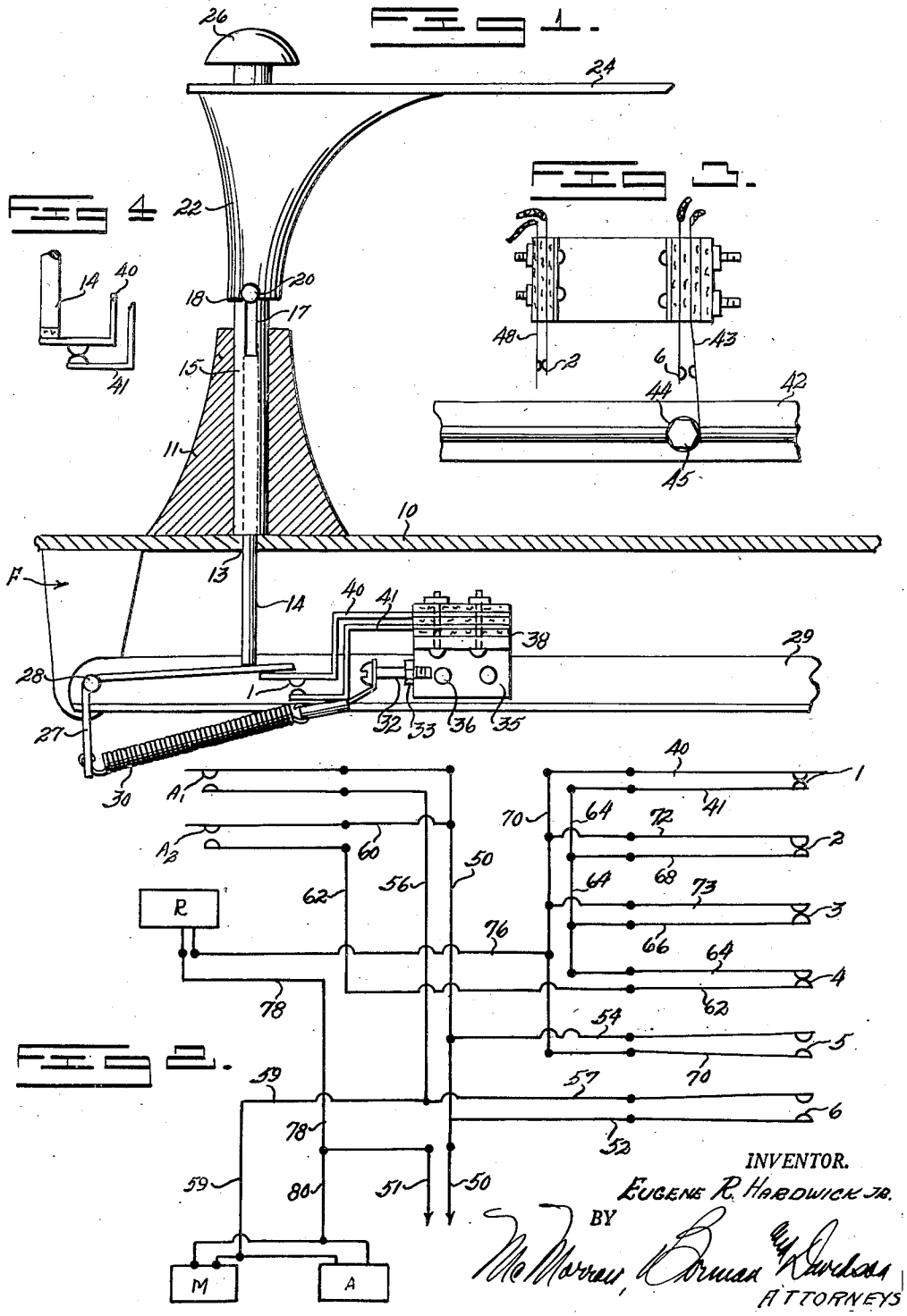
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TERMINATING MECHANISM FOR RECORD CHANGERS

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TERMINATING MECHANISM FOR RECORD CHANGERS

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1

This instant invention relates to means operative to automatically stop the motor of an automatic record changer when the last record of a stack has been lowered on the turntable and played.

The stop mechanism of the invention is particularly designed for use with an electrically driven phonograph of the automatic type where a stack of records is supported above the turntable. The lowermost record of the stack is selectively released from the stack to drop upon the turntable. This may be accomplished by the movement of a peripheral support provided with means for engaging only the lowermost record.

Upon completion of the playing of a record, a cam shaft is connected through a clutch with the motor driving the turntable. A number of operations are performed during each revolution of the cam shaft. First, the tone arm with its pick-up unit is lifted from the record and swung out of the way. Then, the peripheral support engages the lowermost of the records to drop it into playing position on the turntable. Finally, the tone arm is brought into record playing position on the outer groove of the new record on the turntable, which is now in readinesss to be played.

An object of the invention is to provide an improved device to be installed on or manufactured as a part of an automatic phonograph of the drop type and adapted for stopping the record changing mechanism after the completion of the cycle after which the last record has been dropped and played.

These and further objects of the invention will become more apparent in the following device of a preferred embodiment of the invention illustrated in the drawing wherein:

Figure 1 is a vertical section of the record changer forming the preferred embodiment of my invention.

Figure 2 is a wiring diagram.

Figure 3 is a detail view of a pair of switches operated during the changing cycle.

Figure 4 is a detail modification.

In Figure 1 of the drawing, numeral 10 denotes a plate forming part of a boxlike frame F and from which rises a standard 11 having substantially the shape of a truncated cone and provided with a bore registering with an opening 13 through which a rod 14 extends. The same is longitudinally slidable in a hollow shaft 15 provided with a longitudinal slot 17 for a pin 18 affixed to the rod and causing the latter to turn with the shaft. The conical standard is a limit stop for the pin 18 which is seated in a pair of

2

diametrical notches 20 at the lower end of the sleeve portion 22 having at its upper end a record supporting arm 24 which drops the record by turning and is usually one of a pair of arms. The sleeve 22 surrounds the upper part of the shaft which terminates in a cap 26.

When no records rest on arm 24 rod 14 and pin 18 are urged upwardly by the upper and substantially horizontal arm of a bell crank 27 which is fulcrumed upon a pin 28 mounted in an angle 29 of the frame F. The other substantially vertical arm of the bell crank is fastened to one end of a spring 30, the other end of which is connected to the head of a screw 32 adjustably threaded into a nut 33 affixed to the angle 29. An angle bracket 35 has its vertical flange secured by rivets 36 or otherwise to the angle 29 and has a horizontal flange supporting insulation 38 and a pair of conductors 40, 41 insulated from the bracket and one another by such insulation.

The free ends of the conductors have contacts forming a switch 1 urged to open position by the resiliency of the upper conductor 40, but closed by the weight of a record on arm 24, such weight stretching the spring 30 (Figure 1).

In a modified form of construction illustrated in Figure 4 the lower end of rod 14 bears directly upon the upper conductor 40 and when supporting a record closes the switch 1.

Figure 2 is a wiring diagram showing in addition to switch 1 another switch 2 which may be either a pair of points or a switch of a type similar to the so-called "microswitch." This latter switch is located in the boxlike frame below the plate 10 and is urged by resiliency to closed position but is momentarily brushed and opened by the conventional mechanism also located in the boxlike frame and actuating the arm 24. This conventional mechanism is operated by a motor and comprises a pair of levers or cranks each connected to an arm 24 and also connected to one another by a link 42 which brushes the switch 2 and opens the same momentarily and then permits it to close before the record is dropped on the turntable (Figure 3).

A switch 3 is also housed in the frame and is an ordinary snap switch within easy reach of the operator and is only opened by the latter when the use of the mechanism being described is contemplated.

A fourth switch 4 is a push button switch normally closed and momentarily opened by the operator to stop the changer motor.

A fifth switch 5 is normally open and of the push button type and when momentarily closed starts the changer motor.

The last switch 6 is within the boxlike frame adjacent switch 2 and is formed either by a pair of points or a switch of the so-called "microswitch" type. Switch 6 is normally held open by a spring 43 which is engaged by a dielectric post 44 beneath a nut 45 on the link 42 forming part of the conventional record changing mechanism (Figure 3). During the record changing cycle the record releasing angular movement of arms 24, post 44 on link 42 moves to the left and in a circular path and permits the spring 43 to close the switch. As the link continues to move it brushes the left spring 48 of switch 2 thus opening it momentarily, then permitting it to close. This occurs before the record drops on the turntable (not shown). The return movement of link 42 to the right does not reopen the now closed switch 2. Upon the completion of the cycle of movement of link 42 the switch 6 is opened by the engagement between the spring 43 and post 44. Switch 6 is placed in the machine in order to permit the latter to complete its cycle after the termination mechanism has operated, thus preventing the machine from stopping in the middle of the cycle.

A double pole single throw relay R if energized closes a pair of points A1 and a second pair of points A2.

In the wiring diagram of Figure 2 conductors 50, 51 are adapted for connection to a source usually 110 v. One of the points of switch 6 is connected by conductor 52 to conductor 50 and conductor 54 connects one point of switch 5 to conductor 56, the end of which is connected to one of the points A1. The other point A1 is the terminal of a conductor 56 connected by conductor 57 to the other point of switch 6 and also connected to conductor 59 leading to the phonograph motor power input.

One of the points A2 is connected by conductor 60 to conductor 50. The other point A2 is connected by conductor 62 to one of the points of switch 4. The other point of switch 4 is connected by conductor 64 to branch conductors 66, 68 connected respectively to one of the points of switch 3 and switch 2. Conductor 64 is also connected at one end to conductor 41 and one of the contacts of switch 1. The other contact and spring conductor 40 connects to a conductor 70 from which extends a branch 72 to the other contact of switch 2 and branch 73 to the other contact of switch 3. The other end of conductor 70 connects to the other contact of switch 5.

From conductor 70 branches off conductor 76 leading to the relay from which extends a conductor 78 connected at its other end to conductor 51 and conductor 80 leading to the motor M and amplifier A (Figure 2).

In order to operate the mechanism terminating the operation of the record changing device, switch 5, the "on switch" is closed momentarily and current is thereby made to flow into the relay and energizes the same to close the points A1 and points A2. The relay circuit is traceable through conductors 50, 54, switch 5, conductors 70, 76, relay R, conductors 78 and 51.

The closing of A1 causes current to flow to the motor. The closing of A2 will cause the relay to remain energized until either switch 4 which is an off switch normally closed, is opened or switch 3 is opened by the operator wishing to use the terminating mechanism. After the last record has been dropped by the arm 24 on the turntable, switch 1 is opened by the resiliency of the upper spring conductor 40 moving away from the lower conductor. During the cycle after the last record has been played, switch 2 is opened momentarily by the link of the record changing mechanism and for an instant at least switch 1, switch 2, switch 3 are open at the same time and this condition will cause the deenergization of the relay R and the current to the motor will be shut off at the close of the record changing cycle and reopening of switch 6.

If the operator wishes to operate the record changer without the terminating mechanism forming the subject matter of this application, he should leave switch 3 closed.

If the operator wishes to play a stack of records and to have the machine stop when finished, he merely opens switch 3.

During every record changing cycle switch 2 is opened, but the circuit is not interrupted owing to the closed state of switch 1. After the last record of the stack has been dropped, switch 1 will be open during the cycle after the last record has played when switch 2 opens and the relay will open, thus stopping the motor at the close of the cycle.

Various changes and modifications may be made in the details of construction of the invention as described and shown without departing from the broad spirit and scope thereof as set forth in the appended claims.

What I claim is:

1. In an electric motor operated record changer of the type wherein the bottom records of a vertical stack of records are dropped one at a time upon a turntable therebelow, said changer comprising a frame, a vertical post supported on said frame for axial rotation, said post having a lateral record supporting arm arranged to be moved by rotation of said post from a withdrawn position to an operative position in which said arm supportably engages under the bottom record, a post operating element mounted for movement relative to said frame and operatively connected to the electric motor and to said post to move from a starting position to a final position and return to the starting position for rotating said post in a cycle to move said arm from withdrawn position to operative position to support the bottom record of the stack when such bottom record is the last record of the stack and return to withdrawn position, the improvement of means supporting said post for vertical movement relative to said frame in addition to axial rotary movement, spring means for moving said post from depressed to elevated position, the tension of said spring means being adjusted to permit the weight of the last record of the stack to maintain said post in its depressed position and to move said post to its elevated position when the weight of the last record is removed from the record supporting arm of the post and is dropped onto the turntable, and stop switch means comprising a spring opened switch connected in circuit with the electric motor and maintained closed by said post in its depressed position to energize the motor and permitted to open by movement of said post toward its elevated position to deenergize the motor.

2. In an electric motor operated record changer of the type wherein the bottom records of a vertical stack of records are dropped one at a time upon a turntable therebelow, said changer comprising a frame, a vertical post supported on said frame for axial rotation, said post having a lateral record supporting arm arranged to be moved by rotation of said post from a withdrawn

position to an operative position in which said arm supportably engages under the bottom record, a post operating element mounted for movement relative to said frame and operatively connected to the electric motor and to said post to move from a starting position to a final position and return to the starting position for rotating said post in a cycle to move said arm from withdrawn position to operative position to support the bottom record of the stack when such bottom record is the last record of the stack and return to withdrawn position, the improvement of means supporting said post for vertical movement relative to said frame in addition to axial rotary movement, spring means for moving said post from depressed to elevated position, the tension of said spring means being adjusted to permit the weight of the last record of the stack to maintain said post in its depressed position and to move said post to its elevated position when the weight of the last record is removed from the record supporting arm of the post and is dropped onto the turntable, and stop switch means comprising a spring opened switch connected in circuit with the electric motor and maintained closed by said post in its depressed position to energize the motor and permitted to open by movement of said post toward its elevated position to deenergize the motor, a relay circuit including said spring opened switch and the electric motor, said relay circuit comprising additional switch means arranged for operation by said post operating element as said element moves from its starting position to its final position and return so as to produce a cycle of operation of said post and its record supporting arm whereby the deenergization of said motor is delayed beyond the opening of said spring opened switch until said operating element has resumed its starting position.

3. In an electric motor operated record changer of the type wherein the bottom records of a vertical stack of records are dropped one at a time upon a turntable therebelow, said changer comprising a frame, a vertical post supported on said frame for axial rotation, said post having a lateral record supporting arm arranged to be moved by rotation of said post from a withdrawn position to an operative position in which said arm supportably engages under the bottom record, a post operating element mounted for movement relative to said frame and operatively connected to the electric motor and to said post to move from a starting position to a final position and return to the starting position for rotating said post in a cycle to move said arm from withdrawn position to operative position to support the bottom record of the stack when such bottom record is the last record of the stack and return to withdrawn position, the improvement of means supporting said post for vertical movement relative to said frame in addition to axial rotary movement, spring means for moving said post from depressed to elevated position, the tension of said spring means being adjusted to permit the weight of the last record of the stack to maintain said post in its depressed position and to move said post to its elevated position when the weight of the last record is removed from the record supporting arm of the post and is dropped onto the turntable, and stop switch means comprising a spring opened switch connected in circuit with the electric motor and maintained closed by said post in its depressed position to energize the motor and permitted to open by movement of said post toward its elevated position to deenergize the motor, a relay circuit including said spring opened switch and the electric motor, said relay circuit comprising additional switch means arranged for operation by said post operating element as said element moves from its starting position to its final position and return so as to produce a cycle of operation of said post and its record supporting arm whereby the deenergization of said motor is delayed beyond the opening of said spring opened switch until said operating element has resumed its starting position, said relay circuit further comprising a manual switch arranged to be operated to shunt said spring opened switch and maintain energization of said motor during elevation and depression of said post while the changer is in operation.

4. In an electric motor operated record changer of the type wherein the bottom records of a vertical stack of records are dropped one at a time upon a turntable therebelow, said changer comprising a frame, a vertical post supported on said frame for axial rotation, said post having a lateral record supporting arm arranged to be moved by rotation of said post from a withdrawn position to an operative position in which said arm supportably engages under the bottom record, a post operating element mounted for movement relative to said frame and operatively connected to the electric motor and to said post to move from a starting position to a final position and return to the starting position for rotating said post in a cycle to move said arm from withdrawn position to operative position to support the bottom record of the stack when such bottom record is the last record of the stack and return to withdrawn position, the improvement of means supporting said post for vertical movement relative to said frame in addition to axial rotary movement, spring means for moving said post from depressed to elevated position, the tension of said spring means being adjusted to permit the weight of the last record of the stack to maintain said post in its depressed position and to move said post to its elevated position when the weight of the last record is removed from the record supporting arm of the post and is dropped onto the turntable, and stop switch means comprising a spring opened switch connected in circuit with the electric motor and maintained closed by said post in its depressed position to energize the motor and permitted to open by movement of said post toward its elevated position to deenergize the motor, a relay circuit including said spring opened switch and the electric motor, said relay circuit comprising additional switch means arranged for operation by said post operating element as said element moves from its starting position to its final position and return so as to produce a cycle of operation of said post and its record supporting arm whereby the deenergization of said motor is delayed beyond the opening of said spring opened switch until said operating element has resumed its starting position, said relay circuit further comprising a manual switch arranged to be operated to shunt said spring opened switch and maintain energization of said motor during elevation and depression of said post while the changer is in operation, and separate manual momentary on and off switches connected to be operated to energize and deenergize said relay circuit.

5. In an electric motor operated record changer

of the type wherein the bottom records of a vertical stack of records are dropped one at a time upon a turntable therebelow, said changer comprising a frame, a vertical post supported on said frame for axial rotation, said post having a lateral record supporting arm arranged to be moved by rotation of said post from a withdrawn position to an operative position in which said arm supportably engages under the bottom record, a post operating element mounted for movement relative to said frame and operatively connected to the electric motor and to said post to move from a starting position to a final position and return to the starting position for rotating said post in a cycle to move said arm from withdrawn position to operative position to support the bottom record of the stack when such bottom record is the last record of the stack and return to withdrawn position, the improvement of means supporting said post for vertical movement relative to said frame in addition to axial rotary movement, spring means for moving said post from depressed to elevated position, the tension of said spring means being adjusted to permit the weight of the last record of the stack to maintain said post in its depressed position and to move said post to its elevated position when the weight of the last record is removed from the record supporting arm of the post and is dropped onto the turntable, and stop switch means comprising a spring opened switch connected in circuit with the electric motor and maintained closed by said post in its depressed position to energize the motor and permitted to open by movement of said post toward its elevated position to deenergize the motor, a relay circuit including said spring opened switch and the electric motor, said relay circuit comprising additional switch means arranged for operation by said post operating element as said element moves from its starting position to its final position and return so as to produce a cycle of operation of said post and its record supporting arm whereby the deenergization of said motor is delayed beyond the opening of said spring opened switch until said operating element has resumed its starting position, means timing the return of said post operating element

to its starting position and its accompanying operation of a component of said additional switch means sufficiently beyond the opening of said spring opened switch means to permit playing of the last record to take place prior to deenergization of the motor.

6. The combination with an electric motor operated record changer involving a vertical rotary post having a record supporting arm and means operatively connected between the motor and the post for rotating said post through a cycle embracing rotation of said record supporting arm from a withdrawn position to an operative record supporting position beneath the bottom record of a stack of records; of stopping means rendering said changer inoperative upon completion of the cycle of said record supporting arm with respect to the last record of the stack, said stopping means comprising means supporting said post for vertical movement, switch means in circuit with the electric motor and operatively connected to said post whereby said switch means is closed while said post is in a depressed position to energize the motor and open in an elevated position of said post to deenergize the motor, and spring means connected to said post, said spring means being tensioned to permit the weight of the last record of the stack on said record supporting arm in its supporting position to hold said post in a depressed position and to raise said post to an elevated position as said record supporting arm is returned toward withdrawn position and is relieved of the weight of the last record.

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