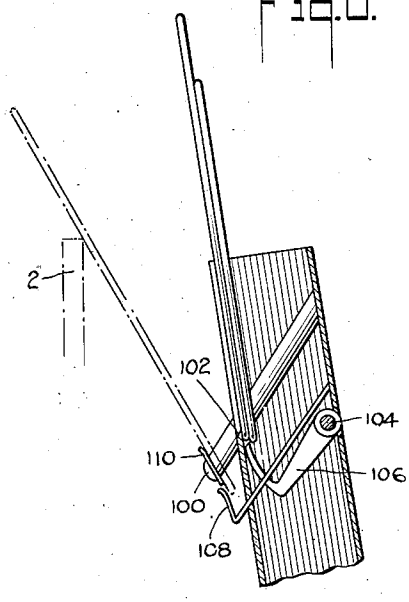


Fig. 8.



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April 10, 1934. L. L. JONES 1,954,246

PHONOGRAPH

Filed Feb. 19, 1929 4 Sheets-Sheet 4

Fig. 10.

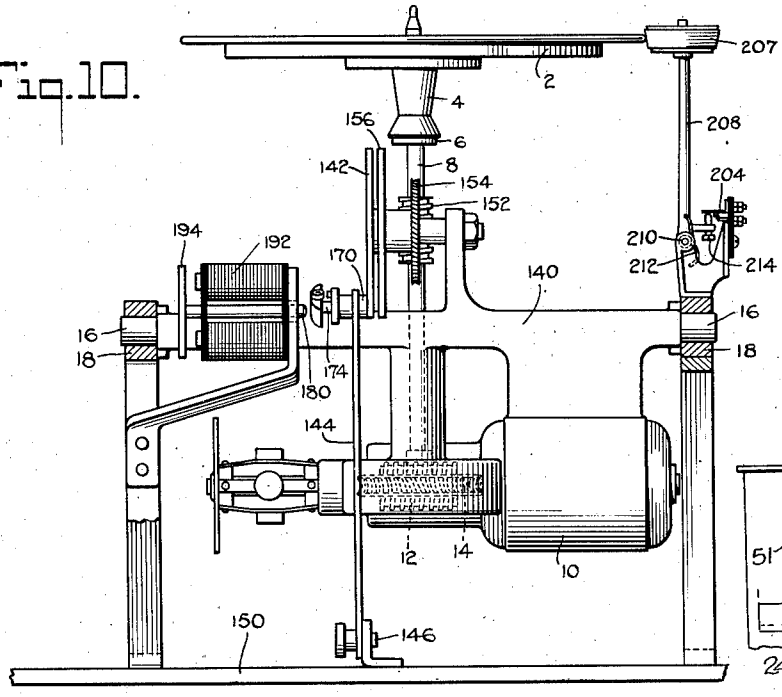


Fig. 13.

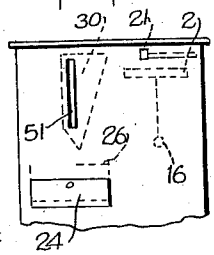


Fig. 11.

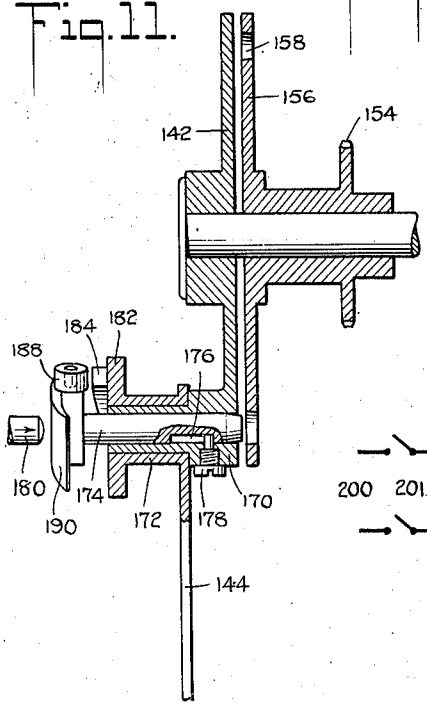
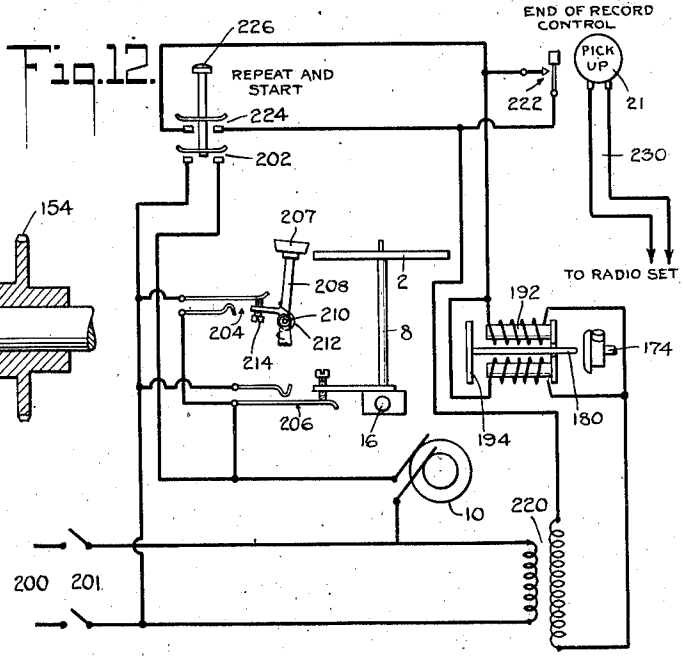


Fig. 12.



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UNITED STATES PATENT OFFICE

1,954,246

PHONOGRAPH

Lester L. Jones, Oradell, N. J.

Application February 19, 1929, Serial No. 341,078

26 Claims. (Cl. 274—10)

This invention relates to phonographs, more particularly to automatic or self-operating phonographs.

This application, together with my copending applications Serial Numbers 341,076, and 341,077 filed concurrently herewith, disclose an automatic phonograph, a general and primary object of which is to simplify and accelerate the record changing operation.

One object of my present invention is to make possible rapid ejection of a used record from the record turntable, which I do by tilting the table to a substantially vertical position. A further object of my invention is to make the ejection certain, and to this end I provide means for pushing the record away from the table when it is in the vertical position in order to dislodge the record from the centering pin, permitting it to fall into a discard magazine by gravit .

If the record is allowed to spin rapidly at the time of ejection it is subject to damage and apt to make considerable noise, and accordingly a further object of my invention is to reduce the rotative speed of the record at the time of ejection. This I do, first, by making the ejector means in the form of arms which press against the bottom of the record near its periphery over a considerable surface, so as to apply a braking action to the record. Secondly, I also attain this object by rotating the turntable with its shaft solely by frictional engagement against the upper face of a collar fixed to the shaft, that is, the turntable is axially movable away from the collar, so that when the turntable is tilted to the discharge position the friction between the table and the collar is reduced and the rotative speed of the table is reduced with it. Similarly, the friction between and the relative rotation of the record and table are reduced.

A further object of my invention is to permit the turntable to carry the next record to be played directly into contact with the reproducer when the table is raised to its normal playing position. This I do, broadly, by bringing the record to be played into engagement with the table, that is, loading the table with the record, while the table is still tilted away from the reproducer. Such an arrangement speeds up the record changing operation because the old record is separated from the reproducer, and the new record is brought into contact with the reproducer, all as part of the record changing operation, and without necessitating the usual delay in that operation caused by waiting for the reproducer to be moved out of the way of the turntable.

According to my invention the new record is picked up by the table simply by supporting the record in such a position that its center hole lies in the arcuate path followed by the centering pin of the table during the restoring oscillation, so that the pin engages the center hole and carries the record with it.

In the event of some misstep in the operation of the machine such that a record is prematurely brought into loading position, the centering pin may catch in the center hole of the record while the turntable is being tilted downwardly, and so jam the machine. To obviate this possible source of trouble is another object of my invention, which I fulfill by so adjusting the position of the record to be played, relative to the path of the centering pin, that the centering pin when oscillating upwardly misses the lower side and engages only the upper side of the center hole in the record. With such an arrangement the centering pin on the downward oscillation will slide harmlessly past a record in loading position.

Heretofore automatic phonographs have been designed solely with a view to automatic record changing, that is to say, they provide for continuous entertainment by a number of records played automatically in succession by the machine. However, the actual step of loading the machine with the group of records to be played is no easier than the step of loading an ordinary phonograph with a single record, and, in fact, is ordinarily much more difficult. A further and very important object of my invention is to provide a phonograph which will be automatic, not merely in the sense of changing records automatically, but in the sense of being self-loading, self-ejecting, and self-stopping, and this whether used for a stack of records or for only a single record at a time. To this end I first provide a record magazine which is preferably arranged for both top and side loading. When the top of the magazine is opened a stack of records may be inserted at once, or the records in the magazine may be removed or rearranged. For side loading the magazine is also provided with a slot in its side which ordinarily will be at the front of the phonograph cabinet, through which records may be successively inserted. The arrangement is such that a single record inserted in the slot moves directly to the front of the magazine, ready to be put into loading position, or, if other records are already in the magazine, the newly

added record joins the stack and awaits its turn to be played. By simply inserting a single record in the slot and pressing the starting button the record is loaded, played, ejected, and the machine is stopped. Another record may be inserted through the slot when desired, and the starting button again pressed to play the new record. If a number of records are desired they may be leisurely or rapidly inserted in the slot in the order preferred, and they are played in that order. My invention, considered in this aspect, is an automatic phonograph comprising an enclosed record turntable and reproducer, a slot in the enclosure through which a record may be inserted to be played, a starting device, means responsive to the starting device for putting the record into loading position, and self-loading mechanism also responsive to said starting device for bringing the record into engagement with the reproducer, and, finally, automatic means for discharging the record and stopping the machine, unless other records have meanwhile been selected and inserted in the magazine.

In accordance with my invention the used record is ejected by ejector means which push the record away from the turntable, and the ejector means are operated by operating means actuated by tilting of the turntable. Similarly, the innermost record of the stack in the storage magazine is separated from the stack into a loading position by separator means responsive to operating means also actuated by tilting of the table. Another object of my invention is to insure that a new record is separated into loading position only if the used record has been ejected from the table, and this I accomplish by mechanically interconnecting the ejector and separator means.

Sometimes a record is found so desirable that the listener wishes to repeat the same record, and to provide for this is still another object of my invention, which I attain by adding a manually operable device for making the operating means which operate the ejector and separator inoperative and non-responsive to tilting of the turntable, so that the used record is not ejected and the next record is not separated into loading position.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, my invention consists in the automatic phonograph elements and their relation one to the other, as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings, in which:

Fig. 1 is a partially sectioned elevation showing the general arrangement of the phonograph;

Fig. 2 shows a record separated into loading position about to be carried up with the trun-table;

Fig. 3 is an elevation looking at the front of the magazine;

Fig. 4 is a detail of the ejector, separator, and repeat mechanism;

Fig. 5 is a horizontal section through the discard magazine;

Fig. 6 is a section taken on the line 6—6 in Fig. 5;

Fig. 7 is a front elevation of another type of magazine for storing records to be played;

Fig. 8 is a section through the magazine shown in Fig. 7;

Fig. 9 is a detail of the turntable;

Fig. 10 is a front elevation of the turntable and tilting mechanism;

Fig. 11 is a detailed section though the single revolution clutch shown in Fig. 10;

Fig. 12 is a wiring diagram for the phonograph; and

Fig. 13 is a front elevation of a part of a cabinet enclosing the mechanism.

Referring to Fig. 1, there is a record turntable 2, the hub 4 of which rests on and frictionally engages a collar 6 fixed to a shaft 8. This is driven by a motor 10 through a worm 12 meshing with a worm wheel 14. The motor and turntable are supported by a frame, not shown, which includes trunnions 16 held in pedestal bearings 18, to permit the turntable to oscillate away from the reproducer 21 to the position 2' shown in dotted lines. The ejector arms 20 are arranged to dislodge the record from the centering pin 22 of the turntable, permitting the record to fall by gravity into a discard storage magazine 24, the record being guided from the vertical to a horizontal position, in order to obtain air cushioning, by a semi-circular guide 26. The records to be played are stacked in a magazine 30, the bottom 32 of which is sloped downwardly so that the records therein tend to move to the forward face 34 of the magazine. Separator mechanism, here exemplified by a finger 40, is used to separate the innermost record from the magazine and drop it onto external supports 36, in loading position. During the downward oscillation the reproducer 21 is swung outwards by a cam 112 and follower 114, ready to begin the new record, which is picked up by the centering pin 22 during the upward oscillation of the table.

The foregoing description is intended to be a more or less general survey, and some of the features of the invention to which the present application is more specifically directed are next described. Fig. 2 is a view similar to Fig. 1, except that the turntable 2 is shown in tilted position, while the next record to be played, numbered 42, is shown separated from the stack of records, with its lower edge resting on the external supports 36, while its upper surface rests against the top edge of the turntable 2. As the turntable begins to oscillate upwardly the record 42, resting thereon, inclines toward the turntable, as is indicated by the dotted line position, and the length or projection of the centering pin 22, as well as the remainder of the dimensions, are so adjusted that the centering pin engages the center hole of the record. For the most popular size of record the dimensions are made such that the centering pin misses the lower side of the center hole and engages only the upper side of the centering hole, in order to prevent jamming in case a record happens to be in loading position when the table is tilted downwardly. For the larger size records the centering pin touches the record a little below the center hole, and then slides up the record until the center hole is reached, after which the record is carried with the table into playing position.

This view also shows how the record magazine is provided with grooves 50, which lead to a slot 51 at the front of the phonograph cabinet, which, except for the slot, fully encloses the phenograph mechanism, as is most clearly brought out in Fig. 13. The inner sides of the grooves are cut away, in the magazine, as at 56, to permit records inserted in the slot to slide down the inclined bottom 32 of the magazine and come to rest against its forward face 34. The magazine is additionally

provided with a curved guide surface 52 which helps make the descent of the records inserted into the magazine certain and almost noiseless. As before, a separator finger 40 is provided which lifts the innermost record above the lower edge 54 of the front face 34 of the magazine, and permits it to fall outside the magazine until caught by the supporting means 36. In the particular case shown the record is additionally supported by the top edge of the turntable 2, but it is obvious that other supporting means may be employed to properly position the record relative to the path described by the centering pin 22.

A front view of this magazine is shown in Fig. 3, in which it will be noted, first, that the guide grooves 50, in which records are inserted from the side slot 51, terminate in the curved portions 56 in order to permit the inserted records to fall clear of the grooves and into the magazine proper. The curved guide 52 eases the record toward the front face of the magazine.

The bottom of the magazine supports the innermost record in the position indicated by the dotted circle 58. After the turntable has been tilted the separator finger 40 is raised and permits the record to clear the bottom edge 54 of the opening at the front of the magazine, and the record then falls to the position indicated by the dashed circle 60, resting on the supports 36. The opening in front of the magazine is enlarged at the points 62 over a sufficient distance to permit easy egress of the record from the magazine.

The mode of operation of the separator finger 40, and of the ejector arms 20, is illustrated in Fig. 4, which is an elevation on the side opposite to that shown in Fig. 1. In this figure, for the sake of clarity, most of the tiltable frame and mechanism, except the table itself, has been omitted. This omitted frame is supported on a shaft or trunnions 16 and carries a crank 70, which, when the table 2 is tilted from the horizontal position to the substantially vertical position indicated at 2', is moved to the position indicated at 70'.

The separator finger 40 is fixed to a shaft 72, fitted with a crank 74, which is operatively connected through a link 76 to the ejector arm 20. The arm 20 is in turn connected to a link 78, the upper end 80 of which is slidably supported in the slot 82 of a bell crank member 84. The connecting link 78 is provided with a projection 86, which, when the bell crank member 84 is in the position shown in solid lines, lies in the path of the crank pin of the crank 70.

It will thus be seen that the ejector means 20 is operated by operating means 78 which is actuated by tilting of the turntable 2. Similarly, the separator means 40 is operated by operating means including the links 76 and 78, which are actuated by tilting of the turntable 2. From a slightly different viewpoint, the separating means 40 is operatively connected to the ejector means 20 by the link 76 in order to insure that a new record is separated only if the used record has been ejected from the table.

The bell crank 84 may be manually shifted to the dotted position indicated at 84', in which case the slot 82 moves to the position 82', thus raising the link 78 to the position 78', so that the protuberance 86 is moved out of the path of the crank 70. In this manner the ejector means 20, and also the separator means 40, are made inoperative even though the table 2 is tilted, and when the table is restored to its horizontal position it still carries the same record as before, the reproduction of which is then repeated. The bell crank 84 thus constitutes manually operable means for making the ejector and separator means inoperative in order to repeat a desired record. With the present arrangement I prefer to put the table through its tilting operation, even though the same record is to be played, because the tilting operation provides for disengaging the record from the reproducer, moving the reproducer outward to the beginning of the record, and again bringing the record into contact with the reproducer, features which have been more carefully set forth in my companion applications already referred to.

The ejector arms 20 are given a relatively large surface area in order to apply a braking action to the record, so as to insure reduction in its rotative speed when it is dropped into the discard magazine 24. An additional precaution for reducing this rotative speed is provided in the simple gravity frictional engagement existing between the turntable 2 and the collar 6. The turntable 2 with its hub 4 is simply dropped over the end of the turntable shaft 8 and descends until the hub 4 rests on the collar 6. This is better illustrated in Fig. 9, wherein the table 2 has been slightly elevated to separate the hub 4 from the collar 6. The tapered surface 90 is covered with felt to insure silence and good frictional contact. Since the table is free to move axially away from the collar the friction therebetween is greatly reduced when the turntable axis is tilted to the horizontal position, and this reduces the motor load and serves to reduce the rotative speed of the table at the time of ejection of the record. The lessened friction between the record and the table also helps stop the record, as well as the braking action of the ejector arms 20.

Fig. 5 is a horizontal section shrough the discard magazine 24 shown in Figs. 1 and 4, and shows how the record is changed from the vertical to a horizontal position by a semi-circular guide ring 26, which is sufficiently great in diameter to permit the record, when horizontal, to pass through to the bottom of the magazine. This figure also shows how the bottom of the magazine is provided with a recess, at 92, which facilitates the removal of records from the magazine. This feature is more clearly illustrated in Fig. 6, which is a section taken on line 6—6 in Fig. 5. A door 94 is provided with a knob 96, by the aid of which the door may be opened about a hinge 98, preferably located substantially below the bottom of the magazine in order to provide clearance in which the hand may grasp the records, through the recess 92.

An alternative type of record storage magazine, having the advantage over that described in Figs. 2 and 3 of being able to accommodate records of different size, is illustrated in Figs. 7 and 8. In these figures it will be seen that the records are supported, both within the magazine, and after separation therefrom, by rods 100. When the records are within the magazine they are engaged by the edge 102 of the forward face of the magazine for sufficient distance up their sides to support them in position. A shaft 104 is provided with separating means, here indicated as a pair of separating fingers 106, upon actuation of which the innermost record in the magazine is raised sufficiently to clear the edge 102, whereupon it slips downwardly, and, if it begins to drop in a vertical plane instead of inclining forwardly, as is desired, its lower edge strikes a

projection 108, which starts the record tilting downwardly. The record is arrested by supporting means 110 fixed to the ends of the rods 100, which hold the lower edge of the record, while the upper edge may be supported by the periphery of the turntable 2, as was set forth in connection with Fig. 2.

It will be understood that this magazine, like the magazine described in Figs. 2 and 3, may be provided with a slot and grooves for guiding records inserted in the slot to the rear of the magazine and onto the supporting rods 100.

The side elevations in Figs. 1, 2 and 3 have omitted the tiltable frame and the tilting mechanism therefor in order not to obscure other features of the machine. For a detailed side elevation reference may be made to my companion application Serial Number 341,077, filed concurrently herewith, but for the purposes of the present disclosure it is believed that the method of tilting and of controlling the tilting of the turntable may be sufficiently clearly set forth with the aid of Figs. 10, 11 and 12. Adverting to Fig. 10 the turntable 2 and its hub 4 rest on a collar 6, fixed to the shaft 8. The shaft 8 is carried in a tiltable frame 140, which is supported by trunnions 16, fitted in pedestal bearings 18. The frame 140 carries the driving motor 10, which rotates the shaft 8 by means of a worm 12 meshing with a worm wheel 14.

The shaft 8 also carries a worm 152 which meshes with a worm wheel 154, integrally formed with which is a fixed or driving clutch wheel 156. Coaxially mounted with the wheel 156 is a crank disk 142, carrying a crank pin 170. The crank pin 170 is anchored to the fixed chassis 150 by means of a connecting rod 144, which at one end surrounds the crank pin 170, and at the other end is borne by a wrist pin 146. One of the pedestals 18 carries an electro-magnet 192, arranged to attract an armature 194, fixed to a plunger 180, which, when reciprocated, actuates a single revolution clutch pin 174, which engages the clutch wheel 156 and thus causes the crank 142 to rotate. The lower end of the connecting rod 144 being anchored to the fixed chassis, the rotation of the crank results in a rotation of the crank shaft about the crank pin, and consequently tilts the entire frame 140, with the turntable 2, about the trunnions 16.

Fig. 11 is an enlarged cross section of the single revolution clutch, and illustrates the positively driven clutch wheel 156 formed integrally with the worm gear 154, and provided with tapered clutch holes 158. Coaxially mounted with the positively driven clutch wheel 156 is the loose wheel 142, which serves not only as the driven member of the clutch, but also as a crank disk. This wheel carries a crank pin 170, to which one end of the connecting rod 144 is connected by means of a bearing 172. The crank pin 170 is hollow and carries a clutch pin 174, which is reciprocable within the crank pin 170, but which is splined thereto to prevent relative rotation therebetween by means of a key slot 176, engaged by a set screw 178. The plunger 180, supported on the stationary chassis as is indicated in Fig. 10, upon reciprocation forces the clutch pin 174 into one of the holes 158 in the rotating clutch wheel 156, and so causes the crank to rotate.

The connecting rod bearing 172 has an enlarged face 182, on which a cam 184 is fixed. The end of the reciprocable clutch pin 174 carries a cam follower 188. The cam and follower experience relative rotation because of the effect of the keyway 176 and key 178, and near the end of a single revolution the follower 188 rides up on the cam surface 184 and retracts the clutch pin 174 from engagement with the positively driven clutch wheel 156. The holes 158 and pin 170 are slightly tapered to permit ready retraction. The outer end of the clutch pin 174 carries a curved shield 90 to prevent jamming of the clutch pin against the plunger 180, should the latter through some mishap not have been meanwhile restored to its normal position.

A wiring diagram for the phonograph is given in Fig. 12. Energy from a supply line 200 is fed through a master switch 201 to the driving motor 10 whenever the circuit is closed by either a manual switch 202, or either of the automatic switches 204 and 206, these switches all being connected electrically in parallel. Switch 206 is arranged, as shown, to be opened when the turntable is in normal playing position, but closed when the table is even slightly tilted. The switch 204 is operated by a roller 207, supported on an arm 208, which is pivoted at 210 to the stationary chassis, and urged toward the periphery of the record turntable 2 by a torsional spring 212. The turntable is smaller in diameter than the records, and the screw 214 is so adjusted that the contact 204 is opened when the roller 207 moves entirely over to the periphery of the turntable 2, without being stopped by a record. A roller or other wiper moving normally of the table, and depending for actuation upon the presence of the record, might equally well be used, but I prefer the present scheme because the roller is also used to locate the initial reproducer position, as is explained in my copending application Serial Number 341,076, filed concurrently herewith. The roller 207 and switch 204 thus provide an automatic stop when the turntable is raised without a record, either because all of the records have been played, or because the machine is being used with only a single record at a time. When the turntable tilts the consequent movement of the roller 206 tends to open the motor circuit, but the additional switch 206 keeps the circuit closed until the tilting cycle has been completed.

Some of the energy from the line 200 is supplied through a transformer 220 to a magnet 192, which is arranged to attract an armature 194 in order to move a plunger 180 fixed thereto against the clutch pin 174. The magnet circuit is closed by a contact 222 which, when the reproducer arm reaches the end of a record, is actuated in any conventional manner, and thus trips the single revolution clutch and ejects the used record. A manually operable switch 224 is arranged in parallel with the automatic switch 222, so that a record may be rejected at will, without waiting for its completion.

To start the machine the button 226 is depressed, which closes the switches 202 and 224. The closing of the switch 224 trips the single revolution clutch, while the closing of the switch 202 starts the driving motor 106, so that the turntable 102 immediately begins to tilt. The button must be depressed long enough for the table to begin to tilt, whereupon the contact 206 is closed, and remains so until the tilting cycle is completed. When the table is restored to its operating position, it carries a record which moves the roller 207 outwardly, which by closing the contact 204 causes the driving motor to continue to operate. At the end of the record the contact 222 is closed, tripping the single revolution clutch, and thereby repeating the tilting cy-

cle. If no record is brought up with the table the motor circuit is opened by the wheel 207 opening the contact 204. If a record already begun is considered undesirable, the button 226 may be depressed, tripping the single revolution clutch and ejecting the undesired record. If a record is to be repeated the repeat lever (lever 84 in Fig. 4) is moved over at any time during the playing of the record.

It may incidentally be mentioned that the reproducer 21 is preferably of the electrical type, and its pick-up is led over conductors 230 to a suitable amplifier, which, in the case of a combined radio receiver and phonograph, may be the amplifier of the radio set.

The location and mode of attachment of the roller 207 and the accompanying mechanism is clearly shown in Fig. 10. It is evident from the figure that when the record turntable 2 carries no record, the roller 207 swings inwardly a sufficient distance to open the contact 204, and so stops the driving motor 10 by opening its energizing circuit.

If the functioning of the record storage magazine described in Figs. 2 and 3, and of the repeat mechanism described in Fig. 4, is kept in mind, together with the supervisory control permitted by the circuit described in Fig. 12, it will be appreciated that the desired complete flexibility of operation has been fully attained. A single record may be inserted in the slot in the exterior of the phonograph, and the starting button depressed, whereupon the record will be loaded, played, ejected, and the machine then stopped. A number of records may be loaded into the magazine at leisure or in rapid succession, and are played in order. A record already begun may be rejected at will, or repeated at will. A portion of the record may be repeated by operating both the repeat lever and the reject button. The machine may be completely stopped and taken out of circuit by opening the master switch on the main line coming into the phonograph.

It will be apparent that while I have shown and described my invention in preferred form, many changes and modifications may be made in the structure disclosed, without departing from the spirit of the invention, defined in the following claims.

What I claim is:

1. In an automatic phonograph having a tiltable record turntable with a centering pin, the method of self-loading which includes tilting the table away from its playing position to a substantially vertical position, bringing a record into leaning engagement with the upper edge of the tilted table, moving the table upwardly until the centering pin engages the center hole of the record, and restoring the table and record to the playing position.

2. In an automatic phonograph having a tiltable record turntable with a centering pin and a reproducer, the method of self-loading which includes tilting the table away from its playing position to a substantially vertical position, bringing a record into leaning engagement with the upper edge of the tilted table, moving the table upwardly until the centering pin engages the center hole of the record, and restoring the table and record to the playing position directly into contact with the reproducer.

3. An automatic phonograph comprising a record turntable, a driving motor therefor, a discard magazine, and means to tilt the motor and table to put the table in a substantially vertical position at a higher level than the magazine in order to facilitate discharge of a used record from the table into the magazine.

4. An automatic phonograph comprising a record turntable, a driving motor therefor, a discard magazine, means to tilt the motor and table to put the table in a substantially vertical position at a higher level than the magazine in order to facilitate discharge of a used record from the table into the magazine, and means to simultaneously reduce the rotative speed of the record.

5. An automatic phonograph comprising a record turntable having a centering pin, a driving motor therefor, a discard magazine, means to tilt the motor and table as a unit until the table is in a substantially upright position higher than the magazine, and means to push a record carried thereby away from the table to dislodge it from the centering pin and discharge it into the magazine.

6. An automatic phonograph comprising a reproducer, a record turntable with a centering pin, means to support a record to be played, means to tilt the table away from its playing position to a substantially vertical position, means for bringing the record to be played into leaning engagement with the upper edge of the tilted table, and means to move the table upwardly until the centering pin engages the center hole of the record and further to restore the table and record to the playing position into contact with the reproducer.

7. An automatic phonograph comprising a record turntable with a centering pin, a reproducer, means to support a record to be played, means to tilt the table away from the reproducer to a substantially vertical position, means for bringing the record to be played into leaning engagement with the upper edge of the tilted table, and means to move the table upwardly until the centering pin engages the center hole of the record and further to restore the table and record to a horizontal position directly into contact with the reproducer.

8. An automatic phonograph comprising a record turntable having a centering pin, a reproducer, means to tilt the table away from the reproducer, a support for holding a record to be played in leaning engagement with the upper edge of the turntable, and means for bringing the table upwardly in an arcuate path such that the centering pin engages the upper side of the center hole of the record and carries the record with it to a horizontal position.

9. An automatic phonograph comprising a record turntable having an elongated centering pin, a reproducer, a support for supporting a record to be played in a nearly upright position but slightly toward the turntable, means to tilt the table away from the reproducer to a nearly upright position spaced from the aforesaid nearly upright record, and means to bring the table upwardly in an arcuate path such that the tip of the elongated centering pin misses the lower side but engages the upper side of the center hole of the record and carries the record upwardly with it to a horizontal position into contact with the turntable on one side and the reproducer on the other.

10. An automatic phonograph comprising a record turntable having a centering pin, a horizontally reciprocable reproducer, a support for a record to be played, a discard magazine, means to tilt the table over the magazine, means to

push a record carried thereby away from the table in order to dislodge it from the centering pin and drop it into the magazine, means to move the reproducer to a point adjacent the outer periphery of a record when the record has been put in playing position, and means for bringing the table upwardly in an arcuate path such that the centering pin engages the center hole of the record to be played and carries it to a horizontal position into contact with the reproducer.

11. An automatic phonograph comprising a record turntable tiltable about a center of oscillation located beneath the table, and means to support a record to be played in an inclined collateral relation to the tilted table such that the center hole of the record lies in the arcuate path of the centering pin of the table during upward oscillation of the table into its playing position.

12. An automatic phonograph comprising a record turntable having a centering pin, means to tilt the table to discharge a used record, means to support a stack of records adjacent the table when it is in tilted position, and means operating in timed relation with the tilting means for moving the end record of the stack into an inclined position such that the center hole of the record lies in the path of the centering pin of the table as the table is restored to playing position.

13. An automatic phonograph comprising a record turntable, a driving motor therefor, means to tilt the table and motor, a discard magazine subjacent the table when it is in tilted position, ejector means for pushing a record away from the table to dislodge it from the centering pin and drop it into the magazine, and means actuated by tilting of the table for operating the ejector means.

14. An automatic phonograph comprising a record turntable, means to automatically tilt the turntable at the end of a record, a discard magazine subjacent the turntable when it is in tilted position, ejector means for pushing the record away from the turntable to dislodge it from the centering pin and drop it into the magazine, means actuated by tilting of the table for operating the ejector means, and manually operable means for making said operating means inoperative to dislodge the record upon tilting of the table, in order not to eject the record.

15. An automatic phonograph comprising a record turntable, means to automatically tilt the turntable at the end of a record, a discard magazine subjacent the turntable when it is in tilted position, ejector means for reducing the rotative speed of the record and for pushing it away from the table to dislodge it from the centering pin and drop it into the magazine, and means actuated by tilting of the table for operating the ejector means.

16. An automatic phonograph comprising a record turntable, a driving shaft therefor, a collar on the driving shaft for supporting and frictionally engaging the turntable, and means to tilt the shaft and table through substantially a right angle in order to discharge a used record, said turntable being axially movable on the shaft away from the collar in order to slow up the rotative speed of the record.

17. An automatic phonograph comprising a tiltable record turntable, a record storage magazine for supporting a stack of records in an upright position adjacent the turntable when it is in tilted position, means for receiving a record from the magazine and supporting it in an inclined position ready for loading, means for separating the innermost record from the stack to the supporting means, and operating means for said separating means actuated by tilting of the table.

18. An automatic phonograph comprising a tiltable record turntable, a record storage magazine for supporting a stack of records in an upright position adjacent the turntable when it is in tilted position, means for separating the innermost record into a loading position, operating means for said separating means actuated by tilting of the table, and manually operable means for making said operating means inoperative upon tilting of the turntable, in order not to separate a record.

19. An automatic phonograph comprising a tiltable record turntable, a record storage magazine for supporting a stack of records in an upright position adjacent the table when it is in tilted position, ejector means for pushing a record away from the table to eject the record, means for separating the innermost record from the stack into loading position, and actuating means interconnecting the ejector means and the separating means in order to insure that a new record is separated only if the used record has been ejected from the table when the table is tilted.

20. An automatic phonograph comprising a tiltable record turntable, a record storage magazine for supporting a stack of records in an upright position adjacent the table when it is in tilted position, ejector means for pushing a record away from the table to eject the record, means for separating the innermost record from the stack into loading position, operating means for said ejector and separating means actuated by tilting of the turntable, and manually operable means for making said operating means inoperative upon tilting of the turntable in order to retain the played record on the turntable.

21. An automatic phonograph comprising a tiltable record turntable, a record storage magazine for supporting a stack of records in a position adjacent that of the table when the table is in tilted position, ejector means for pushing a used record away from the tilted table to eject the record, record supporting means adjacent the magazine, means for separating a record from the stack into loading position on the supporting means, and actuating means interconnecting the ejector means and the separating means in order to insure that a new record is separated from the stack only if the used record has been ejected from the table.

22. An automatic phonograph comprising a record turntable having a centering pin, a reproducer, means to oscillate the table about an axis located beneath the table, and a support for supporting a record to be played in an inclined collateral relation to the table when the table is in tilted position such that when the table is oscillated upwardly the centering pin will engage the center hole of the record.

23. An automatic phonograph comprising a record turntable having a centering pin, a reproducer, means to oscillate the table away from and back to the reproducer about an axis located beneath the table, and a support for supporting a record to be played in an inclined collateral relation to the tilted table such that when the table is oscillated upwardly the centering pin will miss the lower side but engage the upper side of the center hole of the record in order to

carry the record with it to the playing position into contact with the reproducer.

24. An automatic phonograph camprising a record turntable having a centering pin, a horizontally reciprocable reproducer, a discard magazine, means to tilt the table over the magazine about an axis located beneath the table, means to dislodge a record carried thereby from the centering pin to permit it to travel downwardly into the discard magazine, means to move the reproducer to a point adjacent the outer periphery of a record when the record has been put in playing position, means to support a record to be played in an inclined collateral relation to the tilted table such that when the table is moved upwardly the centering pin will engage the center hole of the record, and means to move the table upwardly in order to carry the record to be played to the playing position into contact with the reproducer.

25. In an automatic phonograph having a record turntable with a centering pin, a reproducer, a support for a record to be played, and a discard magazine, the method which includes putting the table in a substantially upright position over the discard magazine, separating the used record from the table and centering pin and thereby causing the separated record to travel by gravity into the discard magazine, moving the reproducer outwardly to a point adjacent the periphery of a record when the record is put in playing position, supporting a record to be played in an upright position adjacent the table, so moving the table that the centering pin enters the center hole of the record and the record is carried to the playing position into direct contact with the reproducer.

26. An automatic phonograph comprising a record turntable having a centering pin, means to support the turntable in a substantially upright position, a horizontally reciprocable reproducer, means to support a record to be played in a substantially upright position adjacent the table, a discard magazine, means to separate a record carried by the table from the turntable and centering pin, means to cause it to travel by gravity into the discard magazine, means to move the reproducer to a point adjacent the outer periphery of a record when the record is in playing position, means for so moving the table that the centering pin enters the center hole of the record and the record is carried to the playing position directly into contact with the reproducer.

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