July 28, 1925. 1,547,259

T. E. NIBLOCK ET AL

ELECTRIC CONTROL

Filed Aug. 20, 1924 2 Sheets-Sheet 1

Fig. 1.

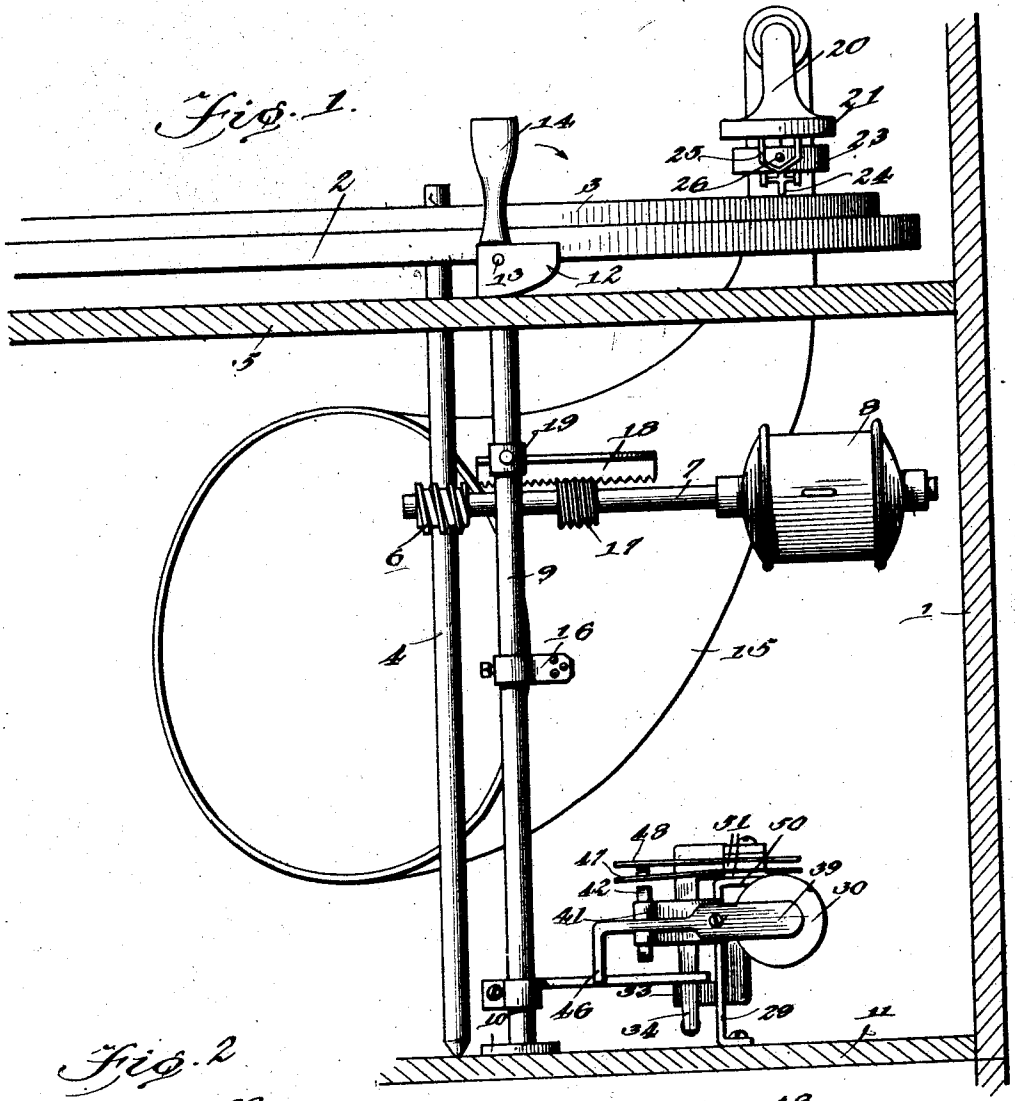


Fig. 2

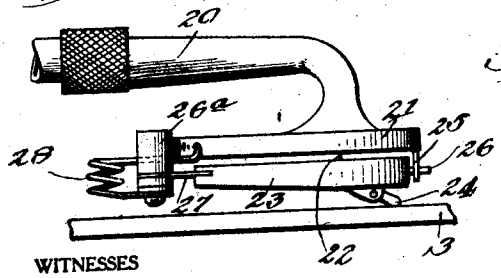
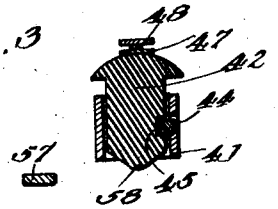


Fig. 3



WITNESSES

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Fig. 4.

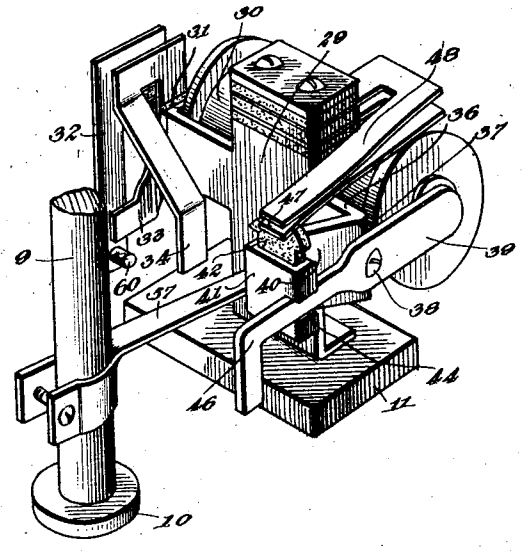


Fig. 5.

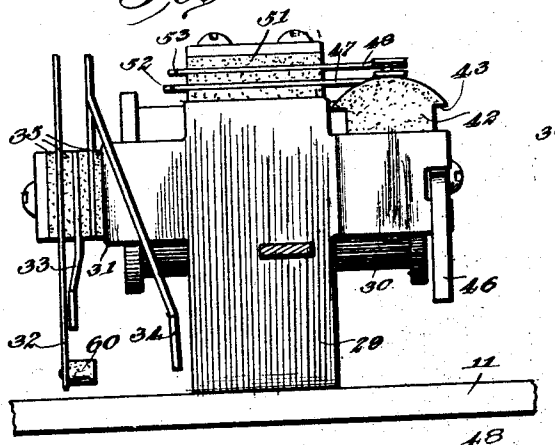


Fig. 6.

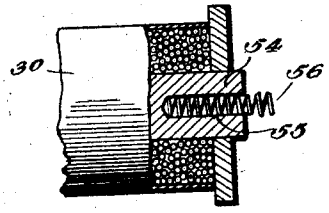
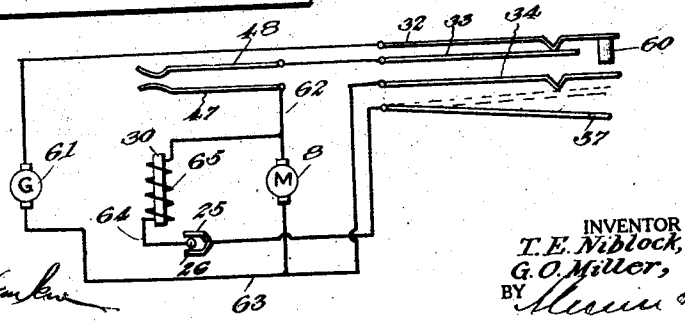


Fig. 7.



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UNITED STATES PATENT OFFICE.

THOMAS EUGENE NIBLOCK AND GUY OSCAR MILLER, OF GREAT FALLS, MONTANA.

ELECTRIC CONTROL.

Application filed August 20, 1924. Serial No. 733,242.

To all whom it may concern:

Be it known that we, THOMAS EUGENE NIBLOCK and GUY OSCAR MILLER, citizens of the United States, and residents of Great Falls, in the county of Cascade and State of Montana, have invented certain new and useful Improvements in Electric Controls, of which the following is a specification.

This invention relates to an electrical switch and more particularly to a device especially adapted for controlling the operation of an Edison type of phonograph when driven by an electric motor.

An object of the invention is the provision of a switch adapted to be automatically operated through the oscillation of the horn and tone arm for causing in proper sequence the starting and stopping of the mechanism of the phonograph without requiring the attention of the operator other than that of placing the stylus upon the face of the record

Another object of the invention is the provision of a simple, inexpensive and reliable device adapted to be automatically operated by the disposition of the tone arm at certain points along the record whereby the motor for rotating the record will be automatically started or stopped.

This invention will be best understood from a consideration of the following detailed description, in view of the accompanying drawing forming a part of the specification; nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Figure 1 is a vertical section of an Edison disc phonograph showing our invention applied thereto.

Figure 2 is a side view of the tone arm and stylus holder and connection between the tone arm and stylus holder constructed according to the principles of our invention.

Figure 3 is a vertical section of the plunger adapted to be automatically operated for controlling a switch.

Figure 4 is a view in perspective of the switch for controlling the motor.

Figure 5 is a side view of the same.

Figure 6 is a fragmentary enlarged view with parts broken away showing the construction of the magnet.

Figure 7 diagrammatically shows the electric wiring for the switch control of the motor and generator.

Referring more particularly to the drawings, 1 designates a section of the cabinet for housing the motor and operating mechanism for a turntable 2 adapted to carry a record 3. A vertical shaft 4 which passes through the top 5 of the cabinet is rigidly connected with the turntable 2 and projects upwardly through a central perforation in the record 3. Shaft 4 is driven by a worm 6 engaging a worm gear on the shaft (not shown). The worm 6 is on a shaft 7 driven by an electric motor 8.

A rock shaft 9 is mounted in a bearing 10 on the floor 11 of the chamber 1 of the cabinet and has its upper end in a bearing in the top 5 of the cabinet. The shaft is vertically moved through a cam member 12 pivoted at 13 to the shaft 9 and has an oscillating operating handle 14 which when moved in the direction indicated by the arrow is adapted to elevate the rock shaft 9 while the vertical position of the handle 14, as shown in Figure 1, maintains the shaft in its normal position.

A horn 15 is connected by a strap 16 to the rock shaft 9 and is adapted to be oscillated through the rocking of said shaft.

A worm 17 on the shaft is adapted to be engaged by an arcuately shaped rack 18 rigidly connected with the shaft 9 through a collar 19.

The upper reduced end of the horn 15 passes through an opening in the top 5 of the cabinet and is extended upwardly in goose-neck fashion and is connected with a tone arm 20 The tone arm is enlarged, as shown at 21, to provide a sound box and a diaphragm which is connected by means of a wire 22 to a stylus carrier 23, the stylus being shown at 24. Projecting downwardly from the periphery of the sound box 21 is a U-shaped member 25 through which is inserted a pin 26 connected with the stylus carrier 23.

Adjacent the reduced rear end of the sound box is located a post 26a. A resilient insulating bar 27 is connected with said post and has its outer free end inserted within a slot in the rear end of the stylus carrier 23. A coil spring 28 has one end secured to the sound box 21 and its other end secured to

the bottom of the post 26ª. The spring 28, post 26ª and resilient insulating bar 27 permits oscillation of the stylus holder 23 in a horizontal plane and also oscillation in a vertical plane.

A switching device is secured to the base member 11 by a foot on a bracket or a standard 29. The frame or bracket 29 is formed of soft ductible iron adapted to be bent and formed to provide a suitable means of support for an electro-magnet 30 which is mounted horizontally and with its axis parallel to the vertical standard of the frame, one end of the magnet being secured to an inturned arm, as shown at 31 in Figures 4 and 5. From the upper part of the bracket 29 that supports the electromagnet 30 and at right angles to the axis of said magnet are mounted three contact springs 32, 33 and 34 which are insulated from the frame and from each other by the members 35. On the opposite end of the frame 29 is provided an arm 36 which is bent inwardly to form a shoulder 37 to which is pivotally mounted at 38 an armature 39. The arm 36 is bent inwardly, as shown at 40 and bent back upon itself several times to provide a guide 41 for an insulated plunger 42 which has shoulders 43 adapted to engage the upper end of the guide 41 and limit the downward movement of said plunger. The guide is provided with a slot as shown at 44 alining with a notch 45 in the plunger 42 adapted to receive an arm 46 at the opposite end of the armature 39 for locking the plunger 42 against movement which is maintained normally in depressed position by the spring contact member 47.

A second spring contact 48 is located above the spring contact 47 and normally engaged with it when the plunger 42 is in its most elevated position and locked in such position by the engagement of the arm 46 with the notch 45 in said plunger. The outer fixed ends of the spring contacts 47 and 48 are rigidly secured to the horizontal arm 50 of the bracket 29 and insulated therefrom and with the spring contacts insulated from each other by members 51. The fixed ends of the spring contact members 47 and 48 are respectively projected beyond the insulating members 51 as shown at 52 and 53 and adapted to be connected with the circuits of the motor.

The core 54 of the magnet 30 is provided with a recess 55 in which is inserted a coil spring 56. The outer free end of the spring is adapted to engage the free end of the armature 39 and maintain said armature outwardly from the core 54 so that the arm 46 will be maintained within the slot 44 of the guide 41.

An arm 57 is rigidly connected with the rock shaft 9 and is adapted to engage the conical end 58 of the plunger 42 when said arm is moved in engagement with the bottom of the plunger whereby the plunger is forced upwardly and engages the spring contact 47. When the shaft 9 is rocked in the opposite direction the arm 57 is likewise moved in an opposite direction and engages the spring contact member 34 and moves it into engagement with an insulating block 60 on the end of the spring contact member 32 for moving said contact member out of engagement with the contact member 33.

The motor 8 may be connected with a generator 61 or as is usual with the ordinary house current and where the generator is shown it may be indicative of the current supplied to the driving motor.

Contact 47 is connected by means of wire 62 with the motor 8; contact 48 is electrically connected with the spring contact 33; spring contact 32 is connected to one pole of the generator or to one wire of the house current, while the other pole or wire of the house current is connected by means of a wire 63 to the motor 8 and to contact 34. Pin 26 is connected by means of a wire 64 to the windings 65 of the magnet 30. The other end of the coil of the magnet is connected to the wire 62 which connects motion 8 with contact 47. The U-shaped member 25 is electrically connected to the spring contact member 57.

The operation of our device is as follows:

Assuming that it is desired to replace the record 3 (Figure 1) with another, compress the handle 14 in the direction indicated by the arrow whereby the cam 12 will cause the rock shaft 9 to be raised together with the horn 15, causing disengagement of the rack 18 from the worm 17, raising of tone arm 20 and stylus 24 from the record and also elevating the operating arm 57 on shaft 9 to a point which is level with the lower end of guide 41. The handle 14 is then rotated in a clockwise direction. This action will cause shaft 9 to rotate in the same direction and will carry the reproducer 23, the rack 18 and the operating arm 57 to extreme outer position. Just before the arm reaches the extreme outer position it will engage with the depending arm 46 of the armature 39 and move the same outwardly from its engagement with the notch 44 in the guide 41 and the notch 45 in the plunger 42 and the pressure of the spring contact member 47 on the plunger will force the plunger downwardly and thus separate the spring contacts 47 and 48 and opening the circuit of the motor 8.

To start the phonograph after replacing the record, revolve the handle on the cam in a counter-clockwise direction until the stylus 24 is directly over the outer music groove on the face of the record. At this time the shaft 9 has been rotated in a clockwise manner until the operating arm 57 has passed beneath the guide 41 engaging the conical end 58 of the plunger 42

and thus moving the plunger upwardly and forcing contact 47 into engagement with contact 48 and the latch arm 46 will automatically seat within the notches 44 and 45 and lock the plunger against downward movement. The contact springs 32 and 33 are normally closed and as the contact springs 47 and 48 are in series with the contact springs 32 and 33, it will be seen from Figure 7 that as soon as the contact springs 47 and 48 are closed by raising the plunger 42 the motor 8 will be started. This action in turn causes the turntable 2 and the record to rotate and the stylus 24 is now lowered into the music groove on the face of the record and rack 18 in engagement with the worm 17 by moving the handle 14 to its normal upright position.

As the record is played the stylus holder 23 is carried across the face of the record by the stylus 24 and the music groove in the face of the record. The upper part of the reproducer 21 is carried across the face of the record at the same time and at the same speed as the stylus holder by the worm 17 and the rack 18. Pin 26 is approximately centered in the U-shaped member 25 as long as the stylus remains seated in the music groove in the face of the record. As the record is played the operating arm 57 is moved back towards the contact spring 34. The operating arm comes in contact with said spring contact at a short time before the stylus leaves the music groove at the end of the reproduction of the record.

It will be seen from the wiring diagram (Figure 7) that one lead from the generator is connected to the iron frame of the phonograph so that the pin 26 is charged at all times when contacts 47 and 48 are closed. Therefore when the operating arm 57 makes contact with the contact springs 34 and when the contacts 32 and 33 and 47 and 48 are closed, which is the normal position of contacts during reproduction of the record, the U-shaped member 25 is also charged by the other lead from the generator or the house current. When the stylus 24 leaves the music groove at the end of the record, the pin 26 is forced over into contact with a side of the U-shaped member 25 by the action of the spiral spring 28. This contact of the pin and the member 25 completes the electrical circuit through the magnet 30. The electric current flowing through the electromagnet 30 sets up a magnetic flux in the core of the magnet and this flux sets up a force which overcomes the counter force of the coil spring 56 acting upon the armature 39 and draws the end of the armature in engagement with the core 54. When the armature is oscillated the arm 46 is moved outwardly from the guide 41 and is released from the notches 44 and 45 whereby the plunger 42 is supported in elevated position. This releases the plunger 42 and causes the contacts 47 and 48 to separate and breaks the electrical circuit to the motor which consequently stops the turntable 2.

If, however, for any reason the plunger 42 should fail to drop or the contacts 47 and 48 fail to open the motor 8 would continue to run. This would cause the operating arm 57 to force the contact spring 34 back until said spring contact engages the insulating block 60 on the spring contact 32. Continued rearward movement of the spring contact 34 will cause the spring contact 32 to be removed from contact 33 and break the electrical circuit through the motor and the electromagnet 30 thus causing the phonograph to stop. This latter action of the arm 57 in breaking the circuit through the contacts 32 and 33 acts as a safety device for the motor.

Another record may now be played by repeating the above described operation.

Substantially all the features of this invention are applicable to all types of phonographs except that feature wherein the motor circuit is automatically opened at the instant the stylus reaches the end of music groove at the end of the reproduction of the record and it must be borne in mind that the automatic feature is especially adapted on an Edison diamond disc phonograph.

What we claim is:

1. In an electrically driven phonograph having a stylus carrier, a motor, a circuit connected with said motor, a switch for closing said circuit, the combination of means for retaining said switch closed, electrical means for causing release of the retaining means to cause opening of the switch, and an open circuit connected with the electrical means, a switch in the last mentioned circuit actuated by a predetermined position of the stylus carrier for closing said circuit whereby the electrical means is operated to release the retaining means and break the circuit to the motor.

2. An electrically driven phonograph having a stylus carrier, a motor, a circuit connected to the motor, a switch for closing said circuit, the combination of a plunger for retaining said switch closed, and electrical means for causing release of the plunger to cause opening of the switch, an open circuit connected with the electrical means, a switch in the last mentioned circuit actuated by the predetermined position of the stylus carrier for closing said circuit whereby the electrical means is operated to release the plunger and actuate the first mentioned switch to break the circuit to the motor.

3. An electrically driven phonograph having a stylus carrier, a motor, the combination of a circuit connected with said motor, a switch for closing said circuit, a spring

pressed plunger for maintaining the switch closed, a latch adapted to engage the plunger for preventing release of said plunger, and electrical means for causing actuation of the latch to release the plunger and cause opening of the switch, an open circuit connected with the electrical means, a switch in the last mentioned circuit actuated by the predetermined position of the stylus carrier for closing said circuit whereby the electrical means is operated to actuate the latch to release the plunger and break the circuit to the motor.

4. An electrically driven phonograph having a stylus carrier, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with the electrical means, a switch actuated by an abnormal movement of the stylus carrier for closing said last mentioned circuit whereby the electrical means is operated to release the retaining means and break the circuit to the motor, and means for causing the abnormal movement of the stylus carrier.

5. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with the electrical means, a sound box having a diaphragm, a stylus carrier connected to the diaphragm, said stylus carrier having independent movement of the sound box, a contact carried by the sound box, a contact on the stylus carrier, the two contacts forming a switch and connected with the open circuit, means for causing the contacts to become engaged to close the circuit whereby the electrical means is operated to release the retaining means and break the circuit to the motor.

6. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with the electrical means, a sound box having a diaphragm and carrying a contact, a stylus carrier connected with the diaphragm and provided with a contact engageable with the contact on the sound box for closing the circuit to the electrical means, and means for connecting the sound box with the stylus carrier and adapted to actuate the stylus carrier relative to the sound box for causing the contacts to engage.

7. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with the electrical means, a sound box having a diaphragm, a stylus carrier connected to the diaphragm, said stylus carrier having independent movement of the sound box, a contact carried by the sound box, a contact on the stylus carrier, the two contacts forming a switch and connected with the open circuit whereby when the contacts are engaged the circuit will be closed whereby the electrical means is operated to release the retaining means and break the circuit to the motor, a resilient means connecting the sound box and the stylus carrier and for moving the stylus carrier relative to the sound box in a horizontal plane whereby the contacts are caused to engage and close the circuit to the electrical means.

8. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an arm, means connecting the arm with the motor for causing revolution of said arm, a switch in the circuit to the motor, said arm being moved to a predetermined position by the motor for actuating the switch to open the circuit, an open circuit connected with the electrical means, a switch actuated by a predetermined position of the stylus carrier for closing the last mentioned circuit whereby the electrical means is operated to release the retaining means and break the circuit to the motor.

9. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with electrical means, a switch in the last mentioned circuit actuated by a predetermined position of the stylus carrier for closing said circuit whereby the electrical means is operated to release and break the circuit to the motor, a third switch in the motor circuit, and means operated by the motor for causing actuation of the switch to break the circuit to the motor.

10. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, means for retaining said switch closed, and electrical means for causing release of the retaining means to cause opening of the switch, an open circuit connected with the electrical means, a switch actuated by a predetermined

position of the stylus carrier for closing the last mentioned circuit whereby the electrical means is operated to release the retaining means and break the circuit to the motor, an arm adapted to be revolved, means connecting the arm with the motor for causing revolution of said arm, a third switch in circuit to the motor, said arm being moved to a predetermined position by the motor for causing actuation of the switch to open the circuit, and a horn adapted to be synchronized for movement with the oscillation of the arm.

11. In an electrically driven phonograph, a motor, a circuit connected with said motor, a switch for closing said circuit, a plunger for retaining said switch closed formed of insulating material, an armature adapted to engage the plunger and maintain the plunger in position to retain the switch closed, a solenoid adapted to operate the armature for releasing the plunger, an open circuit connected with the solenoid, a switch in the last mentioned circuit actuated by a predetermined position of the stylus carrier for closing said circuit whereby the solenoid is energized to operate the armature, and electrical means operated by the motor for breaking the motor circuit.

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