Dec. 30, 1958 L. A. DURANT 2,866,865

MULTI-SELECTOR

Filed April 10, 1957 4 Sheets-Sheet 1

FIG. 1

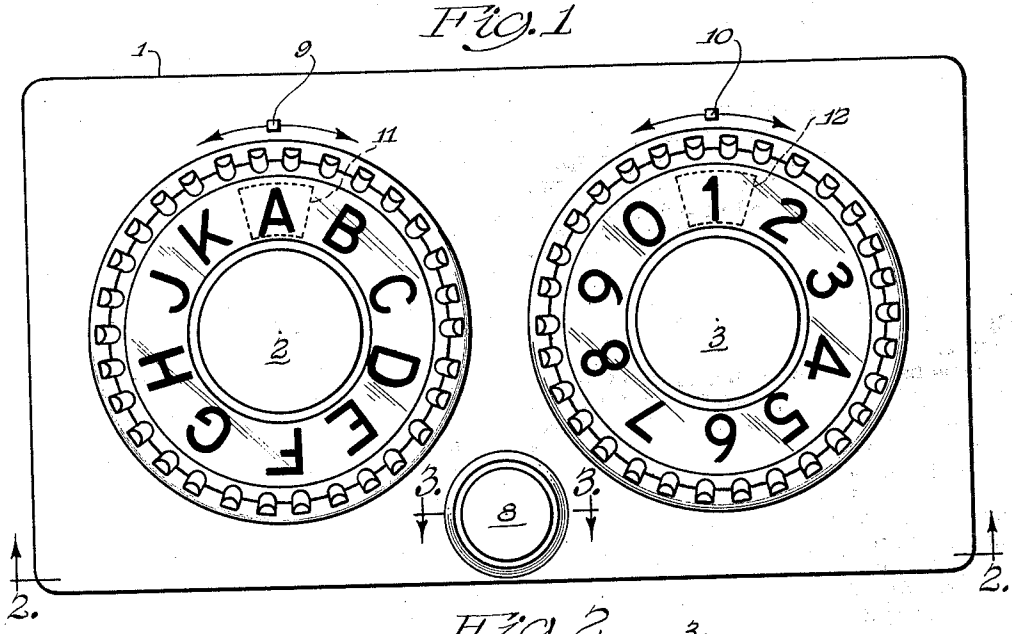


FIG. 2

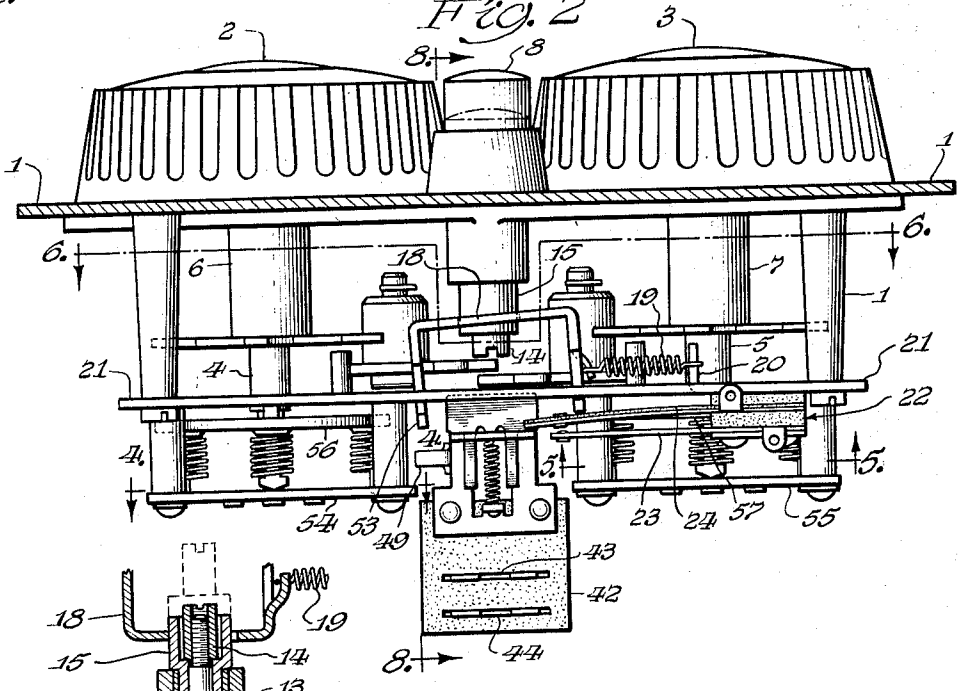
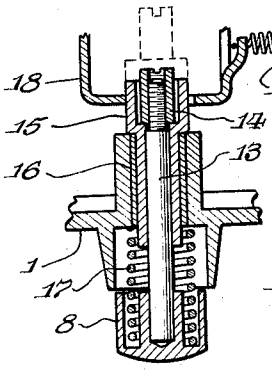


FIG. 3



Inventor
Lyndon A. Durant
by Lloyd J. Sinclair

Dec. 30, 1958 L. A. DURANT 2,866,865

MULTI-SELECTOR

Filed April 10, 1957 4 Sheets-Sheet 2

FIG. 4

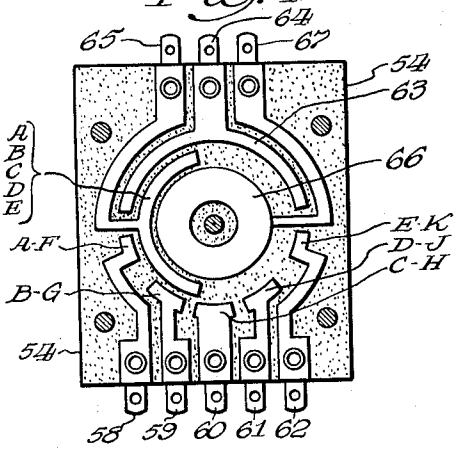


FIG. 7

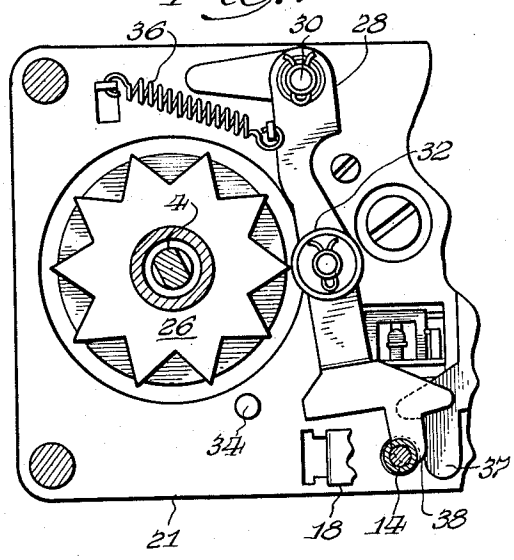


FIG. 5

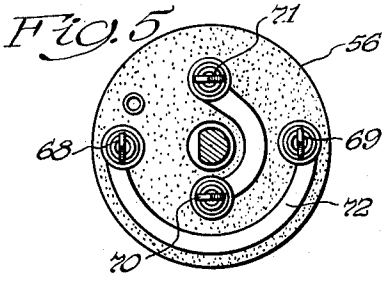
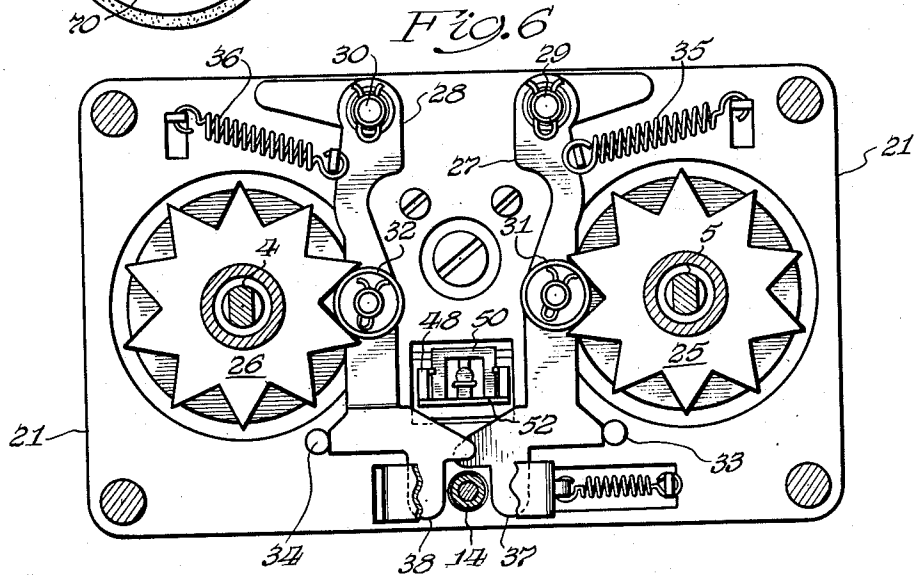


FIG. 6



Inventor
Lyndon A. Durant
by Lloyd J. Sherman

Dec. 30, 1958 L. A. DURANT 2,866,865

MULTI-SELECTOR

Filed April 10, 1957 4 Sheets-Sheet 3

FIG. 8

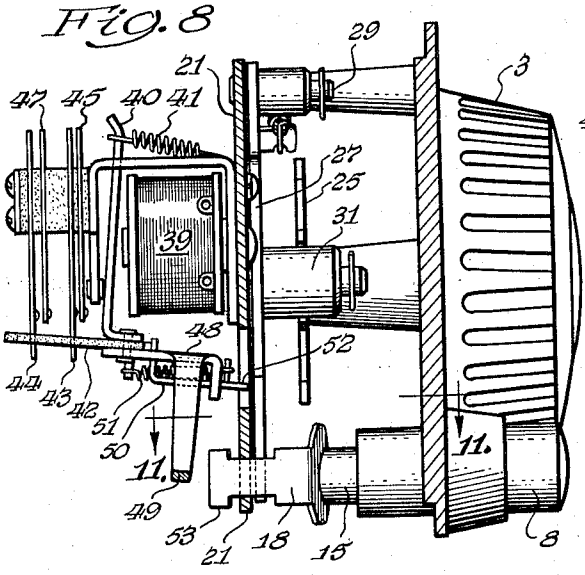


FIG. 9

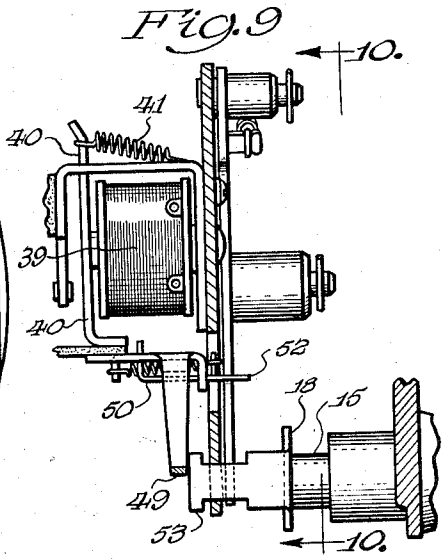


FIG. 11

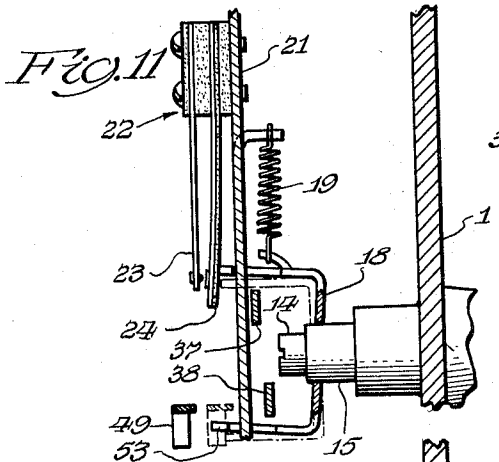


FIG. 12

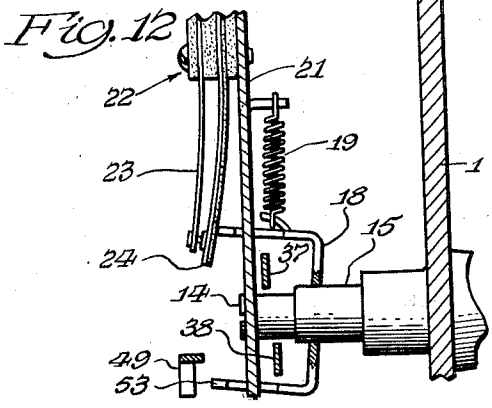
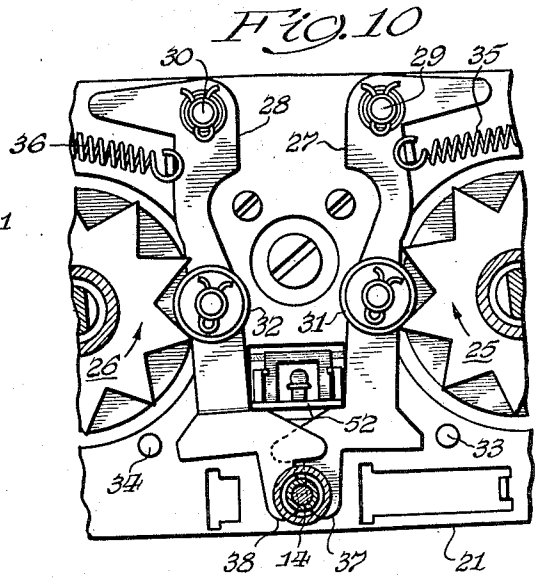


FIG. 10



Inventor
Lyndon A. Durant
by Lloyd J. Anderson

Dec. 30, 1958 L. A. DURANT 2,866,865

MULTI-SELECTOR

Filed April 10, 1957 4 Sheets-Sheet 4

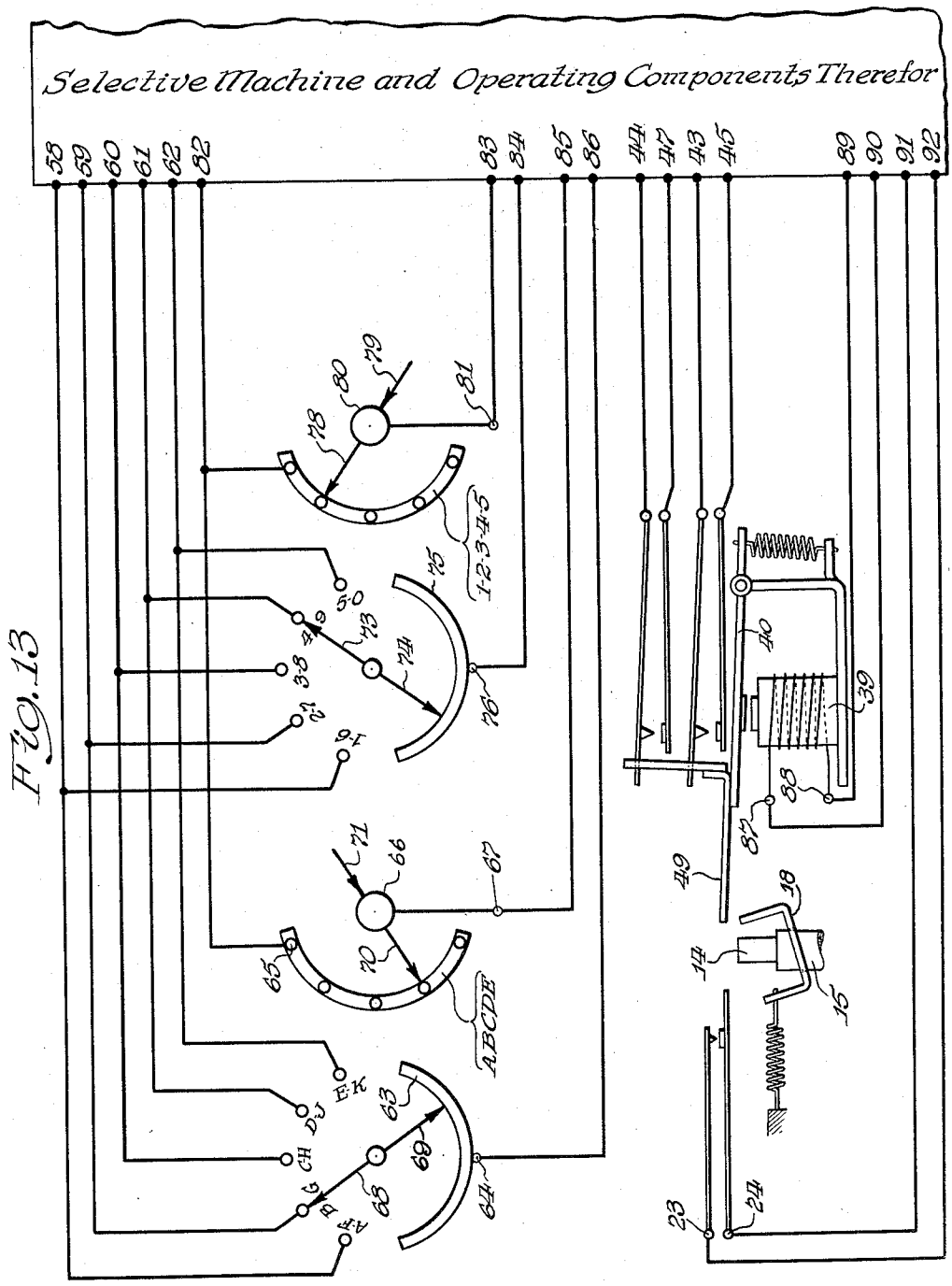


Fig. 13

Inventor
Lyndon A. Durant
by Lloyd J. Sherman

United States Patent Office 2,866,865 Patented Dec. 30, 1958

2,866,865

MULTI-SELECTOR

Lyndon A. Durant, Chicago, Ill., assignor to United Music Corporation, Chicago, Ill., a corporation of Illinois

Application April 10, 1957, Serial No. 651,988

7 Claims. (Cl. 200—50)

This invention relates in general to manual devices for selectively controlling a plurality of electric circuits, and more particularly, to a multi-selector for use in public service machines such as coin actuated phonographs.

Prior controlling devices for use with coin actuated machines usually take the form of pluralities of space wasting panels of electric pushbutton switches, including complex additional "cheat proof" circuits and other protective devices for preventing improper or unauthorized use, such as extreme rapid operation or other unusual manipulation.

For this and other reasons, the inherent advantages of rotary selectors could not be fully realized in previous devices, particularly when used for controlling a relatively large number of selection circuits in coin operated devices.

The present invention overcomes the above disadvantages and objections by the provision of a pair of compact rotary switches of novel construction controlled by a pair of self-designating manual knobs and a cooperating mechanism whereby a relatively large number of selections may be made without danger of the machine being cheated or conversely, without the danger of the machine cheating the user, which is one of the important objects of the invention.

A further object of the invention is the provision of a pair of rotary switches for energizing a selected one of a large number of selecting circuits under the control of a single master pushbutton contactor and including means for preventing the manual operation of the latter during the rotation of either of the switches.

Another object of the invention is the provision of an electromagnetic clutch means responsive to an actuating circuit for preventing the master contactor from operating when the master button is depressed.

A further object of the invention is the provision of a combination detent and interlock for positively detenting each rotary switch in each selective position and to prevent simultaneous rotation thereof.

Another object of the invention is the provision of a selector which may be positioned in a relatively small zone on a machine for convenient operation and with indices thereon simple to translate from a related printed program.

Another object of the invention is the provision of a dual rotary switch means whereby the product of the number of indices on each switch will equal the number of circuits which can be selectively energized by a single master switch.

These and other objects in one embodiment of the invention are described and shown in the appended specifications and drawings in which:

Fig. 1 is a front elevation of the multi-selector;

Fig. 2 is a bottom cross-sectional view taken through section line 2—2, Fig. 1;

Fig. 3 is a cross-sectional view taken through section line 3—3, Fig. 1;

Fig. 4 is a sectional view of one of the switch contact plates taken through section line 4—4, Fig. 2;

Fig. 5 is a sectional view of one of the switch contactors taken through section line 5—5, Fig. 2;

Fig. 6 is a cross-sectional view of the selector taken through section line 6—6, Fig. 2;

Fig. 7 is a fragmentary view of Fig. 6 with elements in changed position;

Fig. 8 is a side cross-sectional view of the selector taken through section line 8—8, Fig. 2;

Fig. 9 is a fragmentary view of Fig. 8 with elements in changed position;

Fig. 10 is another fragmentary view of Fig. 6 with elements in changed position;

Fig. 11 is a fragmentary cross-sectional view taken through section line 11—11, Fig. 8;

Fig. 12 is the same as Fig. 11 with elements in changed position;

Fig. 13 is a schematic circuit diagram showing the electric components of the selector connected for operation.

Referring to Figs. 1 and 2, a frame member 1 having a decorative front panel is adapted to retain all elements of the device. The manual operable parts consist of a pair of rotatable knobs 2 and 3 fixed to shafts 4 and 5 respectively, and journalled for rotation in bosses 6 and 7 integral with the frame. A master contactor pushbutton 8 is conveniently positioned for reciprocation in the frame as shown.

Since this embodiment of the selector is intended to selectively energize one hundred selection circuits, each knob is provided with ten different equi-spaced indices "A–K" on knob 2 and "1–10" on knob 3 for registration with fixed marks 9 and 10 on the panel.

The indices portion of each knob is made from translucent material with an opaque wall framing each index extending rearward for receiving illumination from a lamp not shown through windows 11 and 12 in the panel for the purpose of emphasizing the appearance of the particular pair of indices registered with the said marks.

The pushbutton assembly shown in Fig. 3 consists of the button 8 coaxially secured to a pushrod 13 with an adjustable sleeve 14 threaded on the end thereof. A clutch bushing 15 is slideably positioned over pushrod 13 between a bearing 16 in the frame 1. A compression spring 17 in the button 8 normally bears against the frame for urging the pushrod in the position shown. A clutch cradle 18 is slideably positioned over one end of the clutch bushing 15, the action of which will be hereinafter described. It is now apparent that when the pushbutton is depressed the sleeve 14 will move to the position shown in dotted lines.

Referring to Figs. 2 and 3 a tension spring secured at one end to clutch member 18 has its opposite end secured to a lug 20 in subframe 21 for the purpose of tilting the clutch member 18 into locked engagement with bushing 15. A master contactor 22 secured to subframe 21 is positioned with blades 23—24 in the path of movement of one leg of cradle 18. Thus, due to the locking engagement of clutch member 18 with the clutch bushing 15, the movement of the cradle 18 will close blades 23 and 24 when the push-button 8 is depressed.

Referring to Fig. 6, the shafts 4—5 have keyed thereon detent star wheel 25—26 having teeth corresponding with the indices on the knobs 2 and 3 respectively.

A pair of combination detent and safety members or levers 27—28 are pivoted for oscillation on studs 29—30 in sub-frame 21 as shown. A pair of detent rollers 31—32 are journalled on levers 29—30 for radial engagement with star wheels 25—26 as shown. Each lever is normally urged against corresponding star wheels and stop pins 33—34 in subframe 21 by springs 35—36 mounted as shown. The outer end portions of levers 27—28 termi-

nate in blocking projections 37—38 which are adapted to move transversely over the path of travel of sleeve 14 as illustrated by the changed position of lever 28 in Fig. 7. This figure also illustrates the detent action of the roller 32 with reference to the star wheel 26. It is to be noted that the outer portion of lever 28 is offset with respect to lever 27 to permit the simultaneous overlapping movement of the projections 37—38 as illustrated in Fig. 10. Thus it is apparent that the coaction of the rollers 31—32 with their respective star wheels 25—26 will provide an effective detent action to both knobs 2 and 3 whereby they will come to rest only with one of their indexes in registration with the marks 9 and 10 when they are rotated.

It is also apparent that a slight movement of either knob in either direction will position the blocking projections 37—38 of corresponding levers into the axial path of movement of sleeve 14 and effectively prevent the operation of the pushbutton 8 and the contactor blades 23—24.

Referring to Fig. 8, a relay 39 is secured to subframe 21 having an armature 40 normally urged in the position shown by a spring 41. An insulating projection 42 secured to armature 40 engages switch blades 43 and 44 for contacting blades 45 and 47 respectively when the relay is energized for controlling electric circuits to be hereinafter described.

An outboard member 48 secured to the outer end of armature 40 as shown terminates in a clutch operating lever 49 and slidably carries a detent lock member 50 which is normally urged in position shown by spring 51. The inner end 52 of lock member 50 is adapted for movement through an aperture in subframe 21 and into the path of movement of levers 27 and 28 better shown in Fig. 10.

When the relay 39 is energized, three functional operations occur. The switch blades 43—44 operate the switch means, contacting switch blades 45 and 47, the lever 49 will engage one leg 53 of the cradle 18 and move same out of locking engagement with the bushing 15 and simultaneously insert the end 52 of lock member 50 into the path of movement of levers 27 and 28. Thus it can be seen from Fig. 10 that both rollers 31 and 32 are prevented from moving over the teeth of each star wheel, which in turn, effectively locks both knobs against rotation.

It is to be noted that during the period of time the relay is energized, the operation of pushbutton 8 will not operate the contactor 22 by virtue of the now free position of the cradle 18 with respect to the bushing 15.

In the event that either or both of the knobs are held by manual tension against the lock member 50 the relay 39 will not be prevented from restoring to its normal inoperative position as shown in Fig. 8 by virtue of the elongation of spring 51 under influence of the more powerful relay spring 41, and when the knobs are released spring 51 will restore the lock member 50 to its normal retracted position.

Each of the knobs 2 and 3 are adapted to operate individual rotary switches secured to subframe 21. Each rotary switch comprises identical type stator plates 54 and 55 which are retained to subframe 21 by spacers as shown. Identical rotor assemblies 56—57 mated with plates 54—55 are secured for rotation on inner end of shafts 4 and 5 respectively.

Referring to Figs. 2 and 4 each of the "printed circuit" stator plates 54 and 55 are the same except for the designations applied to the contacts thereon. Plate 54 is associated with the knob bearing letter form of indices, and consists of five selector contacts arranged in a semicircle identified as A–F, B–G, C–H, D–J, and E–K with conductors running to terminals 58, 59, 60, 61 and 62 respectively.

A semicircular segment 63 is concentrically positioned to be bridged with said five contacts and connects to terminal 64.

A smaller transposing segment (ABCDE) is positioned concentric and at right angles to segment 63 and connects to terminal 65.

A central circular contact 66 is connected to terminal 67 and is positioned to be bridged to segment (ABCDE).

Rotor discs 56—57 are adapted to carry four spring loaded brushes in contact with each of the stator plates 54 and 55 as shown.

Fig. 5 shows brushes 68 and 69 bridged together by a conductor 72 for sliding sequential contact on the said five contacts and the segment 63.

Brushes 70 and 71 are bridged together by a conductor with contact 70 positioned for sliding engagement on segment (ABCDE) and brush 71 is positioned to maintain sliding engagement with circular contact 66.

The stator plate 55 and rotor disc 57 operated by the knob 3 bearing "number" indices are the same in construction as the stator and rotor used associated with the "letter" knobs except that the five contacts on the stator are designated 1–6, 2–7 ,3–8, 4–9 and 5–0 and the semicircular segment corresponding to (ABCDE) is designated (12345).

It is to be noted that the relay 39 is intended to be responsive to a circuit means from the device to be operated, and that the relay switch blades, the terminals of the stator plates and the master contactor are intended to be connected in other circuit means for sequentially and selectively energizing each one of the said one hundred selecting circuits, in the device to be operated, not shown.

Referring to Fig. 13 the electrical elements of the device are shown connected to a "Selective Machine and Operating Components Therefor." The rotary "letter" and "number" switches under the control of knobs 2 and 3 respectively are connected by conductors as shown.

Each of the five contacts on each stator 54 and 55 are connected to terminals 58 to 62 inclusive, and their corresponding brushes 68, 69 and 73, 74 provide independent return circuits through segments 63 and 75, terminals 64 and 76 respectively through independent conductors connected to terminals 86 and 84.

The (ABCDE) and the (12345) segments are connected to terminal 82, and their corresponding brushes 70, 71 and 78, 79 are connected through terminals 67 and 81 respectively to independent terminals 85 and 83.

It is now apparent that when brush 68 is rotated to engage any one of the "letter" contacts A–F, B–G, C–H, D–J and E–K a partial circuit will be established between terminal 86 and a selected terminal in the group 58 through 62, and brush 70 will maintain a partial circuit between terminals 82 and 85, thus providing means for selectively energizing five external selecting circuits corresponding to indices A, B, C, D and E on knob 2.

When the brush 69 is rotated to engage any one of the said "letter" contacts then brush 70 will have disengaged from segment (ABCDE) and provide means for operating an external circuit transposing means, not shown, connected to terminals 82 and 85, thus a second group of five external selection circuits connected to said transposing means may be selectively energized through said "letter" contacts, corresponding to indices F, G, H, I and K on knob 2.

The five contacts on the "number" switch 1–6, 2–7, 3–8, 4–9, and 5–0 are also connected to terminals 58 through 62 respectively, and when brush 73 is engaged with any of said contacts brush 78 will maintain a partial circuit between terminals 82 and 83, and when brush 74 is rotated to engage said contacts, brush 78 will have disengaged from segment (12345) and thus provide the means for operating a second external transposing means. Thus, as in the case of the "letter" switch two additional groups of five external selecting circuits may be energized through the said "number" contacts corresponding with indices 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

It is now apparent that the two rotary switches connected to an appropriate external circuit and transposition means permits one hundred selection circuits to be selectively energized.

The pushbutton operation of contactor blades **23—24** connected to terminals **91** and **92** are intended to energize each selection circuit established by the selected positions of knobs **2** and **3**.

Because of the time element required for a selective mechanism to function and to prevent malfunction thereof the relay **39** connected to terminals **89** and **90** is energized by external means, when required, to prevent rotation of either of the knobs **2** and **3** and the operation of contactor **23—24**.

Furthermore the contactor cannot be operated unless both knobs are at rest in a selected position, by virtue of the blocking action of detent levers **27—28**.

The multi-selector described in the foregoing will control each of one hundred selecting circuits with a relatively few conductors connected thereto and because of the previously described safety features the operation of the multi-selector must be performed in a predescribed proper manner.

Having described my invention, I claim:

1. A multi-selector comprising means forming a frame, a pair of multi-contact electric switch means in said frame connected to a plurality of selecting circuits and adapted for independent operation to each of a plurality of rest positions when independently selectively positioned, a knob means operatively secured to each said switch means for independent manual operation thereof, each of said knob means having thereon a plurality of indices corresponding to said rest positions for independent registration with a pair of corresponding fixed indicators on said frame, an electric contactor means in said frame electrically associated with said selecting circuits for energizing each selected one thereof when operated, said contactor means including a blocking element movable through a predetermined path when operated, a pair of detent means corresponding with and responsive to said knobs independently biased between said frame and a movable portion of each said switch means for normally and independently urging the latter into each of said rest positions and said knobs into each of said registration positions, each said detent means including a member positioned and adapted to intersect the said path of movement of said blocking element when either of said detent means is operated for blocking and preventing the operation of said contactor when either of said knobs are moved from their said registered positions.

2. In a multi-selector of the character described means forming a frame, a rotary electric switch means in said frame journalled for operation to each of a plurality of rest positions for selectively contacting a like plurality of selecting circuits connected therewith when selectively positioned, a detent means biased between said frame and a portion of said switch means normally urging said switch means into each of said rest positions, said detent means including a member adapted to move through a predetermined path when said detent means is operated, an electromagnetic means in said frame having an armature means positioned for intersecting movement into and from the said path of movement of said detent member for blocking and arresting the movement of said detent means to lock said switch means when energized.

3. In a multi-selector of the character described means forming a frame, a rotary electric switch means in said frame journalled for operation to each of a plurality of rest positions for selectively contacting a like plurality of selecting circuits connected therewith when selectively positioned, a detent means biased between said frame and a portion of said switch means for normally urging said switch means into each of said rest positions, said detent means including a member adapted to move through a predetermined path when said detent means is operated, an electric relay means having an armature in said frame

including electric switch means responsive to the movement of said armature when said relay is energized for operating a control circuit associated with said selecting circuits, said armature including a blocking member positioned for movement into the path of movement of said detent member for blocking and preventing movement thereof when said relay means is energized.

4. In a multi-selector of the character described means forming a frame, a multi-contact electric switch means in said frame journalled for movement to each of a plurality of rest positions for selectively contacting each of a like plurality of selecting circuits connected therewith when selectively positioned, an electric contactor means in said frame positioned for manual movement thereof including a blocking element movable through a predetermined path, said contactor means electrically connected to said selecting circuits for energizing a selected one of said circuits when operated, a detent means biased between said frame and a portion of said switch means for normally urging said switch means into each of said rest positions, said detent means including a member position and adapted to intersect the said path of movement of said blocking element for blocking and preventing the operation of said contactor when said switch means is moved from each of its said rest positions.

5. In a multi-selector of the character described for self restoring contactor means for momentarily closing an electric circuit connected thereto when manually operated, said means including a pushbutton member adapted for axial movement, an electric switch connected to an electric circuit responsive to said movement, a clutch member slideably associated with said button member and adapted for said movement therewith for normally engaging and operating said switch when said button member is operated, urging means for normally holding said clutch member in fixed frictional engagement with said button member, an electromagnetic means positioned and adapted to engage and displace said clutch member from the said engagement with said button member when energized whereby the operation of said button member will be prevented from operating said switch when said electromagnetic means is energized.

6. In a multi-selector of the character described a self restoring contactor means for momentarily closing an electric circuit connected thereto when manually operated, said means for momentarily closing an electric circuit connected thereto when manually operated, said means including a pushbutton member adapted for predetermined reciprocal movement along its axis, an electric switch connected to an electric circuit positioned to be responsive to said movement, a clutch member slideably positioned on said button member adapted for movement therewith for normally engaging and operating said switch when said button member is operated, spring means for normally urging said clutch member into a fixed oblique position with respect to said axis and in fixed frictional engagement with said button member, electromagnetic means positioned and adapted to engage and move said clutch member against the restraining action of said spring means from its said oblique position to a position substantially normal to said axis for disengaging said clutch member from said button member whereby the operation of the latter will be prevented from operating said switch when said electromagnetic means is energized.

7. A multi-selector comprising means forming a frame, a pair of rotary electric switch means in said frame connected to a plurality of selecting circuits and adapted for independent operation to each of a plurality of rest positions when independently selectively positioned, an electric contactor means in said frame electricaly associated with said selecting circuits for energizing each selected one thereof when operated, said contactor means including a blocking element movable through a predetermined path when operated, a pair of detent means independently movable in said frame corresponding with and responsive

to each of said switch means and independently biased between said frame and a movable portion of each said switch means for normally and independently urging the latter into each of said rest positions, a portion of each of said detent means positioned and adapted to intersect the path of movement of said blocking element when either of said detent means is operated for blocking and preventing the operation of said contactor means when either of said switch means is moved from their said rest positions, electro-magnetic means in said frame having an armature member positioned for movement intersecting the normal path of movement of both said detent members for blocking and arresting the movement of said detent means and locking said switches against rotation when energized, a push button member in said frame adapted to operate said contactor means when depressed, a clutch means positioned on said push button member normally adapted for movement therewith for engaging and operating said contactor means when said push button member

is operated, said clutch means positioned and adapted to be engaged by said armature member and released from engagement with said push button member for preventing the operation of said contactor means when said electro magnetic means is energized.

References Cited in the file of this patent

UNITED STATES PATENTS

1,467,664	Yonge	Sept. 11, 1923
1,913,992	Mabie	June 13, 1933
2,008,053	Whiteside	July 16, 1935
2,101,430	Goldbert	Dec. 7, 1937
2,311,124	Paschke	Feb. 16, 1943
2,577,960	Ginard	Dec. 11, 1951
2,668,893	Vaughan	Feb. 9, 1954
2,676,235	Kennedy	Apr. 20, 1954
2,732,449	Gilman	Jan. 24, 1956
2,781,424	Woolf	Feb. 12, 1957