

Dec. 16, 1952

H. G. JENSEN

2,622,144

SELECTOR FOR AUTOMATIC PHONOGRAPHS

Filed Nov. 15, 1949

3 Sheets-Sheet 1

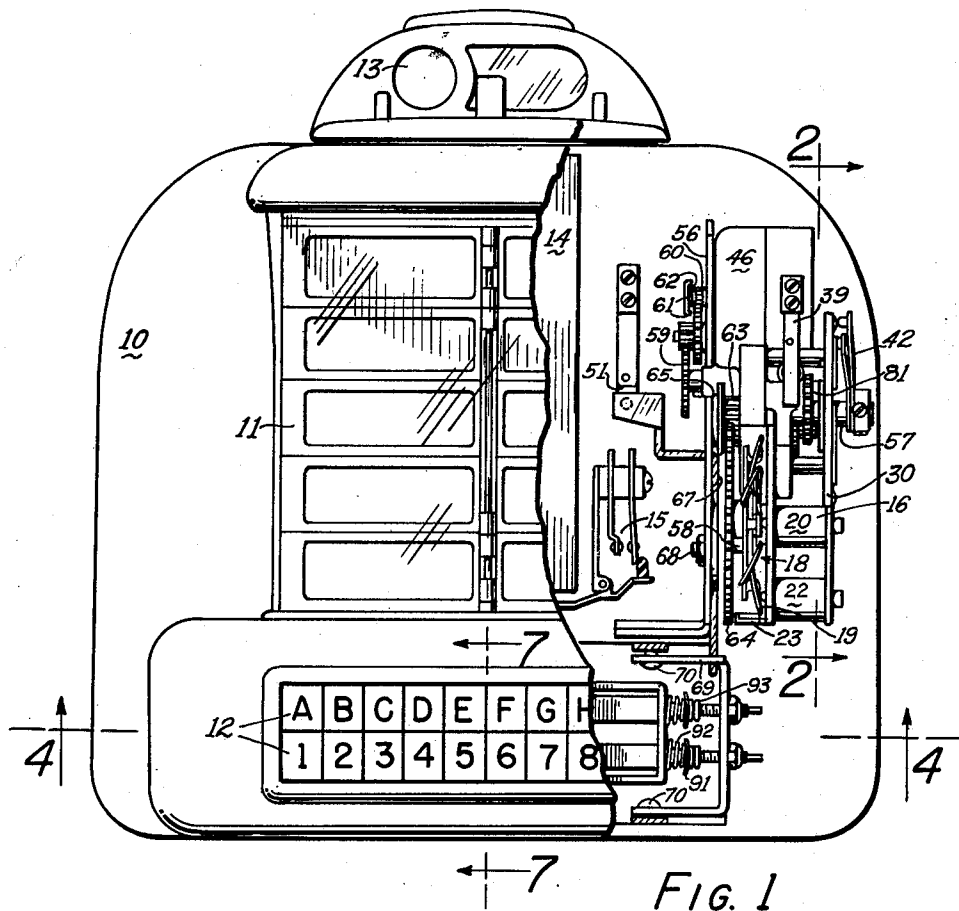


FIG. 1

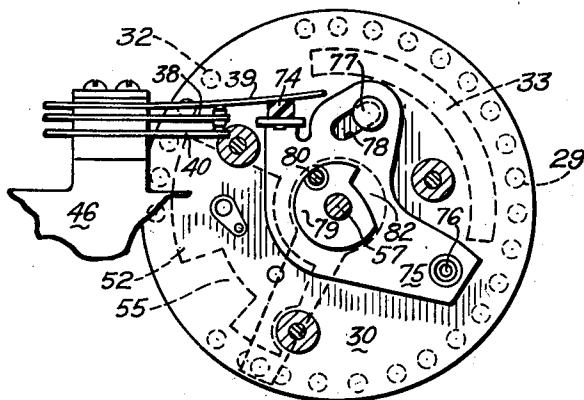


FIG. 2

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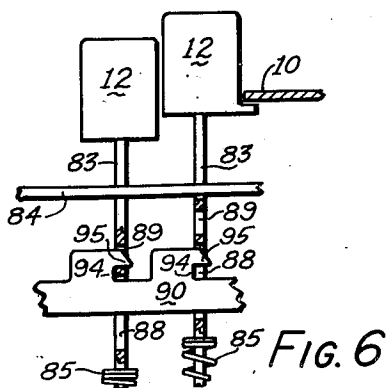
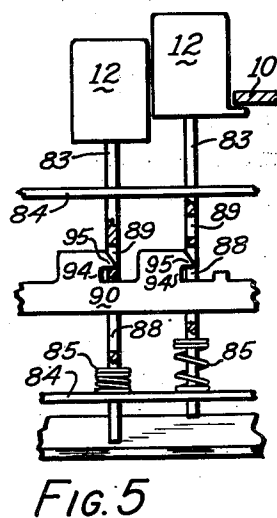
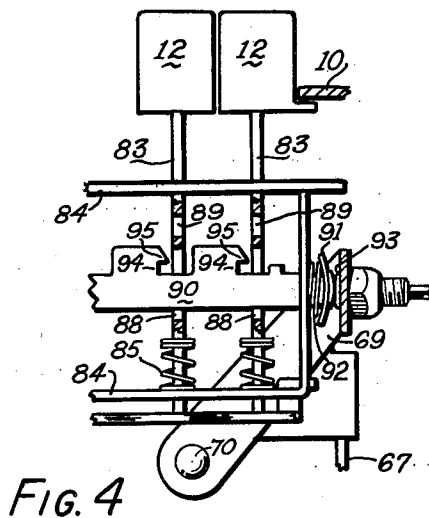
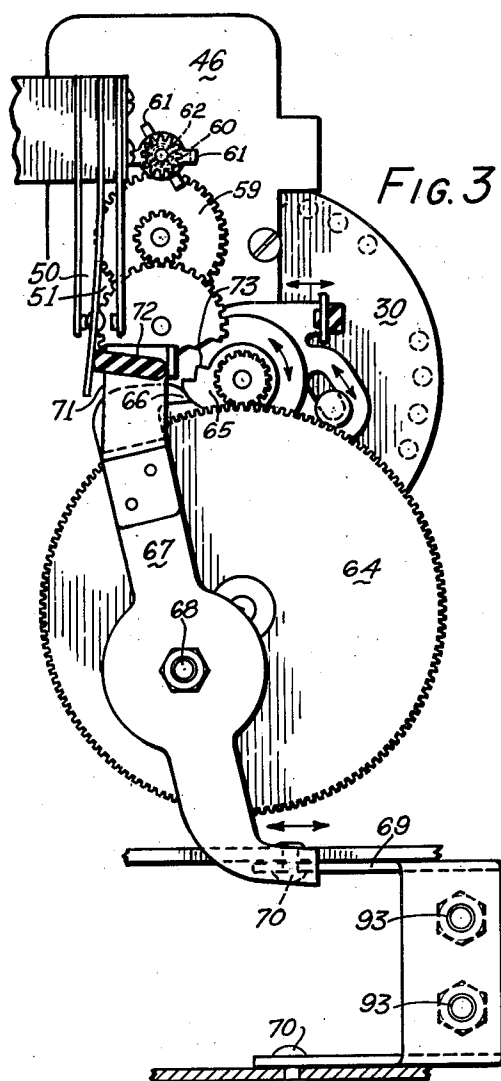
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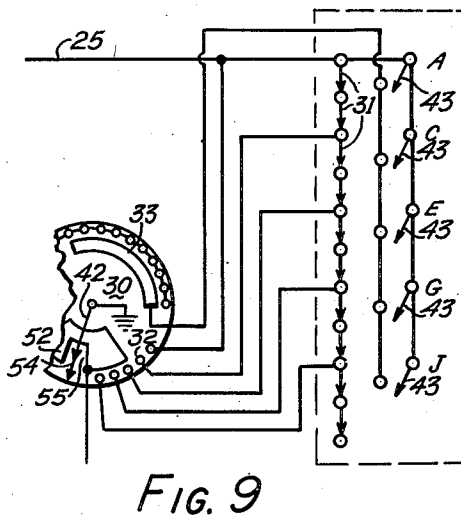
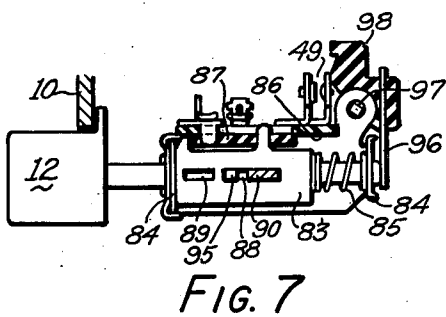
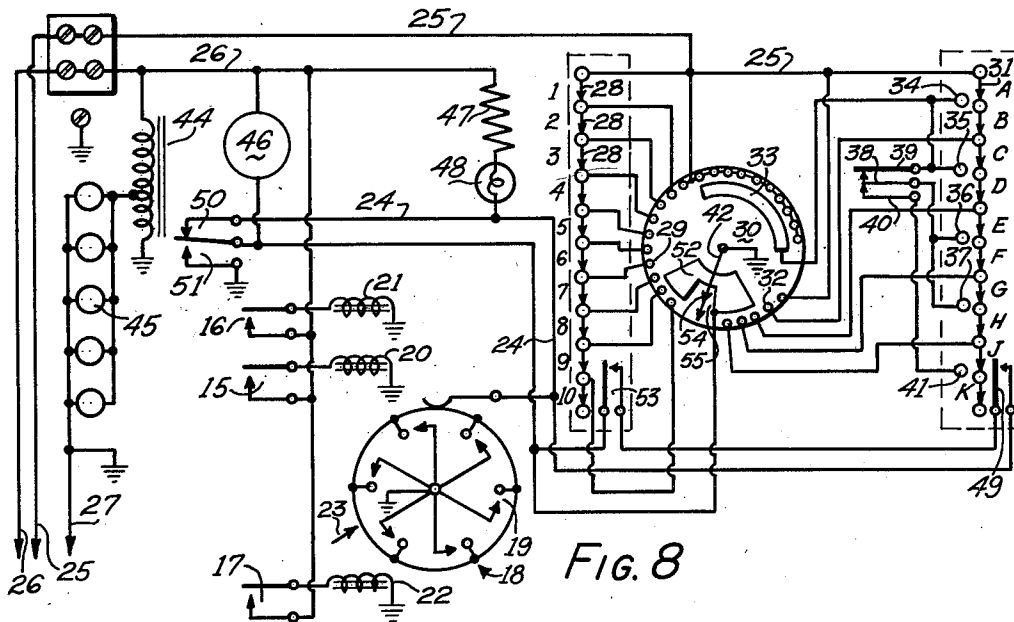
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SELECTOR FOR AUTOMATIC PHONOGRAPHS

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3 Sheets-Sheet 3



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2,622,144

SELECTOR FOR AUTOMATIC
PHONOGRAPHS

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Application November 15, 1949, Serial No. 127,459

6 Claims. (Cl. 177—380)

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This invention relates to selectors for automatic phonographs and particularly to an impulse creating mechanism adapted to create two series of impulses, each of selected number to effect selection of a corresponding recording.

In my co-pending application Serial No. 561,984, filed November 4, 1944 (Patent No. 2,489,782, issued November 29, 1949), I have described and claimed such a mechanism employing two sets of buttons of equal number. Each set controls the number of impulses in each train. The embodiment described in said patent provided 10 buttons in each set and thus provided 100 double train signals having effective impulses from 1-1 to 10-10.

The principal object of the invention is to provide a similar mechanism employing two sets of buttons of equal number and capable of transmitting two-train signals numbering the square of that number, but providing a wider range of numbers for the impulses of one train and a smaller number of impulses for the other train. In the specific embodiment hereinafter described, I employ two sets of 10 buttons and I can transmit 100 double train signals with effective impulses from 1-1 to 20-5. It may here be noted that it is known in this art to provide one or more extra or "dead" impulses in one or more trains. In the patent referred to, two such extra pulses were provided in each train and in the embodiment of the invention hereinafter described, one extra pulse is provided for the first train only. The term "effective number of impulses" used above, disregards these extra impulses.

According to the present invention, the buttons are employed to cut a definite number of impulses out of each train. Thus, one set of buttons is arranged progressively to cut one more impulse from the larger train. Each button of each pair of the other set of buttons progressively cuts one more impulse out of the smaller train and one button of each of such pairs also effectively cuts 10 pulses out of the larger train. The impulses are created by an arm which passes over two sets of contacts. Normally, the arm and all the contacts are connected in the impulser circuit. The buttons are associated with switches which cut a definite number of pulses of each train out of the impulser circuit. The last 11 contacts of the large set of contacts are subtended by a large contact which is normally disconnected from the impulser circuit. One button of each of said pairs of buttons has the effect of connecting the large contact to the impulser circuit. When this large contact is thus connected,

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one large pulse is transmitted instead of 11 short pulses. In this way, I am able to transmit 100 trains of 1-1 to 20-5 effective impulses. Since, as noted above, one "dead" impulse is added to the first train, the actual number of impulses transmitted, ranges from 2-1 to 21-5, 100 in all.

The embodiment of the invention hereinafter described is suitable for use when one of the impulse responsive devices described and claimed in co-pending application Serial No. 127,458, filed November 15, 1949, by Albinus G. Bodoh and with one of the embodiments of an invention described and claimed by me in co-pending application Serial No. 117,389, filed September 23, 1949, which discloses a selector employing two sets of circuits numbering 20 and 5, respectively.

The invention will more fully be described from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a front elevation, partly broken away, of a wallbox embodying my invention;

Fig. 2 is a fragmentary sectional detail taken on the line 2-2 of Fig. 1;

Fig. 3 is a side elevation, as viewed from the left in Fig. 1, of the motor and associated elements;

Fig. 4 is an inverted sectional view taken on the line 4-4 of Fig. 1 showing the buttons and associated parts;

Fig. 5 is a similar view showing one of the buttons latched in;

Fig. 6 is still a similar view showing one of the buttons locked in;

Fig. 7 is a fragmentary sectional elevation taken on the line 7-7 of Fig. 1 showing a button and associated elements;

Fig. 8 is a wiring diagram; and

Fig. 9 is a fragmentary diagram showing a modification thereof.

Referring to the drawings, the wallbox is shown as a whole in Fig. 1. It comprises a housing 10 which includes a program display unit 11 which may suitably be that described and claimed in co-pending application Serial No. 625,784, filed October 31, 1945, by Mahlon W. Kenney, now Patent No. 2,545,362, issued March 13, 1951. The housing 10 has an opening which permits two rows of buttons 12 to be actuated by the user. A receptacle 13 is provided for admission of coins, which are separated according to denomination, and pass through a slug rejector 14. The box is intended for reception of nickels, dimes and quarters. An accepted nickel momentarily closes a switch 15. An accepted dime momentarily closes

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a switch 16 and an accepted quarter momentarily closes a switch 17. The closing of one of these switches effects the storage of the corresponding credit on a credit array 18. This array carries at least six snap switches 19, since the present device is intended to provide six plays for a quarter, two for a dime and one for a nickel. Normally, these switches are open and are located in alignment with the armatures of three solenoids 20, 21 and 22. When a nickel closes the switch 15, the solenoid 20 is energized, closing the adjacent switch 19 to condition the box for one selecting operation. When a dime closes the switch 16, the solenoid 21 is energized and the adjacent switch 19 is closed to condition the box for two selecting operations. When a quarter closes the switch 17, the solenoid 22 is energized and the adjacent switch 19 is closed to condition the box for six selecting operations. It is to be noted that during each selecting operation, the array 18 is rotated one switch spacing in the counterclockwise direction as viewed in Fig. 8. A stationary cam member 23 is located so as to open any closed switch passing it and in order to provide the appropriate number of operations, the cam member is located so as to open the switch closed by a nickel near the end of the first selecting operation. This credit mechanism is described and claimed in co-pending application Serial No. 736,448, filed March 22, 1947, by Henry M. Merrill and is further described in detail in co-pending application Serial No. 117,389, filed September 23, 1949, by Herman G. Jensen. It is therefore considered sufficient to add that when there is credit on the array 18, the line 24 is grounded and this line is ungrounded towards the end of the last selection for which credit has been established. Three lines 25, 26 and 27 are connected to the wallbox. 27 is a ground line. 26 supplies power, suitably 26 volts A. C., and 25 is the impulser line. It may here be noted that an impulse is created by the box each time the line 25 is grounded. One series of buttons 12 carries letters A, B, C . . . J, K. It may be noted that the letter I is omitted to avoid confusion with the number 1. The other series of buttons 12 carries the numbers 1 to 10. This enables 100 selections to be made by actuating one letter button and one number button, such as A7, B4, K9, etc. The numbers buttons carry switch poles 28 which are normally connected in series. The pole 28 of button 10 is connected to the first of a first series of contacts 29, mounted on a disc 30. The pole of switch 28 carried by button 9 is connected to the second contact and so forth. There are 21 contacts in the series 29 and the line 25 is connected to the pole of switch 28 of button No. 1 and to the last 12 contacts of the set 29.

The letters buttons are also individually associated with switch poles 31 which are also normally connected in series. A second set of contacts 32 is provided on the disc 30 being spaced from the first set by a large space which may suitably be about three normal contact spacings. The line 25 is connected to the first contact 32 and also to the pole of the switch 31 carried by button A. The pole of switch 31 associated with button C is connected to the second contact 32. The pole of the switch 31 associated with the button E is connected to the third contact 32. The pole of the switch 31 associated with the button G is connected to the fourth contact 32 and the pole 31 associated with the button J is connected to the fifth contact 32.

The disc 30 also carries a long contact 33 which

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subtends the last 11 of the contacts 29. When the button A is actuated, its pole 31 engages a contact 34 and when the button C is actuated, its pole 31 engages a contact 35. The contacts 34 and 35 are connected directly to the large contact 33. When buttons E and G are actuated, their poles 31 engage contacts 36 and 37 which are connected to a switch pole 38 which normally engages a switch pole 39 connected directly to the large contact 33 and a switch pole 40 which is connected to a contact 41 which is engaged by the pole 31 carried by the button J when that button is actuated.

During a selecting operation, a grounded arm 42 passes over the contacts 29, 32 and 33. It may here be remarked that while the arm 42 is passing over the contacts 29 and 33, the three switch poles 38, 39 and 40 are in contact, but when the arm is passing over the contacts 32, the three poles 38, 39 and 40 are separated. The purpose of this separation in the manner in which it is accomplished, will hereinafter be described. As will also be hereinafter described, the arm 42 is put into a complete revolution when a button of each set is actuated. Which buttons of each set are actuated, determine the number of impulses in each of the two trains. The impulser circuit normally includes all the contacts 29, and all the contacts 32. If button 10 and button K are actuated, all the contacts 29 and 32 remain in the impulser circuit so that two consecutive trains of 21 and 5 impulses are created. If button 9 is actuated, one contact 29 is eliminated from the impulser circuit and so forth, button No. 1 eliminating 9 impulses. Thus, if the large contact 33 is not connected to the impulser circuit, actuation of the numbers buttons gives the first train between 12 and 21 impulses. When the large contact 33 is connected in the impulser circuit, a single large pulse is substituted for the final 11 pulses which can be provided by the last 11 contacts 29. Thus, the inclusion of the large contact 33 in the impulser circuit provides the first train with a range of impulses from 2 to 11. It will thus be seen that the number of impulses in the first set can be controlled by the buttons to give 2 to 21 impulses. When any of the buttons A, C, E, G or J is actuated, the large contact 33 is connected to the impulser line 25.

Actuation of the button J or K cuts no contacts 32 of the second series out of the impulser circuit. Button G or H cuts the last contact 32 out of the impulser circuit. Button E or F cuts the last two contacts 32 out of the impulser circuit. Button C or D cuts the last three contacts 32 out of the impulser circuit and button A or B cuts the last four contacts 32 out of the impulser circuit. It will thus be seen that by actuating any one of the 10 numbers buttons and any one of the 10 letters buttons, a two train series of impulses from 2-1 to 21-5 may be transmitted, 100 signals in all. Thus, if buttons A and 1 are actuated, four of the contacts 32 are eliminated from the impulser circuit, the first 9 contacts 29 are eliminated and the last 11 of the contacts 29 are effectually replaced by the large contact 33 so that a train of two impulses and a train of one impulse are transmitted, the last impulse of the first train being a long impulse. If buttons B and 7 are actuated, four of the contacts 32 are eliminated from the impulser circuit and the large contact 33 is not connected to the impulser circuit. Actuation of the button 7 eliminates the first three contacts of the series 29 from the impulser circuit so that a double train of 18 and 1 impulses are trans-

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mitted. If buttons G and 9 are actuated, the large contact 33 is connected in the impulser circuit, one of the contacts 32 is eliminated from the impulser circuit and one of the contacts 29 is eliminated from the impulser circuit. Consequently, a double train of 10 and 4 impulses is transmitted, the last impulse of the 10 being a long impulse.

It may here be noted that the first train has a minimum of two impulses for the purposes of the electromagnetic devices which are actuated by the trains at the phonograph instrument. It also may be noted that the purposes of the switch poles 38, 39 and 40 which are separated when the arm 42 is passing over the contacts 32, is to prevent a user from creating more than one train of impulses with the contacts 32 by actuating simultaneously a plurality of letters buttons. When a numbers button is actuated, it breaks the series connection between the poles 23, and actuation of another button of higher number can have no additional effect. The same is true with the letters buttons when the poles 38, 39 and 40 are separated, but if it were not for this separation, the common connection of the contacts 35, 36, 37 and 41 could be utilized to include 2 or 3 trains derived from the contacts 32. But with the provision of the three poles 38, 39 and 40, it is impossible to attain any effect from the contacts 32 except by eliminating the last 1, 2, 3 or 4 of the contacts 32.

This same result may be obtained in other manners. Thus, as shown in Fig. 9, I may provide on the buttons A, C, E, G and J, additional movable poles 43 to connect the impulser line 25 to the large contact 33 when any of these letter buttons are actuated.

The power line 26 is connected to a step-down transformer 44 which supplies voltage to lamps 45 to illuminate the box. The power line 26 is connected to one terminal of the actuating motor 46, to the switches 15, 16 and 17 and through a resistor 47 and signal lamp 48 to the line 24. Consequently, when one of the switches 19 is closed, the lamp 48 lights to indicate that there is credit on the machine and that selections can be made. The line 24 is connected also to one side of a switch 49 which is closed when any letters button is in actuated position and to a normally closed switch 50, the other side of which is connected to the other terminal of the motor 46. This other terminal of the motor 46 is also connected to a normally open switch 51, the other side of which is grounded to a segment 52 on the disc 30 and to one side of a switch 53 which is closed when any numbers button is in actuated condition. The other sides of the switches 49 and 53 are connected together to form a series circuit. The large contact 33 and the contact 52 are arranged to be engaged by a contact 54 on the arm 42. The contact 52 has effective portions sub-tending the first few contacts 29 and the last few contacts 32 and is provided between these portions with a cut-out 55 in which the contact 54 is located in the normal zero position of the arm 42.

The switch 50 is normally closed. When credit is established on the machine by closing one of the switches 19, the motor circuit is completed from the power line 26 through the closed switch 50 which is connected to the line 24 grounded by the closing of the switch 19. Consequently, the motor goes into operation for a very brief time whereupon the common pole of the switches 50 and 51 is moved to open position and the motor

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stops. The resultant movement of the arm 42 is so slight that its contact 54 does not engage the fixed contact 52. This slight operation of the motor actuates latching locking means associated with the buttons into latching position as will hereinafter be described so that the two buttons for a desired selection can be actuated and the buttons held in. When one button of each series is actuated, the two switches 53 and 49 are closed, completing the circuit from the power line 26, motor 46, switch 53, switch 49, line 24 and closed credit switch 19 to ground. Thus, the motor is put into operation and in a manner hereinafter described, the switch 51 is closed, the actuated buttons are locked in, and the motor drives the arm 42 through a complete revolution creating the impulses in the line 25 determined by the buttons actuated. The switch 19 may open during a complete revolution of the arm 42, but since the switch 51 provides an independent circuit for the motor, the opening of the switch 19 does not terminate the operation of the motor. At the end of the complete revolution of the arm 42, the switch 51 opens, the switch 50 closes and the buttons are unlatched so that they resume their normal positions.

The contact 52 which is in parallel when the switch 51 renders unnecessary precision in the closing and opening of the switch 51. This switch may be arranged to open at any time near the end of a complete revolution when the contact 54 is moved into engagement with the contact 52. The motor is de-energized when the contact 54 moves into the cut-out 55, at which time the switch 50 is closed.

The motor 46 and disc 30 are rigidly carried by a frame 56 which is mounted on the base of the wallbox. This frame also carries the solenoids 20, 21 and 22 and provides a mounting for the shaft 57 which carries the arm 42 and a shaft 58 which provides a bearing for the switch array 18. The motor 46 is operatively connected to the shaft 57 by speed reduction gearing 59 so that the arm 42 is driven at a suitably low speed to create the trains of impulses. The train of gearing includes a small pinion 60 freely mounted on the motor shaft. Complementary clutch elements 61 are provided on the pinion 60 and on the outer end of the motor shaft. They are normally moved out of engagement by a spring 62. The motor is so arranged that when it is energized, its rotor is magnetically sucked in to the right as viewed in Fig. 1, bringing the clutch elements 61 into engagement to effect the drive. When the motor circuit is broken, the spring 62 separates the clutch elements 61 so that the momentum of the motor rotor is not communicated to the shaft 57. The shaft 57 carries a pinion 63 which meshes with a gear 65 rigidly connected to the switch array 18. The pinion 63 and gear 64 have a 1 to 6 ratio so that the array moves one switch spacing for each revolution of the shaft 57 which carries the impulse creating arm 42. The shaft 57 rigidly carries a cam 65 which engages the pointed end 66 of a lever 67 which is pivotally mounted at 68 on the frame 56. The lower end of the lever 67 engages a bail 69 which is associated with the push buttons in a manner which will hereinafter be described. This bail is pivotally mounted at 70. The upper end of the lever 67 carries a bracket 71 which engages a piece of insulation 72 carried by the common pole of the switches 50 and 51. Normally the point 66 of the lever 67 is located on the highest point of the cam 65 as shown in Fig. 3. In this position, the lever holds

the switch 50 closed and holds the bail 69 in button free position as shown in Fig. 4. When credit is established on the machine, the motor circuit is completed through the closed switch 50 and the closed switch 19 and the motor goes into operation to drive the shaft 57 in the counterclockwise direction as viewed in Fig. 3. A slight movement of the cam 65 in the counterclockwise direction permits the point 66 of the lever 67 to drop onto the step 73 of the cam. The resulting movement of the lever 67 permits the switch 50 to open, terminating the drive of the motor so that the point 66 remains seated on the step 73. This movement of the lever 67 moves bail 69 into button latching position. The relation of the locking bars to the buttons in this condition is shown in Fig. 5. When a button of each series is actuated, the switches 53 and 49 are closed and the motor circuit is completed through these switches and through the closed switch 19 so that the motor goes into operation to create the impulses and the cam 65 being driven in the counterclockwise direction as viewed in Fig. 3, the point 66 of the lever 67 drops off the step 73 allowing the switch 51 to close. This movement of the lever 67 again displaces the bail 69 so that the actuated buttons are held in actuated position as shown in Fig. 6.

The first movement of the cam 65 as a result of establishing credit on the machine is not sufficient to bring the arm 42 into engagement with the contact 52. The second movement of the cam 65 does bring the arm 42 into engagement with the contact 52 and this may occur slightly before the closing of the switch 51.

After the arm 42 has ridden over the contacts 32, the lever 67 is swung in the counterclockwise direction by the cam 65 opening the switch 51 and closing the switch 50. The engagement of the arm 42 with the contact 52 insures complete operation of the motor until after the switch 50 is closed and after the lever 67 has moved the bail 69 back to free button position (Fig. 4) allowing the actuated buttons to move outwardly. After these results have been accomplished, the arm 42 has moved into the cut-out 55 and the machine is in normal condition. It is to be noted, however, that in the event that credit remains on the machine, the motor 46 continues to operate until the point 66 of the lever 67 rests on the step 73 of the cam 65, and in this case the operation of the motor is terminated by the resulting opening of the switch 50. This leaves the buttons in condition to be latched as shown in Fig. 5. The switch pole 33 is biased away from the switch pole 40, but the switch pole 39 is biased towards the switch poles 33 and 40 with a stronger force so that the three poles are normally in engagement. These poles are suitably mounted on the motor 46 and the pole 39 is adapted to be moved away from the poles 33 and 40 by means of a piece of insulation 74 (Fig. 2) which is carried by a lever 75. The lever 75 is pivotally mounted at 76 on the disc 30 and is held in position by means of a headed pin 77 carried by the disc 30. The pin 77 extends through a slot 78 in the lever 75. The lever 75 is provided with a generally circular opening 79 through which extends a pin 80 rotatable with the shaft 57. This pin may suitably be mounted on a gear 81 which forms part of the gearing 59, the gear 81 being the last gear of the train and being rigidly mounted on the shaft 57. The lever 75 is provided with a cam formation 82 which projects into the opening 79. During the rotation of the shaft 57, which occurs in the

counterclockwise direction as viewed in Fig. 2, a pin 80 engages the cam 82 and actuates the lever 75 upwardly as viewed in Fig. 2 so that the pole 35 is elevated away from the pole 38 and this pole, as a result of its normal bias, moves clear of the pole 40. The pin 80 and the cam 82 are arranged to maintain the separation of these poles for the angular movement of the arm 42 over the contacts 32. As has been previously indicated, the separation of these poles prevents a user from deriving more than one train from the contacts 32. It is to be noted that in the modification shown in Fig. 9, the poles 38, 39 and 40 and the lever 75 are unnecessary.

Each button 12 is mounted on a bar 83, as best seen in Figs. 4 to 7. The bars are slidably mounted in a frame 84 and each bar is pushed outwardly by a spring 85. On the frame 84 is mounted a strip of insulation 86 and each bar 83 carries a strip of insulation 87. The strips of insulation 86 and 87 carry the contacts to perform the switching operations previously described. Each bar 83 is provided with a large opening 88 and a small opening 89. A locking bar 90 extends through the large openings 88 of each set of buttons. The bars 90 are slidably mounted in the frame 84. Each bar is provided at one end with a washer 91 and a coil spring 92 bears against this washer and against a frame 84 so that each bar 90 is biased to the right as viewed in Figs. 4, 5 and 6. This causes the ends of the bars 90 to bear against contacts 93 on the intermediate web of the bail 69. Adjacent each bar 83 the bar 90 is provided with a cut-out 94 which provides an undercut cam formation 95 for each bar 83. The large openings 88 of the bars 83 are in the unactuated position of the buttons, in register with the overall width of the bar 90. The normal condition of the bar 90 is shown in Fig. 4. In this position the point 66 of the lever 67 is in engagement with the high part of the cam 65 (Fig. 3) and the bail 69 has been swung so as to force the bar to the left as viewed in Fig. 4 with the cam projections 95 clear of the bars 83. Thus, it will be seen that if a button 12 is actuated, its spring 85 will push it outwardly when the finger is removed from the button. When credit is established on the machine, the point 66 of the lever 67 rests on the step 73 of the cam 65 and in this condition the bail 69 is moved away from the bars 90 a slight distance. The bars 90 follow the bail 69 under the influence of their springs 92 so that the bars 90 are now moved into the position shown in Fig. 5. This brings the cam projections 95 into the large openings 88. If a button is now actuated, its bar 83 engages the cam projection 95, forces the bar 90 slightly to the left as viewed in Fig. 5 and permits the cam projection 95 to enter the small opening 89 of the actuated bar, thus holding the actuated button in actuated condition. When a button of each set is actuated, the motor 46 goes into operation to create the two trains of impulses and the step 73 of the cam 65 moves clear of the point 66 of the lever 67 so that the bars move still further to the right into the position shown in Fig. 6. It is to be noted that this movement brings the major part of the bar into the opening 88 of each unactuated button so that every actuated button is locked in and every unactuated button is locked out, while the two trains of impulses are being created.

As best seen in Fig. 7, the reduced end of each bar 83 of each set projects beyond its frame 84 and normally engages a strip 96 which is pivot-

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ally mounted at 97 at each end of the frame 84. At a suitable position, the strip 96 carries a piece of insulation 98 which engages a switch contact. In Fig. 7 I have shown a letters button and the switch 49 is arranged to cooperate with a piece of insulation 98. It will thus be seen that when a letters button is pressed, the strip 96 is swung in counterclockwise direction as viewed in Fig. 7 and the switch 49 is closed. Similar means are associated with the numbers buttons to effect the closing of the switch 53 when a numbers button is in actuated position.

Although the invention has been described in connection with the specific details of a preferred embodiment thereof, it must be understood that such details are not intended to be limitative of the invention except insofar as set forth in the accompanying claims.

Having thus described my invention, I declare that what I claim is:

1. A selector for automatic phonographs comprising two sets of contacts, an arm arranged to pass over said contacts, an impulser circuit normally including said contacts and said arm, a set of manually actuatable members arranged to cut an individual number of one set of contacts out of said circuit, a second set of manually actuatable members arranged to cut an individual number of the other set of contacts out of said circuit, a large contact subtending a definite number of the first set of contacts also arranged to be engaged by said arm, and means associated with certain manually actuatable means of the second set for connecting and disconnecting said large contact to and from said circuit.

2. A selector for automatic phonographs comprising a large and a small set of contacts, an arm arranged to pass over said contacts, an impulser circuit normally including said contacts and said arm, a set of manually actuatable members each arranged to cut an individual number of the large set of contacts out of said circuit, a second set of actuatable members including a plurality of pairs of members, either of each pair being arranged to cut an individual number of the smaller set of contacts out of said circuit, a large contact subtending a number of the large set of contacts and arranged to be engaged by said arm, and means associated with one of each said pair of members for connecting said large contact to the impulser circuit.

3. A selector for automatic phonographs comprising two spaced sets of contacts, an arm arranged to pass over said contacts, an impulser circuit normally including said contacts and said arm, a set of manually operable switches each arranged to cut out an individual number of contacts out of one set out of the impulser circuit, a second set of manually operable switches including a plurality of pairs of switches, either of each pair being arranged to cut out an individual number of the other set of contacts out of the impulser circuit, said switches being arranged to cut out one or more contacts from the ends of said sets of contacts remote from the space between said sets of contacts, a large contact sub-

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tending a plurality of the contacts of the first mentioned set of contacts adjacent said space and arranged to be engaged by said arm, and means associated with one of each pair of switches for connecting said large contact to the impulser circuit.

4. A selector for automatic phonographs comprising two sets of contacts arranged with a space between them, one of said sets being large and the other small, an arm arranged to pass over said contacts, an impulser line connected to a plurality of the large set and at least one of the other small set of contacts adjacent said space, a set of switches normally connected in series at one end to said impulser line, and individually to the contacts of the large set remote from said space whereby on actuation of one of said switches an individual number of such contacts is disconnected from said impulser line, a second set of switches normally connected in series, and at one end to said impulser line, alternate one of said second switches being connected to the contacts of the small set remote from said space whereby on actuation of one of said second set of switches an individual number of last mentioned contacts is disconnected from said impulser line, said impulser line and such contacts as are not disconnected and said arm constituting an impulser circuit, a large contact subtending a plurality of the large set of contacts adjacent said space and arranged to be engaged by said arm, and switch means associated with alternate ones of said second set of switches to connect said large contact to the impulser circuit.

5. In an impulser, in combination, a series of contacts, a conductor connected thereto, a movable contact arranged to pass over said contacts to create impulses, said conductor, contacts and movable contact being arranged in an impulser circuit, means for disconnecting one or more contacts from said conductor, a large contact subtending a plurality of said contacts and arranged to be engaged by said movable contact, and switch means arranged to connect and disconnect said large contact to and from said conductor.

6. In an impulser, in combination, a series of contacts, a conductor connected thereto, a movable contact arranged to pass over said contacts to create impulses, said conductor, contacts and movable contact being arranged in an impulser circuit, a large contact subtending a plurality of said contacts and arranged to be engaged by said movable contact, and switch means arranged to connect and disconnect said large contact to and from said conductors.

HERMAN G. JENSEN.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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