April 6, 1937. O. M. DUNNING ET AL 2,075,978

PHONOGRAPHIC SYSTEM

Filed May 31, 1935 2 Sheets-Sheet 1

Fig. 1

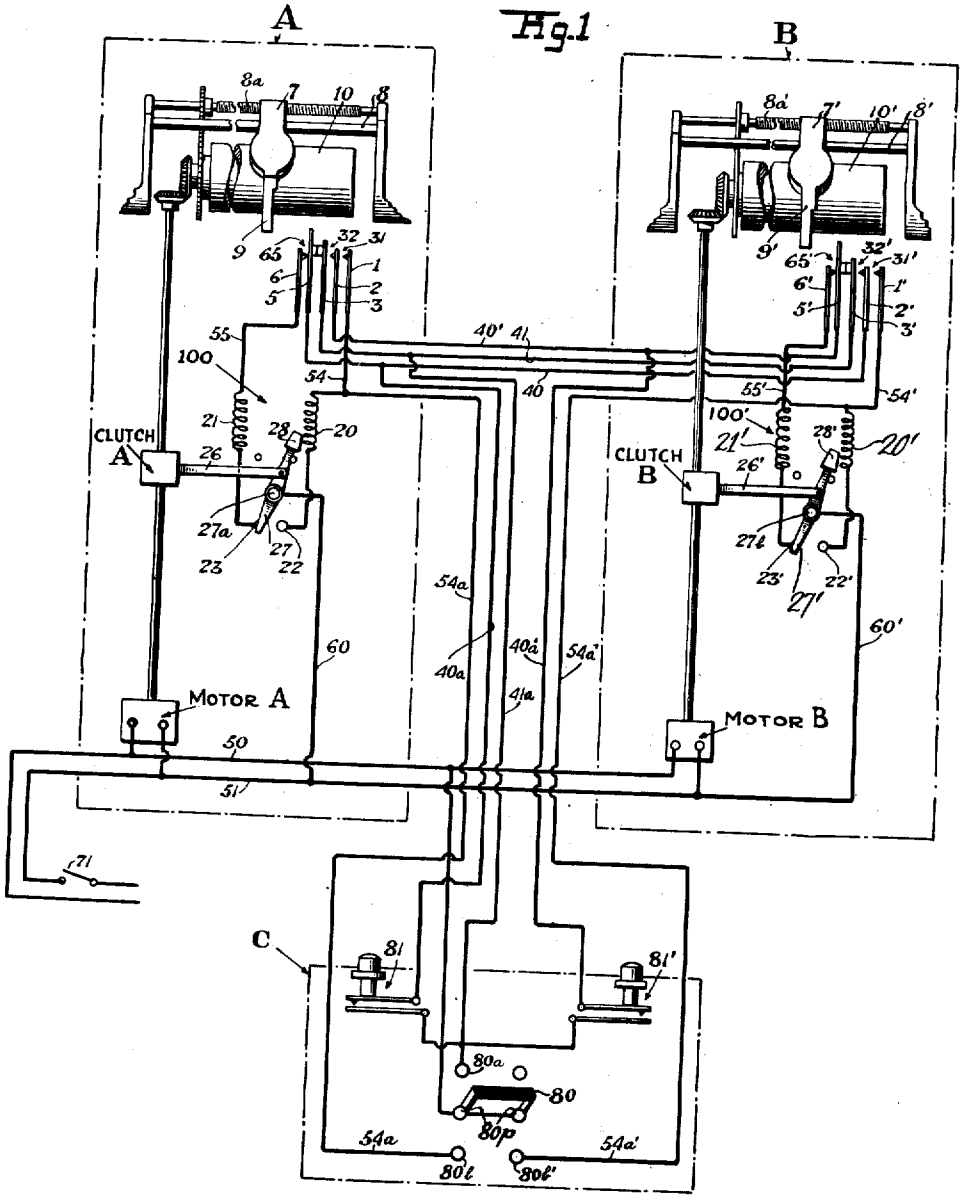

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Fig. 2

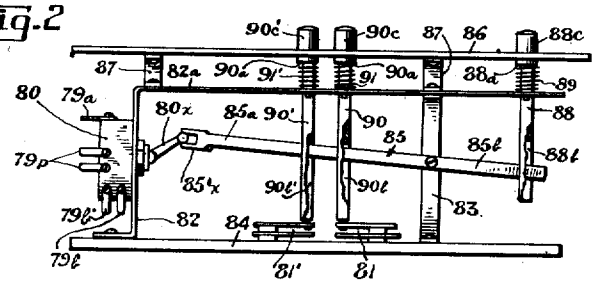
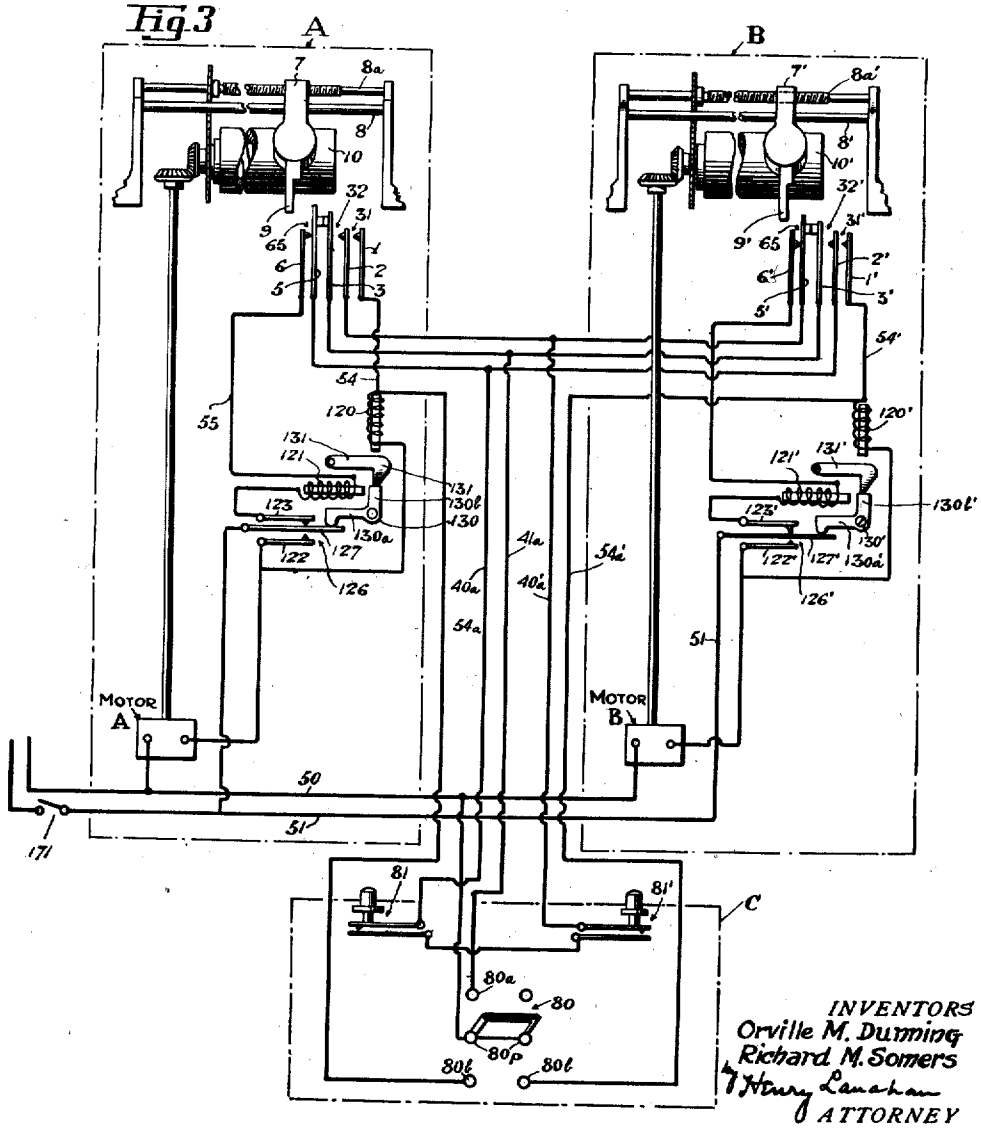


Fig. 3



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2,075,978

PHONOGRAPHIC SYSTEM

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Application May 31, 1935, Serial No. 24,238

22 Claims. (Cl. 274—18)

This invention relates to phonographic systems, and more particularly to means and methods for controlling the operation thereof.

While not in all aspects limited thereto, the invention has particular reference to systems comprising a plurality of phonographs adapted for alternate, or sequential, operation to provide uninterrupted recordation of continuing matter—for example, as shown and described in the copending application of Charles Huenlich, Serial No. 581,870, filed December 18, 1931.

An important object of the invention is the provision of simple and effective means for controlling the operation of a plural phonograph system.

An allied object is the provision of improved means for effecting such control at a point remote from the phonographs proper.

A further object is the provision, in connection with a plural phonograph system arranged for automatic sequential operation, of simple and improved means for stopping and for initiating such operation.

Still a further object is the provision of improvements in a system of the class shown and described in the co-pending application above-mentioned.

Other and allied objects will more fully appear from the following description and the appended claims.

In the description reference is had to the accompanying drawings, of which—

Figure 1 is a schematic diagram of a double phonograph system in one embodiment wherein our invention is incorporated;

Figure 2 is an elevational view of a preferred form of the control station schematically shown in Figure 1; and

Figure 3 is a schematic diagram of a double phonograph system in a modified embodiment also incorporating our invention.

That portion of Figure 1 which is essentially similar to the structure described in the above mentioned copending application of Charles Huenlich may first be described. Two similar phonographs are shown as A and B, respectively; the illustrated components of phonograph B have been designated with numbers similar to those for the corresponding components of phonograph A, excepting that they have been furnished with prime marks. Each phonograph may comprise for example a mandrel (10) adapted to carry a cylindrical record; a sound box (7) adapted to record on and/or reproduce from such a record and adapted to be driven longitudinally thereof as along a guide (8) by means of feed screw 8a; a motor suitably arranged to produce rotational movement of the mandrel and longitudinal movement (in a right hand direction as illustrated) of the sound box; and a clutch interposed between the motor and the parts thereby moved. The sound boxes may be of any known variety, as may also the means for energizing the same—not shown herein because forming no part of the instant invention.

The motors are shown connected in parallel across the main line conductors 50 and 51, current flow through which is controlled by the main line switch 71. Clutch A and clutch B are respectively connected, as by rods 26 and 26', with the arms 27 and 27', which arms may be termed operation control members for the respective phonographs. When either arm is in its limiting clockwise, or "stop", position (as illustrated) the associated clutch is disengaged; when either arm is in its limiting counter-clockwise, or "run", position the associated clutch is engaged. Each arm is selectively moved to its two positions by an associated magnet assembly (100) comprising a pair of stop and start electromagnets (20 and 21), the arm carrying for example an armature (28) at its upper extremity and being thereby adapted upon actuation of either electromagnet to move toward that electromagnet. Each magnet assembly further includes means connected in series with each of the electromagnets and adapted upon actuation of either electromagnet to open-circuit that electromagnet until energization of the other electromagnet. The switching means have been illustrated in each of the magnet assemblies of Figure 1 as comprising the lower extremity of the associated arm (27), and two contacts (22 and 23) respectively in series with the stop and start electromagnets and adapted to be alternately touched by the lower arm extremity. The operation of each magnet assembly may be briefly described, with reference to the assembly 100, as follows:

As illustrated the arm 27 is in its "stop" position, clutch A is consequently disengaged, and the stop electromagnet 20 is open-circuited at contact 22. If now the start electromagnet 21 be actuated (as by impression of a suitable voltage between its upper-shown extremity and the arm 27, at present touching the contact 23) the armature 28 will be attracted by the electromagnet 21 and the arm 27 will rotate to its "run" position, engaging the clutch A, moving the lower arm extremity from the contact 23 to the contact 22,

and thus open-circuiting the start electromagnet and rendering the stop electromagnet capable of actuation. The arm 27 being in its "run" position and the clutch therefore engaged, actuation of the stop electromagnet 20 (as by impression of a suitable voltage between its upper-shown extremity and the arm 27, now touching the contact 22) will attract the armature 28 to that electromagnet and rotate the arm 27 to its illustrated "stop" position, disengaging the clutch A, moving the lower arm extremity from the contact 22 to the contact 23, and thus open-circuiting the stop electromagnet and again rendering the start electromagnet capable of actuation. It will be thus seen that the actuations of the electromagnets are automatically limited to momentary actuations, and that after actuation of either electromagnet the same one cannot be re-actuated until after actuation of the other. Fundamentally the magnet assemblies so described are in accordance, as to structure and function, with the teachings of the U. S. Patent to Langley #1,380,486, issued June 7, 1921. It will be understood that for purposes of the instant invention the function only is of importance, and that further, as will hereinafter appear, the function may be modified to the extent that the arm 27 or its equivalent may if desired control the phonograph operation by other means than a clutch.

As in the system described by Huenlich, there are provided for the several electromagnets a plurality of respective circuits, each adapted upon closing to actuate the respective electromagnet, and a plurality of contact switches operable by the sound boxes in their travel and arranged to effect openings and closings of the circuits. The contacts may first be described, with reference conveniently to phonograph A. Herein will be seen contacts 6 and 5 forming a normally closed switch 65, contact 5 being biased leftwardly. To the right of and insulatedly connected with the contact 5 is provided a contact 3, and to the right of contact 3 successively contacts 2 and 1; contacts 3 and 2 form a normally open switch 32, and contacts 3 and 1 form (through contact 2) a normally open switch 31. A projection 9 is provided on sound box 7, adapted in the normal rightward travel of the sound box to impinge against contact 5, and to move contacts 5 and 3 rightwardly. By this contact movement there is effected in order an opening of the switch 65, a closing of the switch 32, and a closing (through contact 2) of the switch 31. Corresponding contacts and switches and a corresponding sound box projection are of course provided on phonograph B, their designating numerals being each provided with a prime mark.

A stopping circuit for phonograph A is provided, from line conductor 51 to line conductor 50, through conductor 60, switching means 27—22, stop electromagnet 20, conductor 54, contact switch 31, and conductors 41 and 41*a*. A starting circuit for phonograph A is provided, from line conductor 51 to line conductor 50, through conductor 60, switching means 27—23, start electromagnet 21, conductor 55, contact switch 65, conductor 40, contact switch 32′ (on phonograph B), and conductors 41 and 41*a*. Correspondingly for phonograph B are provided a stopping circuit through conductor 60′, switching means 27′—22′, stop electromagnet 20′, conductor 54′, contact switch 31′, and conductors 41 and 41*a*; and a starting circuit through conductor 65, switching means 27′—23′, start electromagnet 21′, conductor 55′, contact switch 65′, conductor 40′, contact switch 32 (on phonograph A) and conductors 41 and 41*a*.

Let it be assumed that phonograph A is operating with the sound box 7 approaching the contact 5, the phonograph B being in readiness for operation with its sound box 7′ at the beginning of its travel path; the extremity of arm 27 will be touching contact 22 in phonograph A, while the extremity of arm 27′ will be touching contact 23′ in phonograph B. Upon impingement of the projection 9 of phonograph A sound box 7 against contact 5, switch 65 first opens; this open-circuits electromagnet 21 of phonograph A, so that it cannot be thereafter actuated until the sound box 7 has been manually moved leftwardly. Upon slight further travel of the sound box 7 the switch 32 is closed; this closes the phonograph B starting circuit (the switch 65′ being in its normal closed position), actuating the electromagnet 21′ and moving the arm 27′ to its "run" position; this places the phonograph B in operation and causes the extremity of arm 27′ to touch contact 22′. For a brief interval at this point in the operation both phonographs will be operating, so that a slight overlap of the recordations of the two phonographs will be effected. Upon still further slight travel of the sound box 7, however, the switch 31 is closed; this closes the phonograph A stopping circuit, actuating the electromagnet 20 and moving the arm 27 to its "stop" position; this places the phonograph A out of operation and causes the arm 27 to touch contact 23. Before the phonograph B sound box 7′ approaches the contact 5′ the phonograph A sound box 7 may be manually moved leftwardly to the beginning of its path of travel, and a fresh record inserted upon mandrel 10.

The conditions of the two phonographs as to operation and component positions will now be seen to be quite reversed from those assumed at the beginning of the preceding paragraph; and the operations of that paragraph are accordingly repeated, but in each case as to the respectively opposite phonograph and components. And upon completion of those operations as to opposite phonograph and components, the operations precisely as described in the preceding paragraph are repeated; and so on, in an automatic alternation which will be unbroken except by the failure to restore one of the sound boxes leftwardly to the beginning of its travel path during the travel of the other sound box. In the event of failure so to restore the sound box of either phonograph, the closing of its starting circuit by the closing of switch 32 (or 32′) on the opposite phonograph is prevented by the open condition of its own switch 65′ (or 65), and upon the stopping of the opposite phonograph the entire system will be out of operation, with both arms 27 and 27′ in their "stop" positions.

In a system operating merely as thus far described, the dictator might cause the stopping of operation of the entire system either by permitting the system to stop itself automatically as just described; or by opening a supply line switch such as 71, either while one only of the phonographs is operating, or during one of the short periods of overlap when both machines are running. Accordingly it would be possible that when operation is to be resumed both the arms 27 and 27′ would be in their "stop" positions, or one in its "stop" and the other in its "run" position ,or both in their "run" positions. Over and above

the random arm positions the possibility exists that since the preceding operation the attendant—who, with the principal portion of the apparatus, may be remotely located from the dictator—has replaced one or both sound boxes at the beginnings of their travel paths. Thus when operation of the system is to be resumed, under certain conditions mere closure of the line switch 71 might start operation of neither phonograph, or might start operation of a single one, or might start operation of both so as to result in simultaneous operation. While there may be employed arrangements by which the dictator may start operation of any phonograph whose sound box is not adjacent its terminal travel limit, starting of operation of only one phonograph in such a case requires that the attendant have left one of the sound boxes adjacent its travel limit. While these system starting difficulties may always be avoided by proper care and attention on the part of the dictator and attendant, the requirement for such attention is a burdensome one.

According to our invention there are provided, for manipulation by the dictator whenever desired, means for so stopping the two phonographs as to leave them in a condition similar to that in which they are left by automatic stopping, and starting means of which normal manipulation results in the starting of operation of one only of the phonographs. These means are comprised in a control station indicated as C in Figure 1, and may be described as follows:

The conductor 41*a*, instead of passing from the conductor 41 directly to the line conductor 50, is led to the control station and therein to one throw contact 80*a* of a double-pole, double-throw switch, of which both the poles 80*p* are connected to the line conductor 50. When the switch is thrown upwardly (in the arrangement as illustrated) to connect one of the poles with the throw contact 80*a*, the connection of 41*a* to line conductor 50 is completed and the system is in an operable condition. The switch may, however, be thrown downwardly to connect the poles with the throw contacts 80*b* and 80*b*', which are respectively connected, by conductors 54*a* and 54*a*', to conductors 54 and 54'; when the switch is so thrown it is obvious that an energizing potential will be supplied to all the stopping circuits (i. e., to all the stop electromagnets) and that accordingly the stop electromagnet of either or both phonographs then in operation (and thus having the arm 27 or 27' in "run" position) will be actuated, causing the assumption by both arms of their "stop" position. This is the condition in which the phonographs leave themselves after automatically stopping as above described. Switch 80 may be considered a device for supplying an energizing potential selectively either to the contact switches for automatic energization of starting and stopping circuits as above described, or directly to both the stopping circuits (i. e., directly to both the stop electromagnets) to cause assumption by both arms 27 and 27' of their "stop" positions.

When operation of the system is to be started by the dictator, one of the arms 27 and 27' must be thrown from "stop" to "run" position. Mere closure of switch 80 will not produce this effect (excepting in the particular case wherein one of the sound boxes has been left at its terminal travel limit); some starting switching means must therefore be provided in the control station, and may now be considered. While the system remains stopped after downward throwing of switch 80, there is no objection to the maintenance of that switch in the downward position. We have found, however, that while the system is operating difficulties are experienced if the starting switching means are maintained in the positions to which they were thrown to initiate the operation of the system. For example, were the switch 80 in its upward throw arranged not merely to place the system in operable condition but also to connect one of the conductors 40 and 40' to the line conductor 50 for actuation of one of the start electromagnets, the system in response to such throw would start and at first operate properly; that start electromagnet upon actuation would automatically be open-circuited at its associated contact 23 or 23' and would remain open-circuited, even after actuation of the associated stop electromagnet, by virtue of the then open condition of the associated switch 65 or 65'. But when the attendant, during operation of the second phonograph, moved the sound box of the first leftwardly (thus closing the switch 65 or 65'), an immediate and therefore premature restarting of the first phonograph would occur because of the resumed connection of conductor 40 or 40' to the line.

We accordingly employ starting switching means closeable to actuate one of the start electromagnets and arranged after closing to open at least as soon as the corresponding stop electromagnet is actuated. A momentary closure of the switch means being sufficient, it is most convenient to comply with the just recited specification by employing a simple form of momentary push-button switch—i. e., one biased to open position and closed only during continued pressure on an included button or other operating finger-piece. To avoid imposing an arbitrary limitation as to which phonograph is to begin operating, we employ for the switch means a pair of momentary push-button switches 81 and 81' respectively arranged for actuating the start electromagnet 21 of phonograph A and the start electromagnet 21' of phonograph B. These switches are connected from contact 80*a* of switch 80 to the respective conductors 40 and 40'; their connection to the contact 80*a* rather than directly to the conductor 50 renders each inoperative to actuate the respective start electromagnet so long as switch 80 is downwardly thrown; this obviates throwing of the arm 27 or 27' under a condition which would result in its immediate and opposite re-throwing. By the two switches 81 and 81' there is made available to the dictator starting means fully selective as to the two phonographs, this contrasting with the stopping means (poles 80*p* and throw contacts 80*b*—80*b*') which is common to the two phonographs. Each of the starting switches will be seen to be connected to a respective one of the automatic starting circuits in parallel with the therein included contact switch 32 or 32'.

It may be noted that in the particular case wherein one only of the sound boxes is adjacent its terminal travel limit and the corresponding switch 32 or 32' therefore closed, mere upward throwing of switch 80 will result in actuation of the start electromagnet associated with the other sound box, rendering unnecessary closure of either switch 81 or 81'. The unnecessary closure of either switch can produce no difficulty, however, as the starting circuit associated with the first sound box is then open-circuited by the corresponding switch 65, while closure of the starting circuit associated with the other sound

box will merely duplicate the effect automatically obtained by closure of switch 80.

While the phonographs are left in an entirely similar condition whether they stop themselves automatically or are stopped by downward throwing of the switch 80, this switch itself is left in respectively opposite positions in the two respective cases. Thus in the first case operation of the system will be resumed merely upon momentary closing of one of the switches 81 and 81' (at least one of the sound boxes having been restored to its initial travel limit since the automatic stopping of the system), while in the second case there is first necessary the upward throwing of switch 80. These starting manipulations required of the dictator in the two cases may of course be generalized as his first making certain that the switch 80 is upwardly thrown and thereafter momentarily closing one of the switches 81 and 81'; they are therefore logically similar. We prefer, however, so mechanically to arrange the apparatus schematically shown in the control station illustration of Figure 1 as to result in absolute similarity of the required starting manipulations. An appropriate arrangement is shown in elevation as Figure 2, which may be described as follows:

In this figure the switch 80 is shown as an enclosed "toggle" switch having a control arm 80*x* pivoted for movement within limits, the switch being of the type whose poles will remain in one of their two throw positions until the control arm 80*x* is moved from one of its limiting positions to near the other, whereupon the poles will suddenly be thrown to their other throw position. The poles and throw contacts do not appear in this enclosed view, but it will be understood that lug 79*a*, lugs 79*b*—79*b'*, and lugs 79*p* are respectively connected to throw contact 80*a*, throw contacts 80*b*—80*b'*, and poles 80*p*. This switch is mounted to a vertical bracket 82 which extends upwardly from a base 84 at one extremity of the latter. The bracket 82 is conveniently provided at its top with a horizontal folded-over portion 82*a* extending over the base so that bracket and base together form a horizontal U; the switch arm 80*x* extends within this U. Transversely of the U near its open end is provided a vertical cross-member 83; to this cross-member is pivoted a lever 85, having an arm 85*a* extending toward and an arm 85b extending away from the switch 80. The lever arm 85*a* has at its extremity a bifurcation 85*x* engaging the switch arm 80*x*. The switch 80 and lever 85 are conveniently so arranged that depression of the lever arm 85*a* will throw the poles 80*p* to connect one of them to the throw contact 80*a* (i. e., upwardly as illustrated in Figure 1), while depression of the lever arm 85*b* will throw the poles to connect to the throw contacts 80*b* and 80*b'*.

Above and spaced from the horizontal bracket portion 82*a* is secured a horizontal plate 86, as by means of the spacing brackets 87. In the plate 86 and bracket portion 82*a* above the lever arm 85*b* are provided suitable apertures in which is slidably retained a vertical rod 88; this rod is provided with a shoulder 88*a* below the plate 86, with an expansion spring 89 interposed between the shoulder and the bracket portion 82*a* to bias the rod upwardly. The rod is provided in its lower portion with the bifurcation 88*b* which extends over the lever arm 85*b*. This lever arm being in its upward position, downward movement of the rod 88 against the biasing force of spring 89 will depress the lever arm and throw switch 80 to stop operation of the system. In the plate 86 and bracket portion 82*a* above the lever arm 85*a* are provided suitable apertures in which are slidably retained the vertical rods 90 and 90'; these rods are respectively provided with the shoulders 90*a* and 90*a'* below the plate 86, and with the expansion springs 91 and 91' interposed between the shoulders and the bracket portion to bias the rods upwardly. The rods 90 and 90', if arranged as illustrated, may be closely adjacent each other, and are respectively provided in their lower portions with the bifurcations 90*b* and 90*b'* extending over the lever arm 85*a*. This lever arm being in its upward position, downward movement of either of the rods 90 and 90' against the biasing force of the respective spring will depress that lever arm and throw switch 80 to render the system operable.

The top portions of the rods 88, 90 and 90' form a group of buttons 88*c*, 90*c* and 90*c'*, the first adapted upon momentary depression to stop operation of the system if it is then in progress, and each of the other two adapted upon momentary depression to place the system, when out of operable condition, in operable condition. We further arrange each of these last two buttons so that they are the finger-pieces for the switches 81 and 81'. Thus when one of these buttons is depressed to provide the required momentary closing of one of the switches 81 and 81', the switch 80, if not already thrown to render the system operable, will automatically be so thrown. This arrangement is readily effected by mounting the switches 81 and 81' to the base, with pole portions immediately underneath the lower extremities of, and responsive to depressions of, the respective rods 90 and 90'.

In Figure 1 we have shown the operation control members as arms 27 and 27', and their mode of functioning as clutch engagement and disengagement; our invention, however, is not to be understood as limited to this construction. Thus in Figure 3 we show the operation control members as poles 127 and 127' of switches 126 and 126', each of which controls the operation of a respective one of the two phonographs by making and breaking its motor circuit; in this case the clutches may be omitted or, if employed, left permanently in an engaged condition. To perform its motor control function each of the switches requires a connection of one of its elements to one of the line conductors; such a connection is also required by the switching means for open-circuiting each of the two associated electromagnets upon actuation of the other (e. g., arms 27 and 27', etc., of Figure 1). Accordingly the motor control and electromagnet open-circuiting functions for each one phonograph may both be performed by the single switch 126 or 126'.

As shown in Figure 3, each of these switches comprises the pole 127 or 127' connected with the line conductor 51, the throw contact 123 or 123' in series with the associated start electromagnet, and the throw contact 122 or 122' in series with the associated stop electromagnet and with the associated motor. The poles 127 and 127' are biased upwardly, as shown, to touch the respective throw contacts 123 and 123'. Respective pivoted armatures 130 and 130' are provided, with horizontal portions 130*a* and 130*a'* resting on the respective poles 127 and 127'. These armatures have respective vertical portions 130*b* and 130*b'* positioned for attraction by the respective start electromagnets 121 and 121' upon actuation of the latter; and it will be understood

that such attraction of either armature will rotate it counter-clockwise, so that its horizontal portion moves the respective pole 127 or 127' downwardly, against its bias, away from throw contact 123 or 123' and into impingement against throw contact 122 or 122'. Continuous start electromagnet actuation and armature attraction is rendered unnecessary by the provision of latches 131 and 131', each of which is arranged to drop slightly upon counterclockwise rotation of the associated armature and to maintain the same in its rotated position. Above the latches are provided the respective stop electromagnets 120 and 120', each of which upon momentary actuation attracts the respective latch, permitting the respective armature to rotate clockwise to the illustrated position in response to the bias of the respective pole 127 or 127'.

In each phonograph in Figure 3 the two electromagnets, armature, etc. may be identified as a latching relay, known in the art per se; the arrangement has been illustrated simply as an alternative to the magnet assembly of Figure 1. Although it comprises an assembly biased to one of its two conditions, in distinction to the unbiased magnet assembly of Figure 1, the cooperations of the two different assemblies with remaining portions of the system are quite similar. The electrical connection of the latching relays in the system is entirely analogous to that of the magnet assemblies of Figure 1, switch poles 127 and 127' being substituted for arms 27 and 27', start electromagnets 121 and 121' for 21 and 21', and stop electromagnets 120 and 120' for 20 and 20'. In order to adapt the switches 126 and 126' to control the operation of the motors, each motor is electrically connected between conductor 50 and the respective switch throw contact 122 or 122'. It will be appreciated however, that the automatic operation of, and the manipulations required of the dictator and attendant for, the two systems respectively illustrated in Figures 1 and 3 are entirely similar.

It will be understood, of course, that while we have shown the magnet assembly of Figure 1 in connection with clutch control of mandrel rotation, and the latching relay in connection with motor switch rotation control, no specific relationships between these respective features are thereby intended to be implied, other groupings being obviously equally available.

We do not intend that our invention be limited by virtue of the details of the embodiments chosen for descriptive and illustrative purposes, but rather that it be gauged in scope by the appended claims, in which we undertake to claim it as broadly as the state of the art will permit.

We claim:—

1. In combination, a plurality of phonographs; an automatic system connected with all of said phonographs and energizable to maintain the same in sequential operation, said automatic system including a plurality of stopping means for the several phonographs respectively; and means operable selectively to energize said automatic system and to actuate the stopping means of all operating phonographs.

2. The combination claimed in claim 1, further including system starting means comprising means operable only when said automatic system is energized to start a single one of said phonographs.

3. In combination, a plurality of phonographs; an automatic system connected with all of said phonographs and energizable to maintain the same in sequential operation, said automatic system including a plurality of starting means for the several phonographs respectively; and means operable selectively to concomitantly actuate a single one of said starting means and energize said automatic system, and to place all said phonographs out of operation.

4. In combination, a plurality of phonographs; an automatic system connected with all of said phonographs and energizable to maintain the same in sequential operation; switch means throwable selectively to place all said phonographs out of operation and to energize said automatic system; and normally open switch means closeable to start a single one of said phonographs, said two switch means being so mutually associated that momentary closure of the second mentioned thereof throws the first mentioned thereof to energize said automatic system.

5. In combination, a plurality of phonographs; an automatic system connected with all said phonographs and energizable to maintain the same in sequential operation; switch means throwable selectively to energize said automatic system and to place all said phonographs out of operation; and starting means for said plurality comprising means, associated with said switch means for operation concomitantly with system-energizing throwing thereof, for starting a single one of said phonographs.

6. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an automatic system connected with all of said phonographs and including a plurality of starting means and a plurality of stopping means for the several phonographs respectively, said automatic system being energizable to actuate the several said starting and stopping means in accordance with relative element positions in the several phonographs respectively; and means operable selectively to concomitantly actuate a single one of said starting means and energize said automatic system, and to actuate the stopping means of all operating phonographs.

7. In combination, a plurality of phonographs; an automatic system connected with all of said phonographs and including a plurality of starting means for the several phonographs respectively, said automatic system being energizable to maintain said phonographs in sequential operation; and system starting means, including openly biased switch means momentarily closeable to actuate a single one of said starting means.

8. The combination claimed in claim 7, wherein the switch means is selective with respect to the several said phonograph starting means.

9. In combination, a plurality of phonographs; an automatic system connected with all of said phonographs and including a plurality of starting means and a plurality of stopping means for the several phonographs respectively, said automatic system being energizable to maintain said phonographs in sequential operation; and system starting means, including switch means closeable to actuate the said starting means of a single one of said phonographs and arranged after closing to open at least as soon as the stopping means of that phonograph is actuated by said automatic system.

10. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an operation control member in each phonograph movable to stop and run po-

sitions, and an automatic system influencing said members to move the same in accordance with relative element positions in the several phonographs, all said members being adapted for movement to their stop positions to stop operation of the system; and system starting means, including switch means closeable to move a single one of said members to run position and arranged after closing to open at least as soon as said member is influenced by said automatic system.

11. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an operation control member in each phonograph having run and stop positions; an automatic system energizable to move said members in accordance with relative element positions in the several phonographs; and means operable selectively to energize said automatic system and to position all said members in their stop positions.

12. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element; an operation control member in each phonograph having run and stop positions; an automatic system energizable to move said members in accordance with relative element positions in the several phonographs; and means operable selectively to concomitantly position a single one of said members in its run position and energize said automatic system, and to position all said members in their stop positions.

13. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an automatic system connected with all said phonographs and including a plurality of starting means and a plurality of stopping means for the several phonographs respectively, said automatic system being energizable to actuate the several said starting and stopping means in accordance with relative element positions in the several phonographs; and means operable selectively to energize said automatic system, and to actuate the stopping means of all operating phonographs.

14. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an operation control member in each phonograph movable to stop and run positions, and an automatic system influencing said members to move the same in accordance with relative element positions in the several phonographs, all said members being adapted for movement to their stop positions to stop operation of the system; and system starting means, including openly biased switch means momentarily closeable to move a single one of said members to its run position.

15. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: starting and stopping circuits individually associated with each phonograph; contact means responsive to the relative element positions in the several phonographs and connected in the several said circuits to control the same; and switch means throwable to supply an energizing potential selectively to said contact means and to all said stopping circuits directly.

16. The combination claimed in claim 15, further including system starting means comprising openly biased switch means closeable to supply an energizing potential to a single one of said starting circuits.

17. The combination claimed in claim 15, further including normally open switch means closeable to supply an energizing potential to a single one of said starting circuits, said two switch means being so mutually associated that momentary closure of the last mentioned thereof throws the first mentioned thereof to supply a potential to said contact means.

18. In combination, a plurality of phonographs each having a sound box element adapted for progressive movement relative to a record element; an individual movement control means associated with each phonograph comprising an electrical circuit adapted upon momentary closing when energized to start said movement, means operative as a limit of said movement is approached for stopping said movement, switch means operative at least as soon as said stopping means for open-circuiting said starting circuit, and switch means operative at least as soon as said stopping means for supplying an energizing potential to the starting circuit of another of said phonographs; and a manually operable switch closeable to supply an energizing potential to the starting circuit of one of said phonographs, said switch being in parallel with the second mentioned said switch means on another of said phonographs but in series with the first mentioned said switch means of the one phonograph.

19. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an individual assembly associated with each phonograph comprising starting and stopping magnets, and means for open-circuiting each of said magnets upon actuation thereof until actuation of the other; an automatic system arranged to actuate the several said magnets in accordance with relative element positions in the several phonographs, all said stopping magnets being adapted for final actuation to stop the system; and system starting means comprising openly biased switch means momentarily closeable to actuate a single one of said starting magnets.

20. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an individual assembly associated with each phonograph comprising starting and stopping magnets, and means for open-circuiting each of said magnets upon actuation thereof until actuation of the other; an automatic system arranged to actuate the several said magnets in accordance with relative element positions in the several phonographs, all said stopping magnets being adapted for final actuation to stop the system; and system starting means, comprising switch means closeable to actuate a single one of said starting magnets and arranged after closing to open at least as soon as the respective said stopping magnet is actuated.

21. In combination in a system of plural phonographs adapted for sequential operation, each having a sound box element movable relatively to a record element: an individual assembly associated with each phonograph comprising starting and stopping magnets, and means for open-circuiting each of said magnets upon actuation thereof until actuation of the other; an automatic assembly arranged to actuate the several said magnets in accordance with relative element

positions in the several phonographs; and movable means for supplying an energizing potential selectively to said stopping magnets directly and to all of said magnets through said automatic system.

22. The combination claimed in claim 21, further including system starting means comprising openly biased switch means connected with at least one of said starting magnets and closeable to actuate a single one of said starting magnets.

ORVILLE M. DUNNING.
RICHARD M. SOMERS.

CERTIFICATE OF CORRECTION.

April 6, 1937.

Patent No. 2,075,978.

ORVILLE M. DUNNING, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, second column, line 74, claim 21, for "assembly" read system; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of June, A. D. 1937.

Henry Van Arsdale

Acting Commissioner of Patents.

(Seal)

DISCLAIMER

2,075,978.—*Orville M. Dunning*, Glen Ridge, and *Richard M. Somers*, Orange, N. J. PHONOGRAPHIC SYSTEM. Patent dated April 6, 1937. Disclaimer filed February 19, 1938, by the assignee, *Thomas A. Edison, Incorporated.*

Hereby enters this disclaimer to claims 1, 2, 3, 4, 5, 7, 8, and 9 of the above identified patent.

[*Official Gazette March 15, 1938.*]

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