May 16, 1939. J. R. MITCHELL 2,158,295

AUTOMATIC PHONOGRAPH

Filed Aug. 24, 1936 4 Sheets-Sheet 1

Fig. 1.

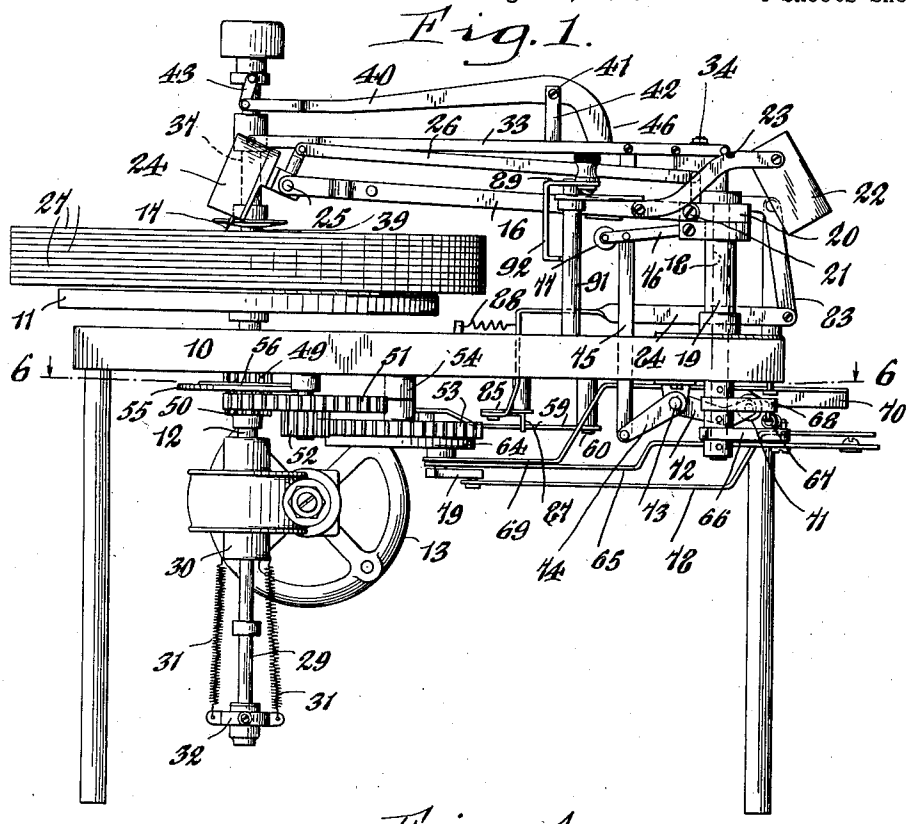
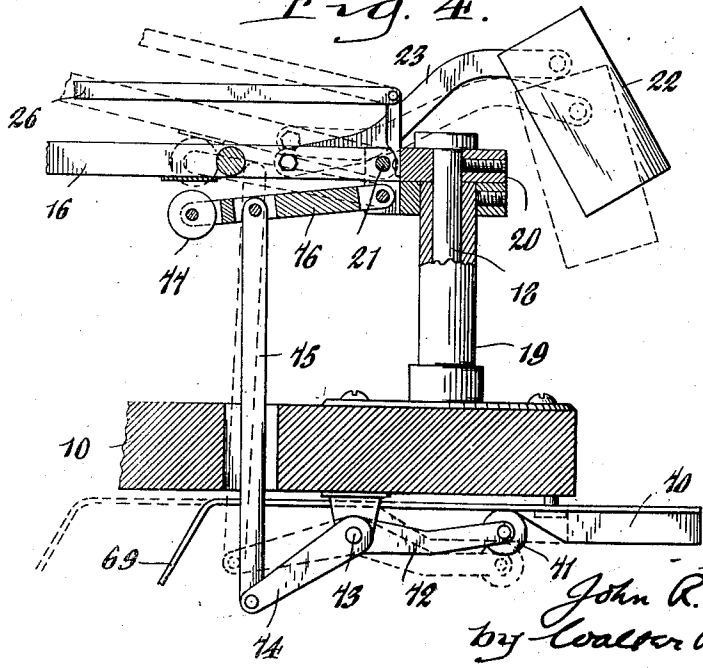


Fig. 4.



Inventor
John R. Mitchell,
by Walter P. Geyer
Attorney.

May 16, 1939. J. R. MITCHELL 2,158,295

AUTOMATIC PHONOGRAPH

Filed Aug. 24, 1936 4 Sheets-Sheet 2

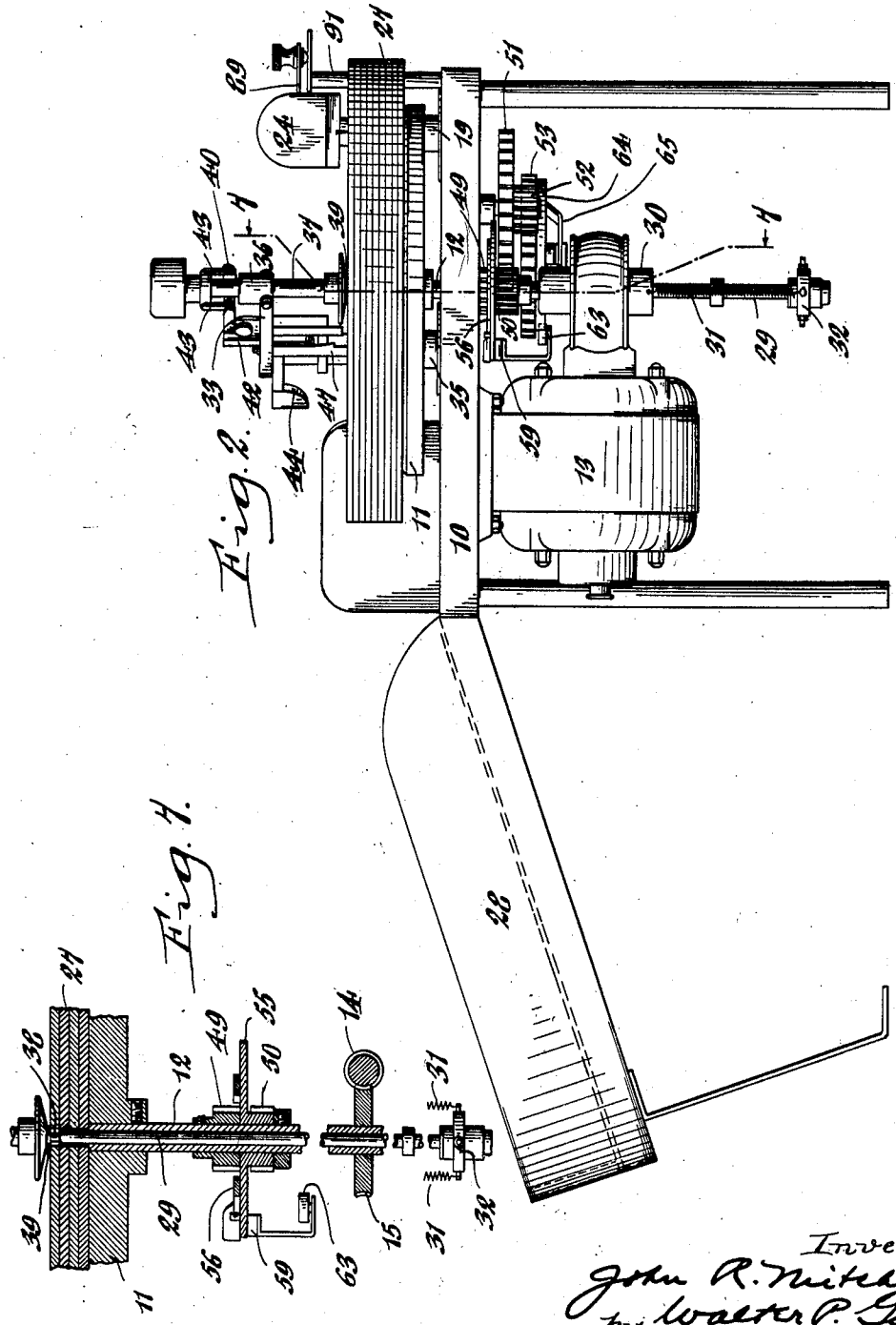


Fig. 2.

Fig. 4.

Inventor
John R. Mitchell,
by Walter P. Geyer
Attorney

May 16, 1939. J. R. MITCHELL 2,158,295

AUTOMATIC PHONOGRAPH

Filed Aug. 24, 1936 4 Sheets-Sheet 3

Fig. 3.

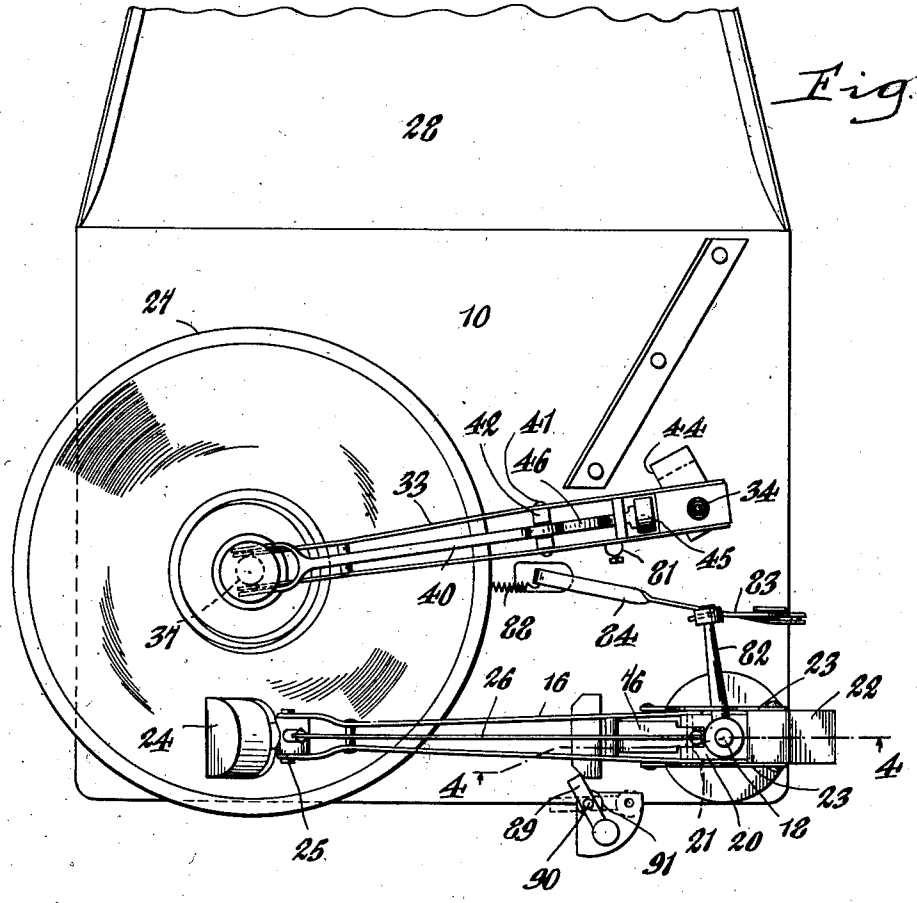
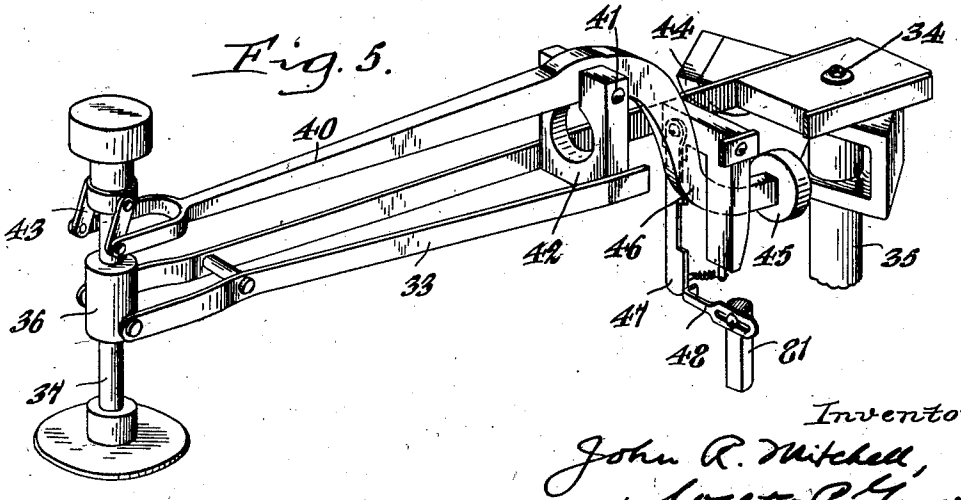


Fig. 5.



Inventor

John R. Mitchell,

by Coates P. Geyer

Attorney

May 16, 1939. J. R. MITCHELL 2,158,295

AUTOMATIC PHONOGRAPH

Filed Aug. 24, 1936 4 Sheets-Sheet 4

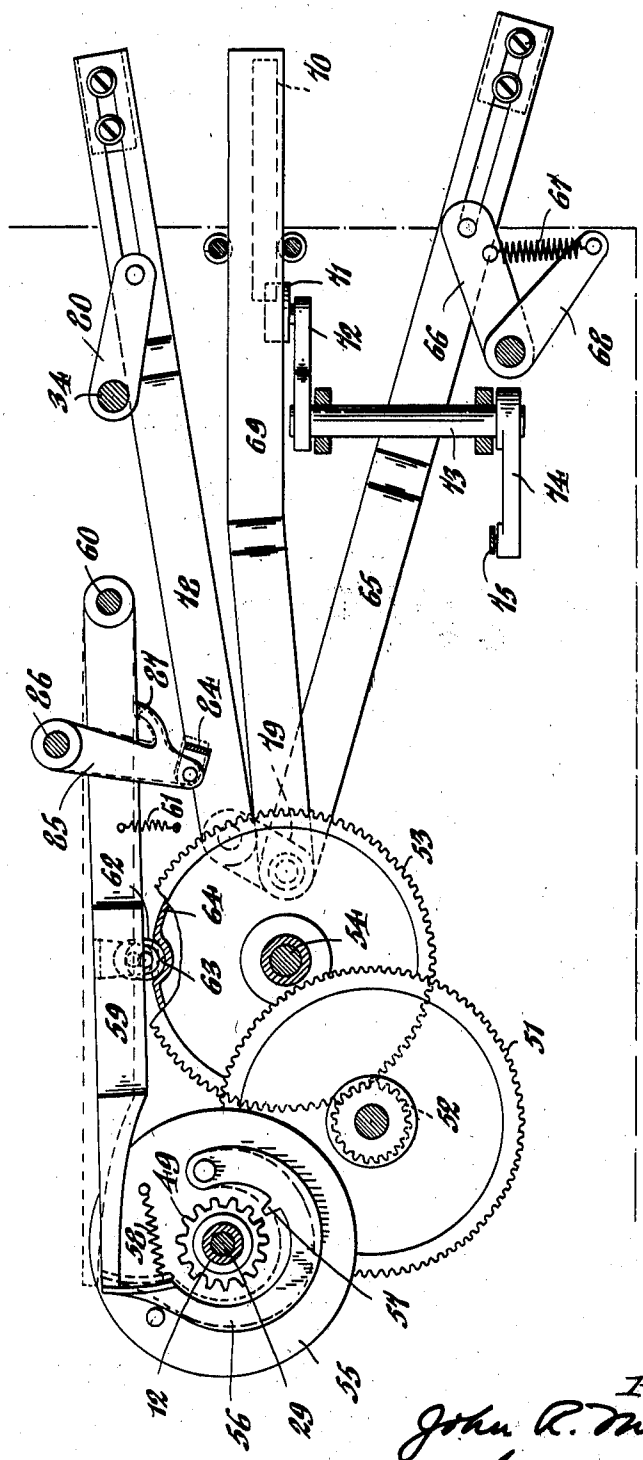


Fig. 6.

Inventor
John R. Mitchell,
by Walter P. Thayer
Attorney

Patented May 16, 1939

2,158,295

UNITED STATES PATENT OFFICE

2,158,295

AUTOMATIC PHONOGRAPH

John R. Mitchell, Dallas, Tex., assignor, by mesne assignments, to The Rudolph Wurlitzer Company, Cincinnati, Ohio, a corporation of Ohio

Application August 24, 1936, Serial No. 97,497

8 Claims. (Cl. 274—10)

This invention relates to improvements in automatic phonographs.

One of its objects is the provision of a phonograph which is designed to continuously play a plurality of records in succession without the necessity for manual attention, and which is provided with simple, compact and quick-acting means for effecting the automatic playing and changing of the respective records.

Another object of the invention is to provide novel means for effecting the discharge of a played record from the stack.

Other objects of the invention reside in the construction and arrangement of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is a side elevation of a phonograph embodying my invention. Figure 2 is a front end view thereof. Figure 3 is a fragmentary top plan view of the same. Figure 4 is an enlarged vertical transverse section taken substantially in the plane of line 4—4, Figure 3. Figure 5 is a perspective view of the record-shifting or discharge arm and associated parts. Figure 6 is an enlarged horizontal section taken substantially in the plane of line 6—6, Figure 1. Figure 7 is an enlarged vertical section taken substantially in the plane of line 7—7, Figure 2.

Similar characters of reference indicate corresponding parts throughout the several views.

Referring now to the drawings, 10 indicates a supporting platform upon which the working parts of the phonograph are mounted and housed within a suitable cabinet not shown. The turntable 11 is mounted on a revolving hollow stem or shaft 12 and is driven from an electric motor 13 through the medium of a worm 14 and worm wheel 15. The tone arm 16 is capable of swinging horizontally toward and from the axis of the turntable as well as vertically to bring its needle 17 clear of the record when returning from the end of its play position to starting position. For this purpose it is fulcrumed on an upright post or rock shaft 18 journaled in an upright bearing 19 applied to the platform 10. Attached to the upper end of this post to swing therewith is a bracket plate 20 to which the tone arm is pivoted, as indicated, at 21, to swing vertically a counterweight 22 being preferably provided on rearward extensions 23 of the tone arm to counterbalance its weight. The sound box 24 of the tone arm is pivoted at 25 to the outer or free end thereof and in order to maintain the needle 17 at substantially the same relative position to a record while playing the records in the stack at their respective elevations, a link 26 is provided which is disposed parallel to the tone arm and is pivotally connected at its ends to the bracket plate 20 and the sound box 24, as shown in Figure 1.

The turntable 11 is adapted to support a plurality of records 27 disposed in superposed relation thereon in the form of a stack, the records being played in succession from the top to the bottom of the stack, and after a record is played it is discharged and positively directed or shifted laterally from the stack to a suitable chute or receptacle 28 provided for receiving it. Extending upwardly through the turntable and its hollow shaft 12 and engageable with the usual center openings of the several records of the stack, with the exception of the topmost one, is a vertically-adjustable spindle 29 which constitutes an adjustable guide and centering post for retaining the records on the turntable, and which is yieldingly suspended from a supporting collar 30, disposed axially of the turntable shaft, by coil springs 31 attached at their lower ends to a bearing member 32 applied to the lower end of the adjustable spindle 29. These springs tend constantly to lift the spindle upwardly through the record stack.

The means for discharging a played record laterally from the stack into the receptacle 28 consists of a horizontally-swinging record-shifting or discharge arm or member 33 mounted on the upper end of an upright rock shaft 34 journaled in a bearing sleeve 35 applied to the platform 10. At its outer or free end this arm is provided with an upright guide member 36 in which a vertically movable centering pin 37 is guided for alining abutting engagement at its lower end with the opposing upper end of the yieldably-suspended, record-engaging spindle 29. At its lower end this pin has a teat or projection 38 which is of a length substantially equal to that of the thickness of a record and whose resulting shoulder 39 bears against the top side of the exposed record of the stack, as shown in Figure 7, whereby this pin centers the uppermost record of the stack during play and maintains the played record in coupling engagement with the pin when its arm 33 is shifted laterally to discharge the played record. This pin 37 normally abuts the spindle 29 to jointly form therewith a sectional or divided record-engaging spindle and as the records are successively played and discharged this pin, through gravity, lowers the spindle out of guiding engagement with the uppermost or

exposed record and brings its teat 38 into engagement with the latter. Overhanging this laterally shiftable arm 33 to move therewith is an elevating lever 40 pivoted at 41 to a bracket 42 carried by the arm and having its bifurcated front end connected by pivoted links 43 with the upper end of the pin 37. This lever 40 serves, when actuated, to elevate the pin 37, after a record has been discharged, to an elevation where it will clear the top record of the stack when the record-shifting arm is returned to its normal position. The means for so elevating the pin consists of a cam 44 applied to the bearing sleeve 35 and disposed in the path of movement of a roller 45 applied to an extension 46 of such arm. A yieldable latch bar 47 depending from the inner end of the arm is adapted to interlock with the arm-extension 46 the moment the arm is shifted by the cam to its elevated position. This latch bar retains the arm in its elevated position during the return movement of the arm to its normal position and when it reaches that position the latch bar encounters a trip member 48 which releases the latch from the arm extension 46 and permits the arm to be lowered by gravity to bring its pin 37 into alining axial relation with the top record and the spindle 29.

The means for actuating the movements of the tone arm 16 to and from the record and outwardly from the end of its playing position to its initial playing position, are preferably constructed as follows:

Mounted on the turntable shaft 12 is a gear 49 which is adapted to be releasably clutched to a train of gears 50, 51, 52 and 53, the latter constituting the driving member for actuating the movements of the tone arm and being mounted on an upright shaft 54 supported from the platform 10. The clutch may consist of a disk 55, to which the gear 50 is attached and which is loosely mounted on the shaft 12, and mounted on this disk is a pivoted pawl 56 having a tooth 57 adapted to interlock with one or another of the teeth of the gear 49, so that when the clutch-pawl is engaged motion will be transmitted to the driven gear 53. A spring 58 tends to swing the pawl into its engaged position while a trip lever 59 pivoted at 60 serves at a predetermined time to shift the pawl to its released position and maintain it in that position by a spring 61 acting on the trip lever, as shown in Figure 6. A roller 62 carried by this trip lever is adapted to engage a recess 63 in an annular flange 64 of the gear 53 to arrest and hold the parts to be actuated in their respective positions of rest. During the record-changing operation, the gear 53 makes one complete revolution, and during that time the roller 63 bears against the gear flange 64 and maintains the trip lever 59 in a position clear of the pawl 56.

Connected to the gear 53 to be actuated thereby is a reciprocating link or pitman 65 which is connected at its slotted free end to an arm 66 loosely mounted on the lower end of the tone arm rock shaft 18 and connected by a spring 67 with a crank arm 68 fixed on said shaft, the spring allowing for a certain amount of lost motion during the movement of the pitman and ultimately causing a turning of the rock shaft in a direction to swing the tone arm outwardly to its position for playing the next record. During this lost motion period the tone arm is elevated clear of the record and this is accomplished by a reciprocating link or pitman 69 having a cam 70 thereon engageable with a roller 71 mounted on a crank arm 72 applied to one end of a horizontal rock shaft 73 whose opposite end has an oppositely-extending arm 74 connected to the lower end of an upright link 75, the upper end of the latter being connected to a vertically-swinging arm 76 having a roller 77 at its free end adapted to bear against the underside of the tone arm forwardly of its pivot 21, as shown in Figure 4.

Also actuated by the driven gear 53 is the mechanism for controlling the movements of the record-discharging arm 33 to and from its discharge position. For this purpose a reciprocating link or pitman 78 is provided which is pivotally connected at its inner end to an arm 79 pivoted to the gear 53 and whose outer slotted end is connected to a crank arm 80 applied to the lower end of the discharge-arm rock shaft 34. Thus, at a predetermined time the arm 33 will be shifted outwardly carrying the played record with it and discharging into the receptacle 28, after which the arm will be returned to its initial position to bring its pin 37 into axial alinement with the turntable and spindle 29. A stop 81 rising from the platform 10 serves to positively limit the inward swinging movement of the arm 33 to its proper radial position over the record stack.

The tone arm 16, after the playing of a record, is adapted to automatically effect the release of the trip lever 59 from the clutch pawl 56 to engage the clutch and establish a driving connection to the driven gear 53 to in turn actuate the reciprocating bar mechanisms for controlling the movements of the tone arm and the record-discharge arm. Projecting from the pivoted end of the tone arm is a radial trip pin 82, which, when the tone arm needle encounters the usual eccentric groove at the inner portion of the record, causes this trip pin to rock a bell crank lever 83 in a direction to engage the clutch, this lever being connected by a link 84 with a rock arm 85 pivoted at 86 and having a toe or projection 87 adapted to abut against the opposing edge of the trip lever 59 to shift the latter from engagement with the clutch-pawl 56 and to allow the spring 58 to engage the clutch. A spring 88 connected to the link 84 serves to normally urge the rock lever in a direction to bring its upper arm against the trip pin 82.

This phonograph is adapted to play records of different sizes, say either 10" or 12" records, and for this purpose stop means are provided for limiting the outward swinging movement of the tone arm 16 and arresting it at the proper position for playing a 10" or 12" record. The stop for playing the 10" record is preferably in the form of a horizontally-swinging lever 89 pivoted at 90 to a supporting post 91 and having a depending arm 92 which constitutes a limiting stop against which the tone arm is adapted to abut for properly presenting the tone arm in playing position with a 10" record. When this lever is swung to the dotted line position shown in Figure 3, its stop arm 92 is displaced out of the path of the tone arm, and the supporting post 91 constitutes a limiting stop for setting the tone arm for playing engagement with a 12" record.

I claim as my invention:

1. In an automatic phonograph, a turntable adapted to support a stack of records, a yieldingly-suspended spindle normally extending through the record-openings and depressible below the top record of the stack for withdrawing it from engagement therewith, a laterally-swinging, record-discharge member normally over-

hanging the record-stack in a stationary position during the playing of the top record and movable to a position beyond the stack to discharge a record after play, and having a vertically movable element guided thereon for abutting engagement with the spindle to retain it in its depressed position out of engagement with the top record, said element engaging the opening of the top record in such position to couple such record therewith, means for actuating said discharge member at predetermined times in directions beyond the stack to discharge the record by gravity from its coupling element after play and to return said member over the stack in coupling engagement with the next record, said vertically movable element being normally moved downwardly by gravity, means including an operative connection to said element for raising the same, latch means for retaining said element in such elevated position after the discharge of a record and during the inward swing of the record-discharge member to its initial position, a tone arm, and means initiated by the tone arm after the playing of a record for rendering said actuating means operative.

2. In an automatic phonograph, a turntable adapted to support a stack of records, a displaceable sectional spindle extending through the openings of the records to releasably retain them in operative position on the turntable, said spindle including an upper section and a lower turntable-engaging section, the latter having means acting thereon for yieldingly urging it upwardly through the several records of the stack, a laterally swinging record-discharge arm movable to positions axially over and at one side of the stack of records for coupling engagement with a record during playing and for automatically removing a record therefrom after playing, the upper section of said spindle being guided for axial movement in said arm and adapted by gravity to extend into the opening of the top record for coupling engagement therewith and for axial abutting engagement with the companion lower spindle-section to depress it out of engagement with the opening in the top record, means for actuating said arm beyond the stack to discharge a played record by gravity from the upper spindle-section and thereafter return said arm over the stack to its initial position to bring its spindle-section into axial alinement with the next record in the stack, cam means for controlling the axial shifting of said upper spindle-section to elevate it clear of the record-stack after discharging a played record beyond the stack, releasable latch means for retaining said upper spindle in its elevated position during the inward swing of the discharge arm to its initial position over the stack, and means for releasing said latch means when such position is reached to effect the gravity-lowering of said upper spindle-section into coupling engagement with the next record.

3. In an automatic phonograph, a turntable adapted to support a stack of records, a tone arm, a depressible, yieldingly-suspended spindle normally extending through the records of the stack, a laterally-swinging record-discharge arm having an axially-shiftable pin therein constituting a separable continuation of said spindle and adapted for engagement therewith to depress it by gravity from the top record and bring said pin into register with the axial opening of such top records, elevating means applied to the record-discharge arm and operatively connected to the axially shiftable pin for controlling the raising and lowering movements of said pin at the ends of the outward and inward swinging movements of said arm, respectively, and means engageable with said elevating means at predetermined times during the outward and inward swinging movements of said arm for actuating such elevating means in a direction to raise and lower said pin, respectively.

4. In an automatic phonograph, a turntable adapted to support a stack of records, a tone arm, a depressible, yieldingly-suspended spindle normally extending through the records of the stack, a laterally-swinging record-discharge arm having an axially-shiftable pin therein constituting a separable continuation of said spindle and adapted for engagement therewith to depress it from the top record and bring said pin into register with the axial opening of such top record, a vertically-swinging lever applied to said arm and connected at one end to said pin for controlling its raising and lowering movements, and means disposed in the lateral path of travel of said lever and engageable with the other end of said lever for actuating the same during the laterally-swinging movements of the discharge arm to raise and lower said pin at predetermined times.

5. In an automatic phonograph, a turntable adapted to support a stack of records, a tone arm, a depressible, yieldingly-suspended spindle normally extending through the records of the stack, a laterally-swinging record-discharge arm having an axially-shiftable pin therein constituting a separable continuation of said spindle and adapted for engagement therewith to depress it from the top record and bring said pin into register with the axial opening of such top record, a vertically-swinging lever applied to said arm and connected at one end to said pin for controlling its raising and lowering movements, means engageable with said lever for actuating the same during the laterally-swinging movements of the discharge arm to raise and lower said pin at predetermined times, and means in the lateral path of and acting upon the other end of the vertically swinging lever for releasably latching said lever in its raised position to hold the pin clear of the record-stack after the discharge of the record beyond the stack and during the return of the discharge arm to its initial position over the stack.

6. In an automatic phonograph, a vertically-swinging tone arm, a turntable adapted to support a stack of records and having a hollow drive stem, a yieldingly-suspended spindle extending upwardly through said stem and through the record-openings and adapted to be depressed from engagement with the top record of the stack, a laterally-swinging record discharge arm disposed over the record-stack during playing of a record and having a vertically-movable pin guided thereon for movement into abutting engagement with said spindle to depress it below the top record and bring said pin into axial coupling engagement with such record, means for moving said pin into and out of operative, record-coupling position, drive means for said turntable-stem, actuating means for lowering and raising the tone arm to bring its needle into and out of engagement with a record, actuating means for swinging the tone arm to its initial play position after playing a record, actuating means for swinging the discharge arm to and from its record-discharge position at one side of the record-stack, a clutch-controlled drive means for the aforesaid actuating means, respectively, and a trip mechanism operatively connected to the drive

means and governed by said tone arm for controlling said clutch-controlled drive means.

7. In an automatic phonograph, a tone arm pivoted to swing horizontally and vertically to and from a record-play position, a turntable adapted to support a stack of records, a motor including a shaft driven thereby for rotating the turntable, a spindle disposed axially of the turntable for vertical movement relative thereto and constituting an adjustable guide and centering post for retaining the records on the turntable, means for yieldingly urging said spindle upwardly with the opening of the records in the stack, a horizontally-swinging, record-discharging member normally overhanging the record-stack and having a vertically movable centering pin at its free end for alining abutting engagement at its lower end with the opposing upper end of said record-engaging spindle, said pin constituting a continuation of the spindle and extending into the center opening of the uppermost record of the stack and having a shoulder thereon bearing against such record, and means for actuating the tone arm to and from its play position and the record-discharging member to and from its discharge position, comprising a driven member, a clutch interposed between the motor-shaft and said driven member for operating the latter during a record-change operation, driving connections between said driven member and the tone arm for swinging the latter into and out of engagement with a record and outwardly over the record to its initial position, a second driving connection between said driven member and the record-discharging member for moving the latter to and from its record-discharging position, a trip mechanism controlled by said tone arm for controlling said clutch, a vertically-swinging arm carried by said record-discharging member and connected at one end to its record-engaging pin for actuating said pin vertically, cam means disposed for engagement with said arm to elevate it and said pin to a position clear of the record-stack upon discharging a played record, means for releasably holding said arm in its elevated position during the return of the record-discharging member to its initial play-engaging position, and means for tripping said releasing means at a predetermined time to cause said pin to drop into alining abutting engagement with said spindle.

8. In an automatic phonograph, a turntable adapted to support a stack of records, a depressible, yieldingly-suspended spindle normally extending through the records of the stack, a laterally-swinging, record-discharge arm having an axially-shiftable pin therein constituting a separable continuation of said spindle and adapted for engagement therewith to depress it from the top record and bring said pin into register with the axial opening of such top record, a vertically-swinging lever fulcrumed intermediate its ends to said arm and connected at one end to said pin for controlling its raising and lowering movements, said lever being normally urged by gravity to its pin-lowering position, means disposed in the lateral path of travel of the other end of said lever for actuating the same about its fulcrum in a direction to raise the pin at a predetermined time in the outward swing of the record-discharge arm, a latch engageable with said lever to retain it in its elevated position during the inward swing of said arm to its initial position, and means for releasably tripping said latch from engagement with said lever at a predetermined time in the inward swing of said record-discharge arm.

JOHN R. MITCHELL.