Jan. 12, 1932. R. R. ERBE 1,840,660

PHONOGRAPH

Filed March 6, 1929

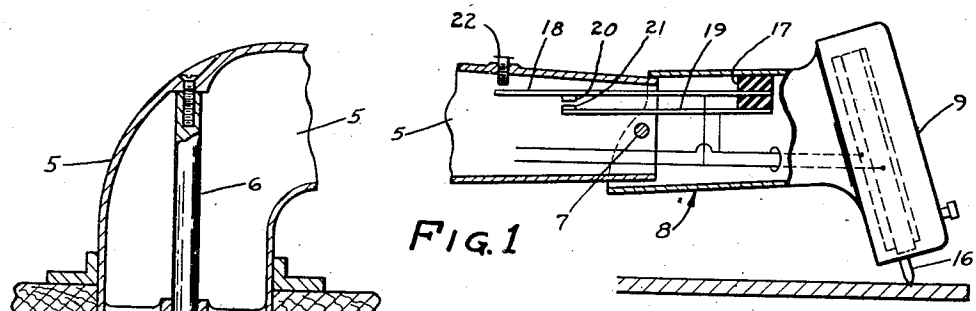


FIG. 1

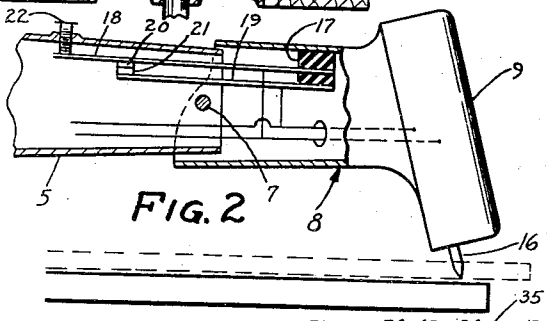


FIG. 2

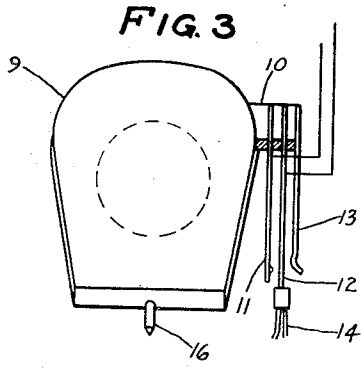


FIG. 3

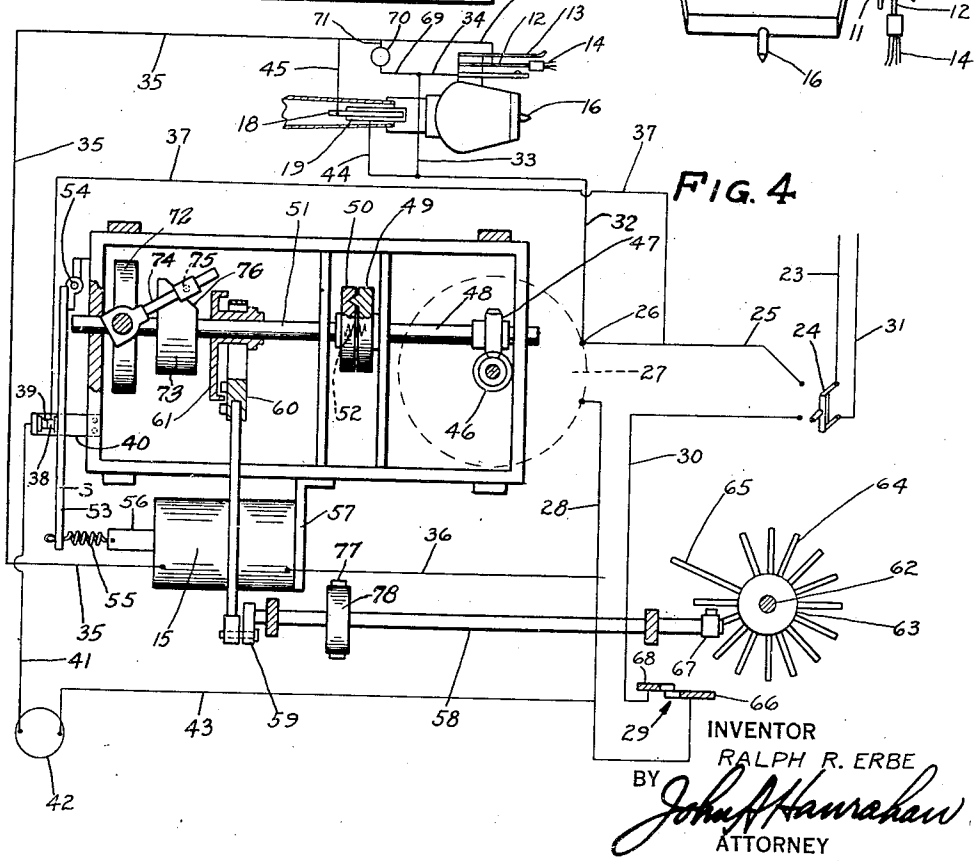


FIG. 4

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UNITED STATES PATENT OFFICE

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PHONOGRAPH

Application filed March 6, 1929. Serial No. 344,676.

This invention relates to new and useful improvements in phonographs and has particular relation to a circuit and circuit controlling means for automatic or multiple playing phonographs.

According to the present invention means are provided for closing a circuit on the completion of the playing of a record, the closing of the circuit energizing means which sets into operation means for elevating and swinging the stylus away from the inner end of the record groove, the elevating of the stylus operating a second means to close the circuit, and then returning the stylus to operative position at the beginning of the record groove, the return of the stylus to operative position serving to open said second circuit closing means.

A further object is to provide a circuit closing means associated with the stylus carrying element which circuit closing means is held open by engagement of the stylus with a record and automatically moved to close the circuit when the stylus is raised off the record.

An additional object is to provide a circuit closing means associated with the stylus carrying means for closing a circuit on the stylus ceasing its movement across a record in combination with a second means for maintaining said circuit closed while the stylus is suspended.

A still further object is to provide means for breaking the circuit to an amplifier on the completion of the playing of a record.

Yet an additional object is to provide a means for closing a circuit on the completion of the playing of a record and other means for maintaining said circuit closed.

A further object is to provide in combination with a supporting arm mounted only for swinging movement in a horizontal plane and having a movable end section carrying a stylus support and mounted for vertical movement only, a circuit closing means controlled by said end section and adapted to close a circuit when the section moves a predetermined distance.

Additional objects are to provide improved circuits for a phonograph and particularly for a multiple or automatic phonograph including electrical means for amplifying sound, improved circuit controlling means for said circuits, said circuit controlling means including means in the circuits for cutting off power to the amplifying means on completion of one of said circuits for placing in operation the record changing means, and/or stylus shifting means.

With the foregoing and other objects in view, as will become more apparent as the description proceeds, the invention consists in certain novel features of construction, combination and arrangement of parts as will be hereinafter more fully described in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, the drawing and this description are only for the purpose of teaching the invention and changes and rearrangement of parts as well as the omission of parts may be made without departing from the spirit of the invention or the scope of the appended claims.

In the drawings:—

Fig. 1 is a view partly in section and partly in side elevation showing the arrangement of switches on the supporting arm, the stylus being shown in operative position in engagement with a fragment of a record;

Fig. 2 is a somewhat similar view of the forward end of the support but showing the stylus in inactive position;

Fig. 3 is a view in front elevation of the "pick-up" or reproducer showing the switch carried thereby; and

Fig. 4 is a diagrammatic view some mechanism being indicated to make clear the action of the parts.

Referring in detail to the drawings, at 5 is shown a support or arm mounted on pin 6 or in any other suitable manner for swinging movement in a horizontal plane only, and hollow at its forward end as shown. Attached to the forward end of this horizontal movable arm 5, as by means of a horizontal pivot or pin 7 is an end section 8, hollow, as in the case of the arm, and carrying at its forward end a reproducer 9 which may be either an electrical pick-up or an

acoustic reproducer of any or the usual construction. In this specification the word reproducer is used to include an electric pick-up or an acoustic sound box. As is clear from the drawing, the pivot 7 permits only vertical movement of the end section 8, relative to the support or arm 5.

Attached to the reproducer unit is a switch. The switch includes a block of insulation 10, carrying a stationary contact 11, and a flexible contact 12. Also mounted on the insulating block, and at the end opposite the reproducer is a contact or stop 13. Contact 12 carries a brush 14 or other device adapted to engage the face of the record disk and to follow in the grooves. The contact 11 and 12 are normally disengaged so that the circuit to a solenoid 15, (Fig. 4) is open, but are brought together incident to the continued inward travel of the brush toward the center of the record, after the reproducing needle 16 has entered the continuous circular groove formed in the disk at the end of the record groove, it being apparent that the needle reaches the continuous groove in advance of the brush, and that since the brush is following in the spiral groove of the record, it will be crowded against the contact 11. When the needle reaches the end of the record groove, the brush 14 moves in the record grooves until the flexible contact 12 becomes engaged with the contact 11, thereby closing a circuit.

Within the movable section 8, is a switch. This switch includes a block 17, of insulating material supporting spring arms 18 and 19 provided with contacts 20 and 21 respectively. Spring arm 18, is longer than spring arm 19 and extends beyond its contact 20 as clearly shown in Fig. 1 and 2. An adjusting screw, 22, extends through a wall of the tubular support 5, in a position to engage the extended end of arm 18, and limit its movement in one direction. The arms 18 and 19 are movable with the end section 8, and when the stylus is in engagement with a record, (Fig. 1) these arms occupy the relative positions shown in this figure. However, when the support 5 is elevated, the section 8 swings on its pivot 7, resulting in movement of the arms 18 and 19. Screw 22, limits the movement of arm 18, as before described and as a result the contacts 20 and 21, are brought into engagement as shown in Fig. 2.

In Fig. 4, is shown the complete wiring diagram and certain mechanical parts, the structure and operation of which are fully disclosed in my application Serial No. 270,363, of April 16, 1928. In the figure, current entering thru wire 23, from any suitable source passes thru switch 24, to wire 25 which leads to contact 26 on the motor 27. The circuit of the motor is completed thru a wire 28, a switch 29, wire 30, thru the other arm of switch 24 to wire 31. Wires 30 and 31 being connected to any suitable source of supply.

To enable the stylus and the motor to work together, wire 32 leads from the contact 26, and is connected by wires 33 and 34 to the stationary arm 11. Now when the stylus ceases its movement and the circuit is closed through the arms 11 and 12, owing to the continued movement of the arm 12 under the influence of brush 14, current passes thru wire 35, to the solenoid 15, previously mentioned, and a circuit from the solenoid is completed by a wire 36 to the wire 28 and thru switch 29 as previously described.

The wire 37, leads off the wire 25, to a contact 38, carried by a clutch shifting arm S, controlled by the solenoid 15. A contact 39, co-operating with the contact 38 is carried by bracket 40 and a wire 41, from contact 39 leads to the loud speaker 42. A wire 43 completes the circuit from the loud speaker to the line 28.

When the playing of a record is finished, the producer is automatically lifted from the record, as previously stated and the movable section 8 drops, moving contacts 20 and 21 into engagement. Also when the reproducer is elevated the arms 11 and 12, spring apart breaking the circuit thorugh them. Now, the circuit is thorugh wire 32, and wire 44 to spring arm 19, through contacts 21 and 20, to arm 18, through wire 45, to the line 35, and to the solenoid 15 as before.

The motor 27, drives a worm 46 meshing with a worm gear 47, on a shaft 48, said shaft carrying a clutch element 49. The clutch comprises two co-operating friction discs 49 and 50, the element 50 being carried on the end of a shaft 51 and the elements are held apart by a spring 52. Clutch elements 49 and 50 are so arranged as to effect a driving connection between the shaft 48 and 51 by the inward swinging of a lever 53 which is hingedly attached to one end as at 54, to the base or frame. The inward swinging of this lever causes the shaft 51, to move inwardly engaging clutch elements 49 and 50 whereby the shaft is driven. This is effected through a spring connection 55 with the core bar 56 of the solenoid 15, that is fixed to the frame of the machine by means of a bracket or member 57. When the solenoid is energized through connection with the main circuit, the core 56 is drawn inwardly and this places the spring 55 under tension and pulls the lever 53 inwardly. This action of the solenoid, whereby the clutch is set and the transfer mechanism thus put in motion, is occasioned at the completion of playing a record by the closing of a circuit through the solenoid by the automatic momentary contacting of the arms 11 and 12, carried on the

reproducer unit at the end of the tone arm, as previously described.

Carried on shaft 51 are a pair of cams 72 and 73 each secured to the shaft to turn with it. The lower end of rod 6 rests on the cam 72 and as this cam rotates, the end of the rod rides on the periphery of the cam being raised and lowered during a complete revolution of the cam, and carrying the arm 5 with it.

Secured to rod 6 near its lower end is a laterally extending arm 74 carrying a depending finger 75 adapted to be engaged by the face 76 of a cam 75 to be moved, resulting in the turning of the rod 6 and the swinging outwardly of the arm 5.

For the purpose of the downward tilting of the record supporting rack which is necessary for each record transfer operation, a shaft 58 has a crank arm 59, fixed to one end thereof, and this is connected by a rod to a member 60, that is actuated by a cam 61, on the horizontal shaft 51. The shaft 51, is stationary during the playing of a record, but is set in motion for the record changing operation by the setting of the friction clutch mechanism as previously described.

Movement imparted to shaft 58 is transmitted therefrom through a belt 77 disposed about a pulley 78 thereon. This belt drives means (not shown) for operating record transfer means.

For setting the device to automatically stop itself after playing a selected number of records, I have provided a switch actuating mechanism operating in connection with the shaft 58, and the cut-out switch 29, in the wire connection 30. The setting device consists of a knob (not shown) fixed in the upper end of a shaft 62. On the lower end of the shaft is a wheel 63, having a plurality of radially extending pins 64 therein, one of which, here designated as 65, is considerably longer than the others and is adapted to be brought into contact with the yieldable contact 66, of the controlling switch. On the end of the shaft 58, which overlies the wheel, is a block 67. Each operation advances the long pin 65, one interval closer to the switch and finally brings it against the movable contact 66, of the controlling switch. On the tact 68 and opens the motor circuit to stop the machine. The mechanical operation of these parts is the same as shown in my copending application Serial No. 270,363 of April 16, 1928, wherein the mechanical arrangement is more fully shown and described.

Means are provided for manually closing the circuit to the solenoid 15. As shown in Fig. 4, this means includes a wire 69, leading from wire 34, to one side of a push button 70. The other side of the push button is connected with line 35 by a wire 71.

It is believed that the operation will now be clear. However, briefly stated, when the stylus reaches the end of a record the circuit is closed by arms 11 and 12 coming into contact and when the reproducer is elevated the contacts 20 and 21 are closed, as the contact between arms 11 and 12 is broken. The circuit through solenoid 15, will be closed by arms 11 and 12, and shaft 51 shifted to engage the clutch elements 49 and 50, whereby the support 5, is elevated and contacts 20 and 21 closed and the solenoid maintained energized. This situation continues until the stylus is again brought into engagement with a record when the contacts 20 and 21 are separated, breaking the circuit through the solenoid and the clutch elements 49 and 50 are moved apart.

Operation of the push button 70, has the same effect as the contacting of arms 11 and 12.

It is to be noted that owing to the arrangement of contacts 38 and 39, the circuit to the loud speaker or other amplifiers is broken during the record changing operation.

Having thus described the invention what is claimed is:—

1. In a phonograph, an electric circuit, means for closing said circuit on the completion of the playing of a record, electrical means within said circuit adapted on being energized to put into operation means for removing the played record and replacing it with another record, a second circuit, a sound amplifier within the second circuit, and means within the first circuit adapted to open the second circuit on the completion of the playing of a record.

2. The combination as in claim 1, including means whereby the circuit through the amplifier is closed when the phonograph starts to play the replacing record.

3. In combination with a multiple playing phonograph, an electric circuit, means for closing said circuit on the completion of the playing of a record, means within said circuit for setting into operation record changing means, a second circuit, a sound amplifier within said second circuit, and means within the first circuit for opening the second circuit on the closing of the first circuit.

4. A combination as in claim 3, including means for maintaining the first circuit closed during the transfer operation.

5. A combination as in claim 3, including means for maintaining the first circuit closed during the operation of changing records and including means for breaking said first circuit at the beginning of the playing of the second record.

6. The combination as in claim 3, including means for breaking the first circuit and closing the second circuit at the beginning of the playing of a record.

7. In combination, a supporting arm mounted for swinging movement in a horizontal plane, means to raise and lower said

arm, a movable end section mounted on said arm for horizontal movement therewith and for vertical movement relative thereto, said end section adapted to swing downwardly relative to the supporting arm as the spporting arm is raised, and a circuit closer adapted to move to circuit closing position on the downward swing of said end section.

8. In a phonograph, including a vertically movable stylus support, an electric circuit, electrically operated means in said circuit, mechanical means thrown into operation by said electrically operated means for elevating the stylus support, means for closing the circuit on the completion of the playing of a record, said means adapted to move to break the circuit on the elevating of the stylus support, a second circuit closing means brought into operation on the elevating of the stylus, and said second circuit closing means adapted to be moved to open the circuit on the stylus being again lowered into contact with a record.

9. In a phonograph, an electric circuit, electrically operated means in said circuit, means controlled by said electrically operated means for elevating the stylus support of the phonograph, means for closing the circuit on the completion of the playing of a record, a second closing means for said circuit brought into operation on the elevating of the stylus, a sound amplifier in said second circuit, and means in said first circuit adapted when the first circuit is closed to automatically open the circuit to the sound amplifier.

10. In a phonograph, mechanism for removing a played record and replacing it with another record, a reproducer, means actuated thereby upon completion of the playing of a record for placing said record changing mechanism in operation, an electric circuit, a sound amplifier within said circuit, and means actuated upon completion of the playing of the record for opening the circuit through said sound amplifier.

11. The combination as in claim 10, including means whereby the circuit through the sound amplifier is closed when the phonograph starts to play the replacing record.

Signed at Bridgeport, in the county of Fairfield, and State of Connecticut, this 5th day of March, A. D. 1929.

RALPH R. ERBE.