Feb. 25, 1947. J. F. EAKINS 2,416,436

MULTISELECTIVE PHONOGRAPH

Filed April 22, 1944 2 Sheets-Sheet 1

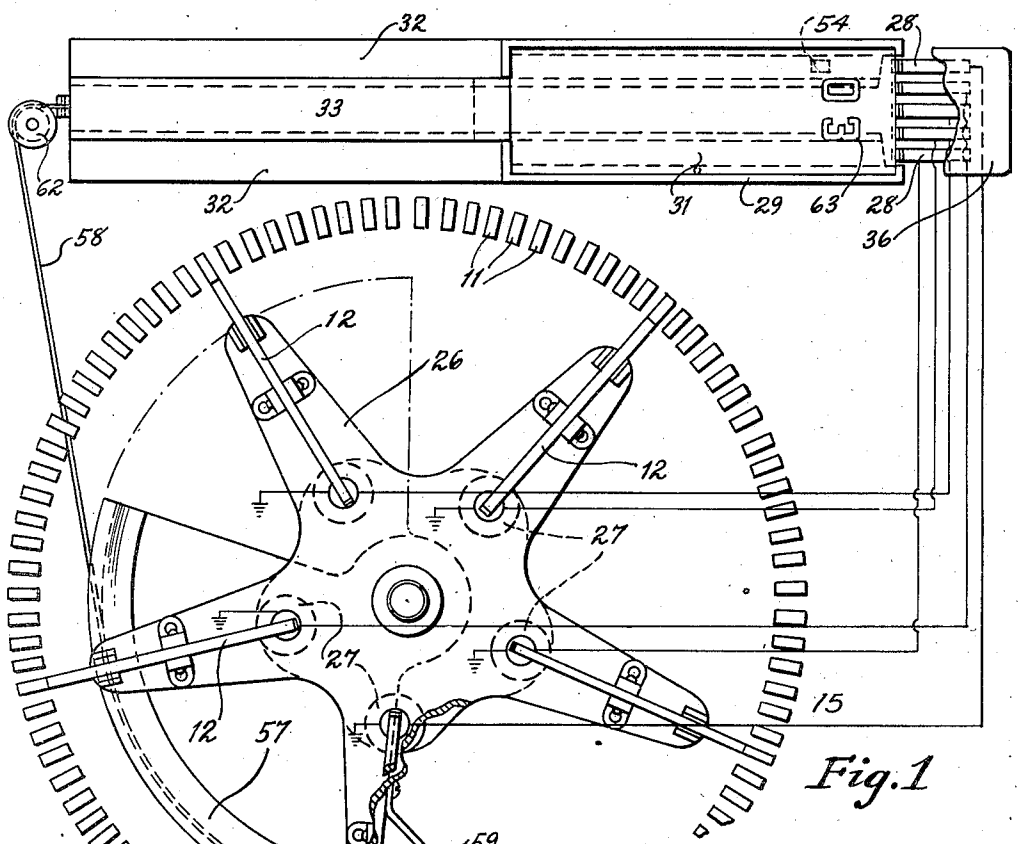


Fig. 1

Fig. 4

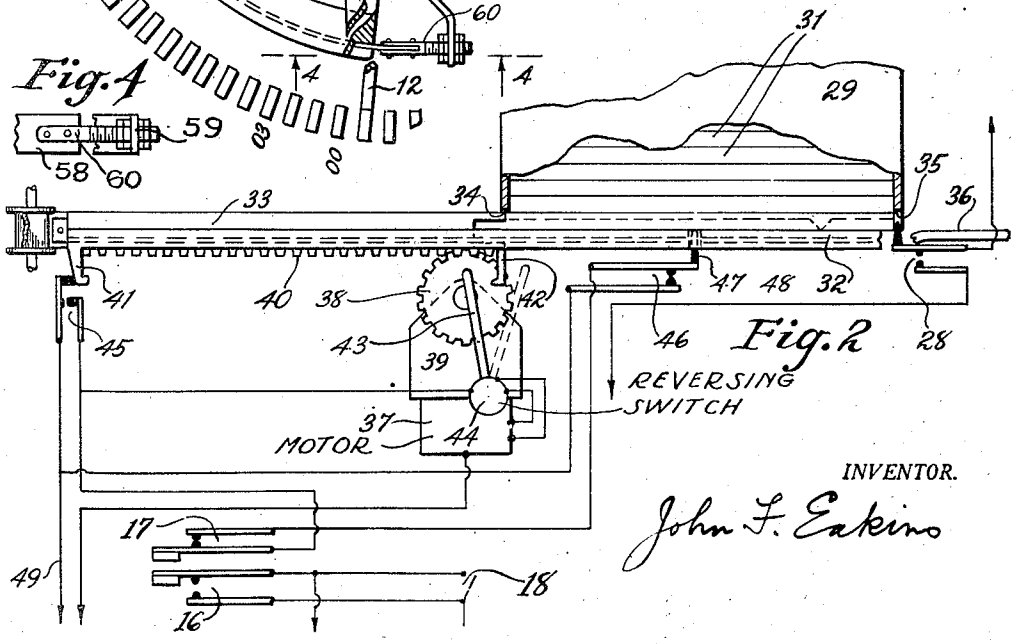


Fig. 2

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Fig. 3

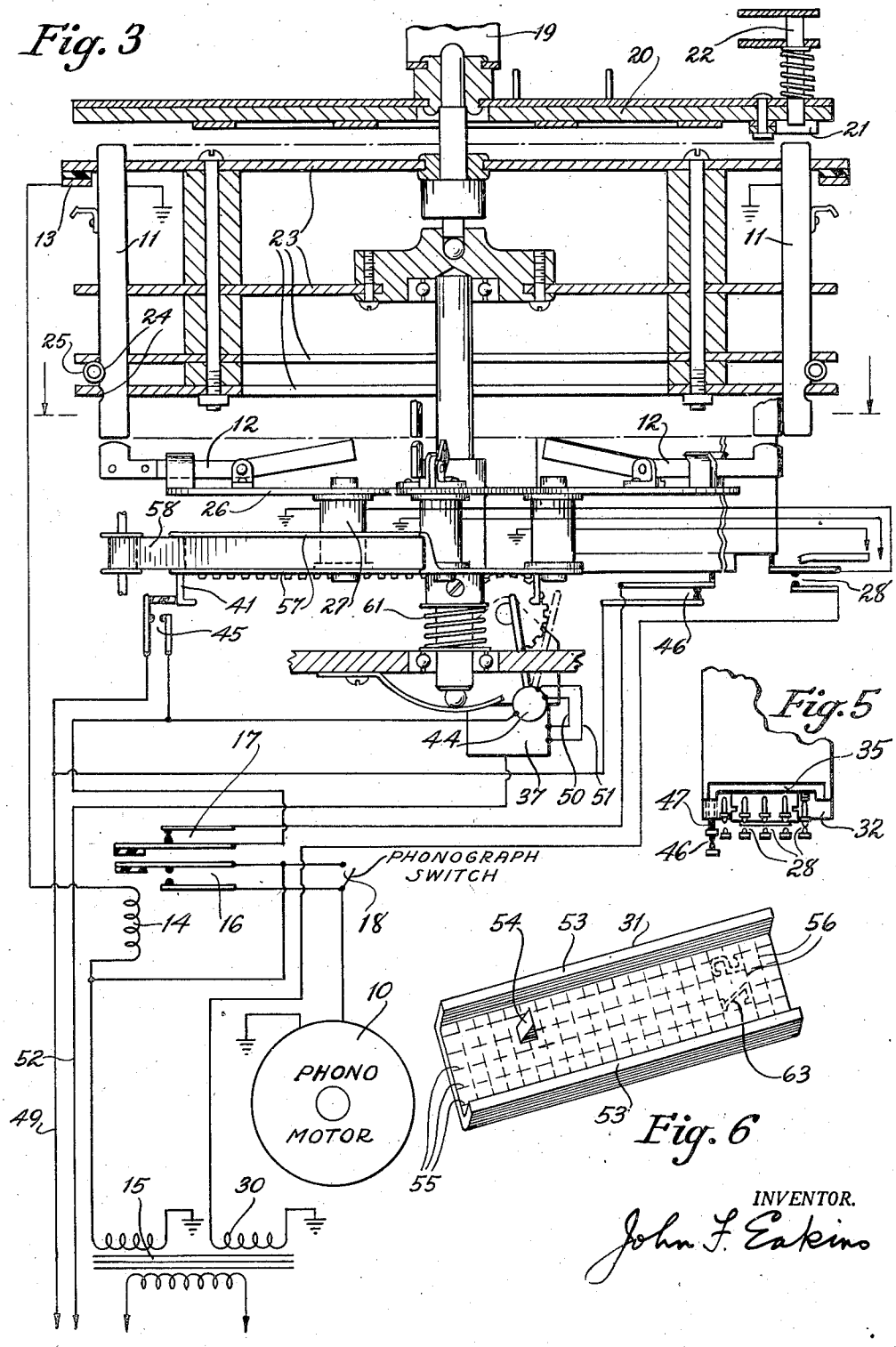


Fig. 5

Fig. 6

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2,416,436

MULTISELECTIVE PHONOGRAPH

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7 Claims. (Cl. 177—353)

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This invention relates to multiselective phonographs and has for its principal object the provision of a multiselective phonograph which can readily be put into operation to reproduce a program of recordings in predetermined order from the recordings available on the phonograph.

In my pending application Serial No. 531,902 filed April 20, 1944, I have described and claimed a phonograph of this type in which a stack of tokens is arranged in the order desired for the recordings. Each token is provided with means for creating trains of impulses which actuate stepping means to actuate one of a plurality of selector members individual to each token and to the recording corresponding thereto. The impulses are created by each token as it is dispensed from a magazine. The selector members control the operation of the dispensing means so that only one selector member is actuated at any time so that the phonograph plays the recordings in the order determined by the order of the tokens in the magazine.

In accordance with the present invention the stepping mechanism is rendered unnecessary. The token dispensing means is mechanically connected to an actuator and each token determines individually the point of time which the actuator actuates the selector member individual to the token being dispensed.

The preferred embodiment of the invention hereafter described is adapted to control a phonograph having 100 available recordings. Since it is desired to keep the tokens of moderate size, I prefer to employ a plurality, for example five, actuators. Each actuator is controlled by an impulse creating means on the token and these impulse creating means may be located along any of five lines on the token. The impulse creating means on the token may be located in any of twenty positions along each line. Thus with a token about three inches long the longitudinal spacing between the positions of the impulse creating means on the token may be about one-seventh of an inch. Consequently the operation is not highly critical and correct actuation of the actuator can be obtained without extreme precision of assembly or adjustment.

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

Fig. 1 is a plan view of my improved magazine and actuator assembly shown in cooperative relation to 100 selector members;

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Fig. 2 is an elevational view, magazine and associated parts, part of the magazine wall being broken away to show the manner in which the tokens are stacked in the magazine;

Fig. 3 is an elevational view of the actuator assembly, associated parts of the phonograph including the assembly of selector members, the selector member assembly being shown in section, together with a wiring diagram;

Fig. 4 is an elevational detail view taken on the line 4—4 of Fig. 1;

Fig. 5 is an elevational view of the discharge end of the magazine, the small supporting table being removed; and

Fig. 6 is a perspective view showing the under side of a token.

Referring to the drawings the phonograph motor is indicated by the reference numeral 10. This phonograph comprises 100 selector members 11 which are arranged to be projected from their normal position shown in Fig. 3, upwardly by means of five actuators 12. The selector members 11 are grounded and when they are actuated upwardly they make contact with an insulated ring 13. The ring 13 is connected to a relay 14 which is connected to the ungrounded end of a secondary of a transformer 15. The ungrounded side of this secondary is also connected to one side of a normally open switch 16 and to one side of a switch 18. The other sides of the switches 16 and 18 are connected to the ungrounded terminal of the phonograph motor 10.

When one of the selector members 11 is actuated the relay 14 is energized so that switch 16 closes. The motor 10 is thus put into operation. Immediately the motor 10 goes into operation the switch 18 is closed and the motor 10 remains in operation until the switch 18 is again opened during the next recording changing cycle of the phonograph. Consequently the recording selected is reproduced completely notwithstanding that the selector members 11 may be returned to normal position and the switch 16 is opened by the consequent deenergization of the relay 14. After the motor 10 goes into operation the shaft 19 and disc 20 are driven through at least a complete revolution. An abutment 21 carried by the disc 20 engages the actuated selector member 11 and the disc 20 is arrested. The drive of the shaft 19 by the motor 10 is effected through a friction drive which enables the shaft 19 to be arrested in any position determined by which member 11 is actuated. After this arrestment and after the switch 18 is closed, plunger means 22 carried by the disc 20 is effective to return the

arresting member 11 to its initial position. The arrested position of the shaft 19 determines which record is supplied to the turntable and reproduced. The phonograph thus briefly described may suitably be that described in copending Patents Nos. 2,382,487 and 2,382,488 issued August 14, 1945, to Mahlon W. Kenney and Herman G. Jensen or co-pending application Serial No. 342,419, filed June 26, 1940, by Marion R. Winkler. Said application discloses a plurality of selector elements which correspond to the selector members 11, a selector shaft which corresponds to the present shaft 19 and a phonograph motor controlling switch, which corresponds to the present switch 18. In that application the selector members were actuated from normal positions by individual solenoids. In the present application the selector members 11 are actuated mechanically by the actuators 12. Other phonographs are known in which control of recording selection is determined by the actuation of one of a series of members each corresponding individually to a recording, and it is to be understood that my invention is equally applicable to all such phonographs.

In the embodiment illustrated the selector members 11 are arranged in a circular series and are 100 in number. The selector members 11 are slideably mounted in a frame 23. Each selector member is provided with two notches 24 which are arranged to seat a circular coil spring 25 so that each selector member is resiliently held in its actuated and normal position. The spring 25 is held between two parallel rings carried by the frame 23. The actuators 12 are levers pivotly mounted on a spider 26 which is rotatably mounted in alignment with the shaft 19 and on the axis of the circular series of members 11. The outer ends of the actuators extend below the members 11. Their inner ends are armatures associated with electromagnets 27 carried by the spider 26. One end of the winding of each magnet 27 is grounded. The other end of each winding is connected to one side of one of the five switches 28 associated with the token magazine 29. The other sides of the switches 28 are connected to the ungrounded end of a secondary 30 of the transformer 15. It will thus be understood that each time one of the switches 28 is closed the electromagnet 27 connected thereto is energized and the selector member 11 beneath which the actuator 12 of the energized electromagnet 27 is then located, is moved upwardly into actuated position.

The magazine 29 consists of an open topped box into which a stack of tokens 31 may be dropped. The lowermost token rests upon guide members 32 which serve as guides for a slide structure 33. The end walls of the magazine 29 are provided with openings 34 and 35 which enable the upper part of the slide structure 33 to enter the magazine and discharge the lowermost token 31 out of the magazine towards the right as viewed in Figs. 1 and 2. The discharging token is supported beyond the discharging end of the magazine by a small table 36 from which it falls into a suitable receptacle or receiver (not shown).

The slide structure 33 is reciprocated by means of a reversible motor 37 which drives a pinion 38 at a suitably slow speed through a gear reduction 39. The pinion 38 meshes with rack teeth 40 carried on the lower side of the slide structure 33. The slide structure 33 carries two projections 41 and 42 which are arranged to cooperate with an arm 43 of a reversing switch 44. The switch 44 is a snap switch which controls the operation of the motor 37 in one direction or the other. If the circuit to the motor 37 through the reversing switch 44 were held closed the motor would drive the slide structure 33 to the right and left as viewed in Fig. 2 continuously. The projections 41 and 42 are correlated to the arm 43 so that the slide structure makes a complete dispensing movement to the right and then is fully retracted to the left so that the remaining tokens 31 in the stack may move down after each dispensing operation.

Just as the projection 42 causes the arm 43 to snap into its full line position in Fig. 2 or an instant before this occurs, the projection 41 opens a switch 45 which is biased towards closing position. The operation of the motor 37 is controlled by a switch 46 which may be a manually actuated on and off switch, which may be mechanically associated with switches (not shown) for supplying energy to the transformer 15 and to the amplifier of the phonograph, etc. In the embodiment illustrated the switch 46 is adapted to be closed when one or more tokens 31 are in the magazine 29. One pole of the switch 46 carries an insulating pin 47 which projects upwardly through an opening 48 any one of the guide members 32 so that it is engaged by the lowermost token in the magazine. One power line 49 is connected to one side of the switch 45 and to one side of the switch 46. The other side of the switch 45 is connected to the reversing switch 44 and to one side of the normally closed switch 17 which is controlled by the relay 14. The other side of the switch 17 is connected to the other side of the switch 46. The reversing switch 44 is connected to the motor 37 by two lines 50 and 51 and the motor is also connected to the power line 52.

When no selector member 11 is in the actuated position switch 17 is closed. When one or more tokens is placed in the magazine 29 the switch 46 is closed. The circuit of the motor is now completed from line 49 through switch 46, switch 17 and reversing switch 44 to power line 52. The motor 37 goes into operation, the pinion 38 rotating in clockwise direction as viewed in Figs. 2 and 3 so that the lowermost token 31 is dispensed. As will hereinafter appear this causes one of the members 11 to be moved upwardly opening the switch 17. However the motor 37 continues to complete its reciprocation because the switch 45 closes and does not open again until the end of a complete reciprocation. At the end of the right hand movement of the slide 33 the projection 41 throws the switch arm 43 into its dotted line position in Figs. 2 and 3 so that the rotation of the pinion 38 is reversed to bring the slide structure 33 back to its initial position throwing the arm 43 to the left and opening the switch 45. When the members 11 are all in their normal position the motor 37 is again put into operation to dispense another token and effect the actuation of the corresponding member 11. The selector thus tends to keep one member 11 in actuated position ready to determine the next recording after the termination of the reproduction of the recording being reproduced.

The tokens 31 are in the form of inverted channels. When the tokens are stacked in the magazine 29 the side flanges 53 rest upon the upper surface of the token immediately below. On its underside the main web of the token carries a downwardly directed projection 54 which is arranged so as to close one of the five switches 28

at a definite time in the dispensing of the token. As shown in Fig. 6 the projection 54 is located on one of the intersections between one of the five longitudinal lines 55 and one of twenty transverse lines 56. These lines intersect at 100 points so that the projection 54 is located at one of 100 possible positions and each one of these possible positions corresponds to one of the 100 recordings. Thus in Fig. 6 the projection 54 is so arranged that it will cooperate with the fourth switch 28 from the top as viewed in Fig. 1 and it will actuate this switch when the token is dispensed 16 steps from its initial position. In Fig. 1 I have shown in dotted lines a projection 54 which cooperates with the uppermost switch 28 in Fig. 1 when the token has been moved four steps from its initial position. These steps which are defined by the distance between the transverse lines shown in Fig. 6 correspond to movement of the actuators 12 from one member 11 to the next.

The spider 26 carries a flanged sector 57 upon which rides a belt 58. One end of the belt is secured to the slide structure 33, the other end being anchored to a bracket 59 carried by the sector by means of a threaded clevis 60. Adjustment of the clevis locates the actuators 12 below selector members 11 when any of the projections 54 is closing any of the switches 28. The spider 26 is biased in the counter-clockwise direction by a spring 61 one end of which is connected to the spider, the other end being connected to the frame supporting it. This spring keeps the belt 58 taut at all times. The belt 58 may suitably be a fine strip of steel or other suitable material and it may be arranged to pass over an idler 62 if necessary. The sector 57 is sufficiently long so that the belt 58 engages it tangentially under all operating conditions.

Each token 29 bears indicia 63 which identifies it and the recording to which it corresponds. The name of the recording may be applied to the token. I may number the tokens, for example from 00 to 99. Thus the token shown in Fig. 1 having a projection 54 arranged to close the switch 28 after four steps from initial position may bear the indicia 03. The token shown in Fig. 6 having a projection 54 adapted to close the fourth switch of Fig. 1 after sixteen step movements would bear the indicia 75. On Fig. 1 I have marked the indicia 03 and 75 opposite the members 11 which would be actuated by these two tokens. It will be obvious that each of the members 11 thus corresponds to one of the 100 positions for the projection 54 on one of the 100 intersections of the lines 55 and 56, each intersection determining the positions of the projections 54 on the various tokens.

The operation is as follows:

The operator selects the various tokens corresponding to the recordings which he desires to have reproduced and he arranges the selected tokens in a stack, the first token at the bottom of the stack, the next immediately above it and so on. He places the arranged stack in the magazine 29 and thus closes the switch 46. The motor 37 is put into operation so that the slide structure 33 moves to the right moving the lowermost token towards the right and rotating the spider 26 in the clockwise direction as viewed in Fig. 1. If the lowermost token is that shown in Fig. 1, then when the spider has moved four steps in the clockwise direction and the downwardly directed actuator 12 is below the selector member 11 marked 03 the projection 54 closes the uppermost switch 28 and the electromagnet 27 associated with the downwardly directed actuator 12 in Fig. 1, is energized and the selector member 11 indicated by 03 on Fig. 1 is displaced upwardly. If the lowermost token had been that shown in Fig. 6 the projection 54 would have actuated the fourth switch 28 in Fig. 1 and the actuator 12 directed upwardly and towards the right in Fig. 1 would have been actuated by its electromagnet when that actuator was below the selector member 11 identified by the indicia 75 on Fig. 1 so that that selector member would be actuated. Each switch 28 controls one of the electromagnets 27 and consequently controls one of the actuators 12. Each actuator 12 actuates any one of the twenty selector members located in the clockwise direction from the position of the actuator shown in Fig. 1.

To return to the operation, the selector member 11 corresponding to the lowermost token has been displaced upwardly by the momentary energization of the associated electromagnet 27. The motor 37 continues to operate until the lowermost token has been discharged from the magazine and the sector 57 has attained the position shown in dot and dash lines in Fig. 1. Then the switch 44 is snapped by the projection 41 so that the motor is reversed and the slide structure 33 moves to the left and the sector 57 returns to its normal position. The motor 37 then stops because a selector member 11 is displaced, the relay 14 is energized and the switch 17 is opened. When the first selector member 11 was pushed upwardly the switch 16 was closed and the phonograph motor 10 was put into operation. This promptly closed the switch 18 so that the motor continues to operate. The operation of the motor rotates the shaft 19 until the abutment 21 collides with the displaced selector member 11 and the rotation of the shaft 19 is terminated. The phonograph moves the record bearing the desired recording into playing position and thereafter the plunger 22 is actuated to return the arresting selector member 11 to its normal position. This causes the closing of the switch 17 and the motor 37 is again energized to dispense the second token with the result that the corresponding selector member 11 is displaced upwardly again opening the switch 17. Thus while the first recording is being reproduced the member 11 corresponding to the second recording is displaced. After the first recording is completed the shaft 19 again rotates and becomes arrested by the second displaced member 11 so that the phonograph reproduces the second recording. While the second recording is being reproduced the third token is dispensed and the corresponding selector member 11 is displaced. This sequence is repeated until all the tokens are dispensed from the magazine. When that occurs the switch 46 opens and when the slide 33 attains its normal position the switch 45 is opened and the motor 37 ceases to operate until another token or stack of tokens is placed in the magazine 29. During the playing of the last selected recording the switch 16 is open but the circuit of the phonograph motor 10 is maintained by the switch 18. After the playing of the last recording the phonograph motor actuates the record changing mechanism of the phonograph and opens the switch 18 so that the phonograph goes out of operation until the operation is again resumed by the insertion of one or a stack of tokens in the magazine 29.

It is to be noted that the location of the abutments 41 and 42 is not critical. They should be

arranged so that the slide structure 33 makes a complete dispensing movement and is completely retracted to allow the tokens to drop in the magazine. The actuators 12 should be adjusted by the clevis 60 so that the actuators are exactly beneath the proper selector members 11 when the projections 54 arranged on any of the transverse lines 56 close any of the switches 28.

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 in so far as set forth in the accompanying claims.

I claim:

1. A selector for automatic phonographs comprising a plurality of selector elements each adapted to control the playing of an individual recording, a plurality of tokens each corresponding to an individual recording and element and adapted to be arranged in a stack, magazine means for receiving such a stack, dispensing means adapted to dispense said tokens one at a time from said magazine, an actuator connected to said dispensing means to move therewith past a plurality of said elements, switch means arranged for cooperation with the dispensing token, switch actuating means at individual positions on the tokens whereby said switch means is actuated at a predetermined position of each dispensing token, and means controlled by said switching means for actuating said actuator whereby the selector element individually corresponding to the dispensing record is actuated into selecting position.

2. A selector for automatic phonographs comprising a series of selector elements each adapted for displacement to control the reproduction of a corresponding recording, a plurality of tokens each corresponding to an individual recording and element and adapted to be arranged in a series of selected order, a magazine for receiving said series of tokens, dispensing means adapted to dispense said tokens one at a time from one end of said series, an actuator arranged for movement through positions in which it registers with a plurality of said elements, means for moving said actuator simultaneously with the dispensing means during its dispensing movement, means for actuating said actuator to effect displacement of a registering element, switch means for controlling last said means, and switch actuating means at an individual position on each token whereby the switch is actuated by each token at an individual point of dispensing thus actuating the selector element corresponding to the token being dispensed.

3. A selector for automatic phonographs comprising a series of selector elements each adapted for displacement to control the reproduction of a corresponding recording, a plurality of tokens each corresponding to an individual recording and element and adapted to be arranged in a series of selected order, a magazine for receiving said series of tokens, dispensing means adapted to dispense said tokens one at a time from one end of said series, a plurality of actuators each arranged to actuate any one of a certain number of said selector elements, means for moving said actuators in synchronism with the token being dispensed, a plurality of switch means each adapted to control the operation of one actuator and individual means each token arranged to actuate a definite one of said switches at a definite dispensing position to actuate the corresponding

actuator to displace the corresponding selector element.

4. A selector for automatic phonographs comprising a series of selector elements each individual to a recording, an actuator arranged to actuate any of said elements, a plurality of tokens each corresponding to a selector element and adapted to be arranged in a series, means for dispensing said tokens one at a time from said series, means for driving said dispensing means and said actuator simultaneously, and individual means on said tokens effective at individual positions of dispensing for controlling the selecting operation of said actuator.

5. In a selector for automatic phonographs, in combination, a plurality of tokens adapted to be arranged in a series, a magazine for receiving said series, means for dispensing said tokens one at a time from said magazine, a plurality of switches arranged in transverse relation to the dispensing token, each of said tokens having a single switch actuating element in alignment with one of said switches whereby one of said switches is actuated by each dispensing token, said elements being located at a plurality of positions in the longitudinal direction of the tokens whereby a single one of the switches is actuated at an individual time in the dispensing operation, a series of selecting elements each corresponding to an individual recording, a plurality of actuators each associated with and controlled by one of said switches and means for moving said actuators synchronously with the dispensing token past sub-series of said series of selecting elements whereby the selecting element corresponding to the dispensing token is displaced by its actuator when the switch actuating element of the dispensing token actuates the corresponding switch.

6. In a selector for automatic phonographs, in combination, a plurality of tokens arranged to be stacked, a magazine adapted to receive a stack of tokens, dispensing means for dispensing the tokens one at a time, a plurality of switches arranged in the transverse direction of the magazine, each token having a single switch actuating element in alignment with one of the switches, said elements being located variously in the longitudinal direction of the token whereby each dispensing token actuates one of the switches at a predetermined point of its dispensing operation, a series of selector members each adapted to be displaced to control the reproduction of a corresponding recording, a carriage movable past said selector members, a plurality of actuators on said carriage adapted to displace said members, electromagnetic means associated with each actuator and controlled by one of said switches, and means for operating said dispensing means and moving said carriage simultaneously whereby each dispensing token effects the actuation of one of the actuators at a predetermined point of the dispensing operation to displace a selector member corresponding to the dispensing token.

7. In an automatic multiselective phonograph, in combination, a series of selector elements each adapted to be displaced to control the reproduction of a corresponding recording, a phonograph motor, switch means associated with each element for energizing the motor when an element is displaced, switch means controlled by said motor for maintaining its circuit, recording selecting means operable by said motor to engage a displaced selector element to control the reproduction of the corresponding recording, au-

tomatic means for returning the engaged selector element to initial position, a plurality of tokens each corresponding to an individual recording, a magazine for receiving a plurality of said tokens, dispensing means for dispensing said tokens one at a time from said magazine, a plurality of switches arranged in the transverse direction of the dispensing movement, a switch actuating means on each token located to close one of said switches during the dispensing operation, said switch actuating means being located at various longitudinal positions on the tokens whereby they cooperate with the switches at various positions of the dispensing operations, a plurality of actuators arranged to cooperate with the selector elements, a plurality of electromagnetic means for operating said actuators, a movable carriage supporting said actuators and said electromagnetic means, means connecting each switch to an electromagnetic means, motor

means for moving said carriage and said dispensing means simultaneously, and means controlled by said selector elements for rendering said motor means inoperative when a selector element is displaced and operative when no selector element is displaced.

JOHN F. EAKINS.

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