Oct. 21, 1952 L. J. ANDRES 2,614,674

ELECTRIC CONTROL FOR PHONOGRAPHS

Filed Jan. 16, 1947

FIG. 1.

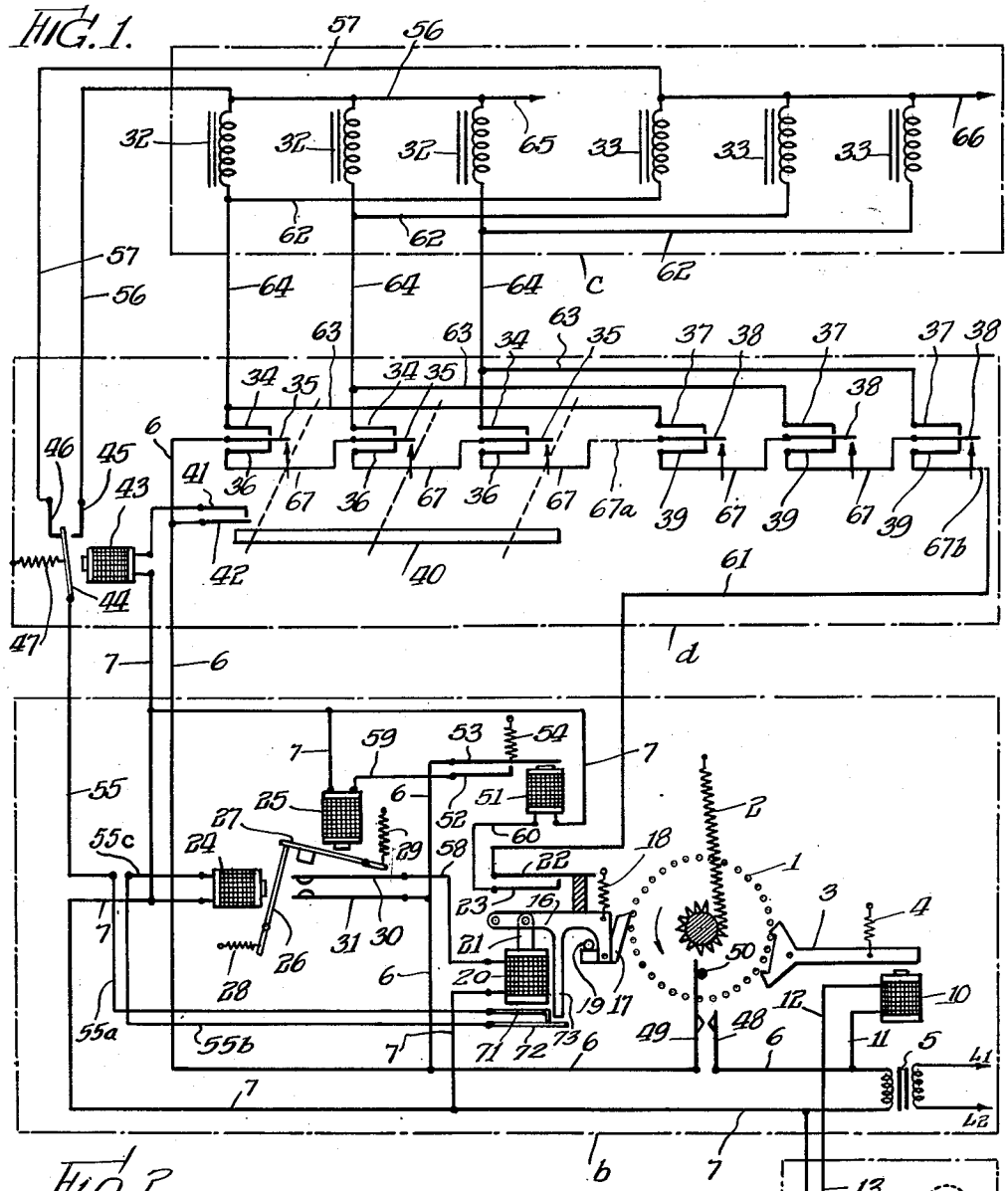
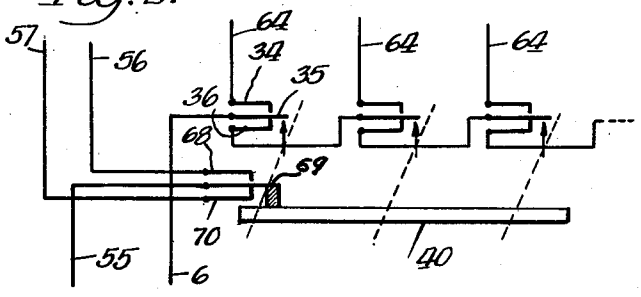



FIG. 2.




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Patented Oct. 21, 1952 2,614,674

# UNITED STATES PATENT OFFICE

2,614,674

## ELECTRIC CONTROL FOR PHONOGRAPHS

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Application January 16, 1947, Serial No. 722,323

3 Claims. (Cl. 194—15)

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My present invention relates in general to electric control apparatus for automatic coin-operated phonographs or similar devices and more particularly to an electro-magnetic selecting system therefor possessing the features of improvement hereinafter pointed out.

Electric selecting systems previous to this invention have generally been subject to unauthorized or improper operation in various ways, such as by manipulating the usual push buttons in an unintended manner or setting up other conditions which would make it possible to cause operation of the device without insertion of proper or sufficient coins. Many attempts have been made to provide protective devices in one or more of the circuits to overcome these defects, but the added complexity involved often resulted in the mechanical failure of the device in normal operation. The present invention solves this problem in a simple and direct manner and the apparatus provided thereby has been found to be cheat-proof and fool-proof in operation regardless of the sequence or manner in which the controls are manipulated.

A principal object of the invention is the provision of electro-magnetic means whereby only a selected given number of the controlling electro-magnets may be energized upon the deposit of a corresponding number of coins.

Another object is the provision in such an apparatus of means for applying an electric pulse of short duration to said electro-magnets when they are to be energized, controlled by a simple time delay relay or like device.

A further object is the provision of an electro-magnetic computing device whereby the predetermined value of coins inserted may be registered in combination with means whereby a selected group of electro-magnetic devices, corresponding with the value of the coins inserted, may be energized.

Another object, which is important from the standpoint of economy and simplicity, is the provision of means whereby a given number of control switches will operate a like given number of electro-magnets with not more than half of that number of conductors running from the said switches to the said electro-magnets.

Other objects and advantages of the invention will be apparent from the following specification and drawings, in which:

Fig. 1 is a diagrammatic view of the circuit and its associated elements; and

Fig. 2 shows a modification of part of said circuit and associated elements.

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In said drawings I have shown, within a dotted line enclosure *b*, a conventional add-subtract unit, including a credit wheel 1 movable in one direction, one step for each coin deposited, and in the other direction, one step for each record played or each unit of service rendered. The wheel is urged in the direction shown by the arrow by a spring 2, and a pivotally mounted escapement lever 3 is positioned to alternately engage the teeth of said wheel. A spring 4 holds said escapement lever normally in its rest position shown in the drawing.

The primary of a transformer 5 is connected to power lines L1 and L2 and a low voltage secondary of said transformer is utilized to supply the circuit with electric energy through power conductors 6 and 7.

A conventional coin switch 8, 9, shown in a dotted line enclosure *a*, is connected to a coin magnet 10 by a conductor 12, 13 and to the line 7 by a conductor 14. Said magnet is connected by a conductor 11 with the line 6. It will be apparent that the deposit of a coin 15 will momentarily close the normally open switch 8, 9 and energize the magnet 10 to attract the escapement lever 3 and cause the wheel 1 to advance one tooth, and that the deposit of additional coins will cause said wheel to advance a number of additional teeth corresponding to the number of such coins deposited.

A pivotally mounted restoring lever 16, having a pawl 17 pivotally attached to one end thereof in operative relation to the teeth of the wheel 1, is normally held out of engagement with said teeth by a spring 18, with a tail part of the pawl resting against a fixed stop 19. An electromagnet or solenoid 20 having a core 21 to which the lever 16 is pivotally attached will move the lever 16 in a downward direction when said magnet is energized and the pull thereof overcomes the action of the spring 18, causing the pawl 17 to engage an adjacent tooth on the wheel 1. When the magnet 20 is de-energized, the spring 18 will return the lever 16 causing the pawl 17 to move the wheel 1 a distance equal to one tooth in the direction opposite that indicated by the arrow. The escapement means on the lever 3 will retain the wheel in the restored position.

A switch 22, 23 is positioned to be held open by said lever 16 when it is in its normal rest position and to automatically close when said lever is lowered as just described.

A relay comprising electro-magnets 24 and 25, disposed at right angles to each other, and interlocking armatures 26 and 27, is provided for

controlling the magnet 20. Said armatures are retained in their normal inoperative position, shown in Fig. 1, by springs 28 and 29, respectively, and a normally open switch 30, 31 is so positioned with respect to the armature 27 that it will be closed when the magnet 24 is energized and attracts the armature 26, thereby releasing said armature 27 from the armature 26 and permitting it to be moved under the influence of its spring 29 to switch-closing position.

A plurality of electro-magnets, shown in two groups, marked, respectively, 32 and 33, represent the controlling elements in the device to be operated, as, for example, selector mechanism of an automatic phonograph, and are shown within a dotted line enclosure *c*.

A plurality of push button-operated single-pole, double-throw switches arranged in two groups, the switches of one group each comprising elements 34, 35, 36 and those of the other group each comprising elements 37, 38, 39, are shown in a dotted line enclosure *d*, these two groups of switches corresponding, respectively, to the two groups of magnets 32 and 33. The central poles, 35 and 38, respectively, of these switches are operated by individual push buttons represented in the drawings merely by arrows.

A bar 40, which is operated by depression of any one of the push buttons of the first group of switches, serves to close a switch 41, 42, thereby energizing an electro-magnet 43 of a switching relay which includes a two-position armature switch 44, 45, 46. Blades 44 and 46 of said switch are normally held in contact by a spring 47.

A master switch 48, 49 is positioned adjacent the credit wheel 1 and is controlled by a pin 50 on said wheel. The blades of said switch are biased toward closed position and the pin 50 holds the switch blade 49 out of contact with blade 48 when the wheel is in its initial position.

A time delay relay comprising an electro-magnet 51 and a pair of switch blades 52, 53, which are normally held open by a spring 54, is connected to operate the electro-magnet 25 of the above-described interlocking relay in manner to be hereinafter explained.

The master switch 48, 49 is in the power line 6 and the latter runs to switch blades 31, 53 and 42 and to the blade 35 of the first of the push button switches 34, 35, 36.

Blade 45 of the switch 44, 45, 46 is connected to one terminal of each of the magnets 32 by a conductor 56 and blade 46 of said switch is connected to one terminal of each of the magnets 33 by a conductor 57.

Switch blade 30 is connected to the second terminal of magnet 20 by conductor 58; switch blade 52 is connected to the second terminal of magnet 25 by conductor 59; switch blade 23 is connected to the second terminal of magnet 51 by conductor 60; switch blade 22 is connected to the blade 39 of the last of the group of switches 37, 38, 39 by conductor 61; and the remaining terminals of the magnets 32 are connected in parallel to the remaining terminals of the corresponding magnets 33 by conductors 62. Arrows 65 and 66 indicate possible extensions of the banks of magnets 32 and 33, respectively.

The elements 36 of the switches 34–36 and the elements 39 of the switches 37–39 are connected by conductors 67. The conductors 67 for the two groups of switches are connected by a conductor 67*a* and the last of the second series of switches is connected with the conductor 61 by a conductor 67*b*.

If the operator depresses blade 38 of the first switch of the second group to energize the first magnet of the second group, the series circuit to the remaining switches of the second group, which is normally maintained through the conductors 67, will be broken and, by virtue of the blade 38 contacting the mating blade 37, a circuit will be established between the preceding conductor 67 and one of a series of conductors 63 leading to the respective conductors 64. This will complete a circuit through the first of said conductors 64, one of the conductors 62, the first electro-magnet 33, the conductor 57, the closed switch 46, 44, a conductor 55, a conductor 55*a*, a normally closed switch 71, 72, a conductor 55*b*, a conductor 55*c*, and the electro-magnet 24 to the power line 7.

Simultaneously with the energizing of the first magnet 33, the magnet 24 will attract its armature 26 and release armature 27 which will then close the switch 30, 31. This will energize magnet 20 which will then pull arm 16 to its lowermost position where it will remain until the magnet 20 is de-energized. In moving to said lowermost position the lever 16, through an arm 73 depending therefrom, will depress the switch blade 72, thus opening the circuit to the magnets 32 and 33 and preventing any possibility of a second one of said magnets being energized until the restoring operation has been completed and the arm 16 has returned to its upper position.

When the push button-operated blade 38 is released, said blade 38 and the blade 39 will complete a circuit through conductors 67, 67*b* and 61 and through the then closed switch 22, 23 to energize the time delay relay magnet 51 thereby closing the switch 52, 53. This energizes the restoring magnet 25 which thereupon returns the armature 27 to position to interlock with the armature 26 which has previously been released by the magnet 24 as above described. The switch 30, 31 will then open and de-energize the magnet 20, permitting the spring 18 to return lever 16 to its normal rest position. During this movement the pawl 17 will move the wheel 1 one step in the direction opposite that indicated by the arrow on said wheel.

When the arm 16 is thus returned to its normal position the switch 22, 23 will be opened, thereby de-energizing magnet 51 and opening switch 52, 53 to de-energize the restoring magnet 25. Under these circumstances all of the apparatus is in the position shown in Fig. 1 except that the switch 48, 49 will remain closed if more than one coin has been inserted, as the pin 50 will then be one tooth or more away from contact with the switch blade 49.

If the operator depresses blade 35 of one of the switches 34, 35, 36 of the first group the bar 40 will be moved and caused to close switch 41, 42, thereby energizing magnet 43. This will cause blade 44 to be moved out of contact with the blade 46 and into contact with the blade 45 of the switch 44, 45, 46. Then, upon the contact of switch blade 35 with the blade 34, a circuit will be established from conductor 6 to energize the magnet 32 corresponding to the switch which has been operated. Since the magnets 32 are connected through conductor 56, switch 45—44, conductors 55 and 55*a*, switch 71, 72 and conductors 55*b* and 55*c* to the magnet 24, and through the latter to the power line 7, the magnet 24 will

thereupon be energized, releasing the armature 26 and conditioning the apparatus for a restoring operation upon release of the push button, as previously described.

When the wheel 1 returns to its initial position the pin 50 thereon will contact the blade 49 of the master switch 48, 49 and break its contact with the blade 48, thus completing a cycle of operation.

While a blade 38 or 35, as the case might be, is in depressed position the series circuit through the conductors 67 is broken, thus preventing the completing of a circuit to any subsequent magnet 33 or 32 by depressing the push button of another switch. Furthermore the opening of the switch 71, 72 as an incident to each restoring operation renders it impossible to maintain a second circuit during such operation by manipulation of push buttons. It therefore will be apparent that an operator can energize only such number of the magnets 32 and 33 as correspond to the number of coins deposited; or, in other words, that it is impossible to effectively energize more than one magnet upon deposit of a coin of single unit value, regardless of how the push buttons or any other part of the mechanism may be manipulated.

As above indicated it is also an important feature of the invention that only half the number of conductors 64 are required as the number of magnets 32 and 33 to be energized. This is particularly advantageous where the switches 34—36 and 37—39 are located at a distance from the magnets, as is required in the remote control of phonograph mechanisms.

It will also be apparent that, utilizing the alternate means of switching shown in Fig. 2, the relay 43 and its associated switches 41—42, and 44—45—46 may be eliminated by the use of switches such as that shown at 68, 69, 70, and that, with this arrangement, more than two groups of magnets may be operated from corresponding groups of push button switches, provided multiples of the double throw switches 68, 69, 70 are utilized in connection with each group of push button-operated switches. For example, four pluralities of electro-magnets may be energized from four pluralities of push button switches, utilizing only a single corresponding plurality of connecting conductors.

Ordinarily if the switch 22, 23 were accurately adjusted it could be utilized to directly energize the restoring magnet 25. However, it is possible that the switch blades 30, 31 may not stay closed for a time sufficiently long to permit the magnet 20 to move the wheel restoring lever 16 its full range. Hence, it has been found that the insertion of the time delay relay which includes magnet 51 and switch blades 52, 53 will in all conditions of operation permit the lever 16 to move its full range. With this simple construction an electric impulse of short duration may be applied to the magnet 32 or 33 to be operated, as by a quick operation of one of the push buttons, and the magnet 20 will nevertheless remain energized long enough to perform its function.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

I claim:

1. A coin-controlled selecting system for phonographs comprising two pluralities of electromagnets, a first plurality of manually operable electric switches corresponding in number with said first plurality of electromagnets, a second plurality of manually operable electric switches corresponding in number with said second plurality of electromagnets, electric switch means responsive to the displacement of any one of said first plurality of switches, two independent common connections one running from each said first and second plurality of electromagnets to said electric swtich means, the remaining terminal of each of the electromagnets of said first plurality being connected with a corresponding remaining terminal of each of the electromagnets of the second plurality, each switch in the first plurality of switches being connected to a corresponding switch in the second plurality of switches, conductors running, respectively, from each electromagnet of said first plurality of electromagnets to the corresponding switch of said first plurality of switches, and means for connecting the switches of the second plurality to said conductors respectively.

2. A selecting system for phonographs comprising a first and second group of electromagnets, a first and second group of manually operable electric switches corresponding in number and order to said electromagnets, electric switching means responsive to the initial movement of any switch of said first group, one of the terminals of each electromagnet in the first group being connected to a common conductor leading to one contact of said switching means and one of the terminals of each electromagnet of the other group being connected to a common conductor leading to another contact of said switching means, the remaining terminal of each electromagnet in said first group of electromagnets being connected by a separate independent conductor to the remaining terminal of each said electromagnet in the said second group, separate conductors, respectively, connecting said electromagnet of said first group with each switch of said first group, branch conductors connecting said last-mentioned conductors, respectively, with successive switches of the second group, thereby connecting each electromagnet of said second group with its corresponding switch in the second group, a source of electrical energy, circuit means connecting said electric switches and said switching means and said source of electric energy, and means whereby the manual selective initial operation of any of the switches of the first group will first operate said switching means to partially complete an electric circuit to said first group of electromagnets and whereby the further movement of said selected switch will energize, through a portion of said circuit means, an electromagnet corresponding with the said switch, and whereby the selective operation of any switch in said second group switches will establish, through a corresponding separate conductor, a circuit to an electromagnet of the second group corresponding with said switch.

3. In a selecting system for coin-operated phonographs, a series of electromagnets to be selectively energized, a series of switches selectively operable to energize said magnets, a source of power, an add-subtract coin control unit for connecting said switches and magnets to said source of power so that subsequent operation of selected switches will energize corresponding magnets, actuating means and a coin-controlled escapement device for causing entering operations of said add-subtract unit, said switches being electrically

interconnected through the operatable element thereof whereby operation of one of said switches disconnects the others from said source of power, and means controlled by the return movement of the actuated switch for causing a restoring operation of said add-subtract unit, said last-mentioned means including an actuator for said unit, a solenoid for controlling the operation of said actuator, a switch for controlling the supply of current to said solenoid, a relay comprising a switch-opening magnet, a switch-closing magnet and interlocking armatures controlled thereby, and a time delay relay, including a switch and a controlling magnet therefor controlled by operation of said selectively operable switches, for controlling the supply of current to said switch-opening magnet to thereby cause completion of



said restoring operation even though the electric impulse resulting from actuation of said switch should be of too brief duration to otherwise complete such operation.

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