Jan. 17, 1967 M. F. THOMPSON 3,299,222

PUSH BUTTON MECHANISM WITH INTERLOCKING APPARATUS AND ENERGIZING MEANS THEREFOR

Filed Oct. 23, 1964 4 Sheets-Sheet 1

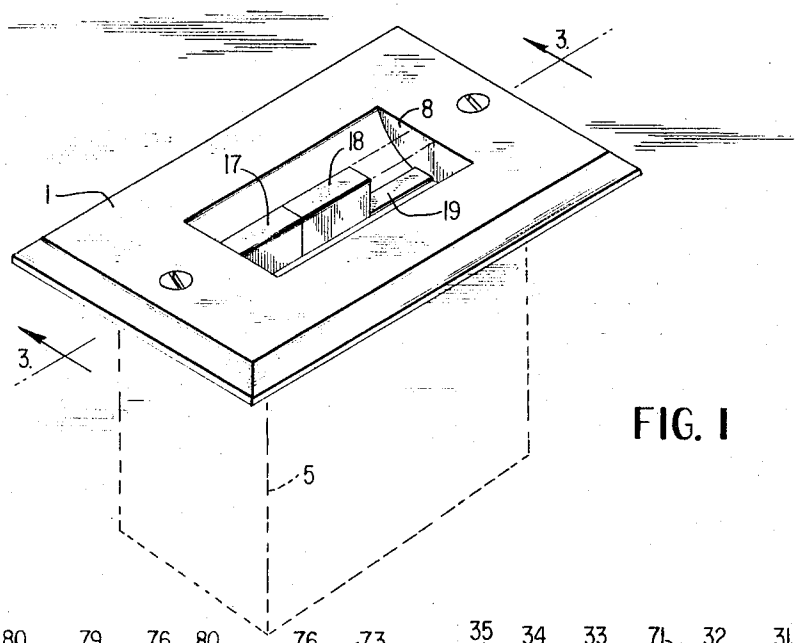


FIG. 1

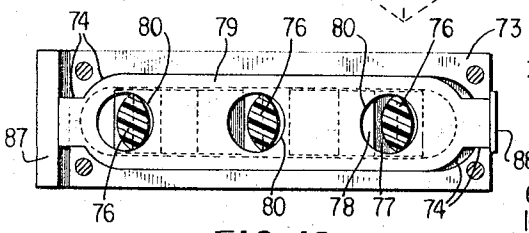


FIG. 10

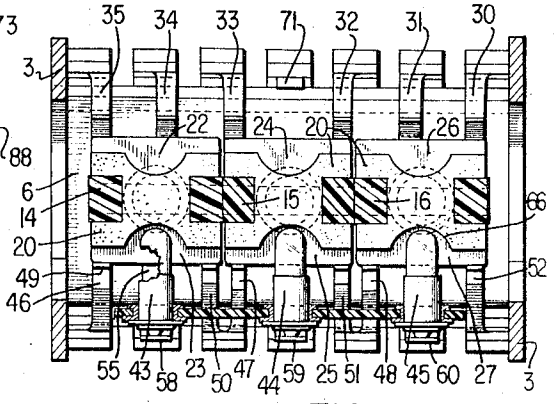


FIG. 9

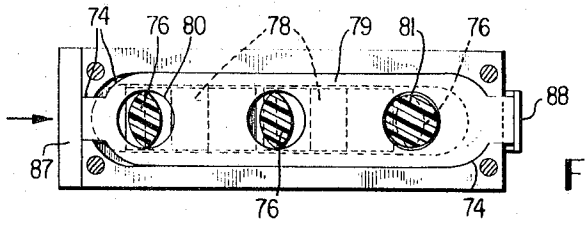


FIG. 11

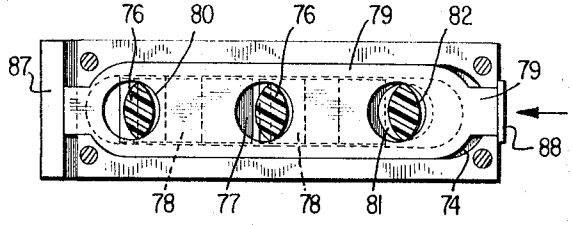


FIG. 12

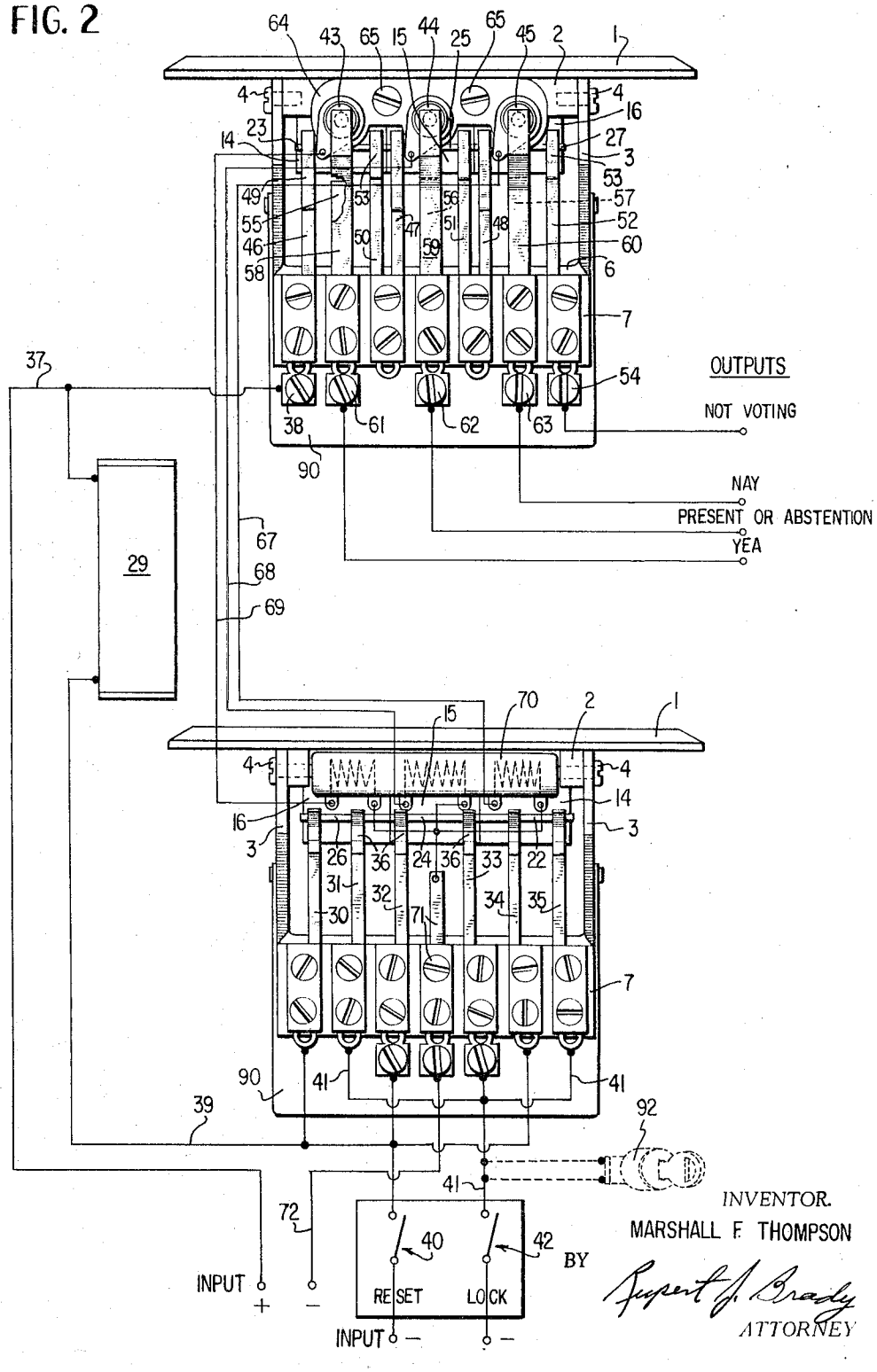
INVENTOR.
MARSHALL F. THOMPSON
BY Rupert J. Brady
ATTORNEY

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FIG. 2



INVENTOR.
MARSHALL F. THOMPSON
BY
Rupert J. Brady
ATTORNEY

Jan. 17, 1967 M. F. THOMPSON 3,299,222

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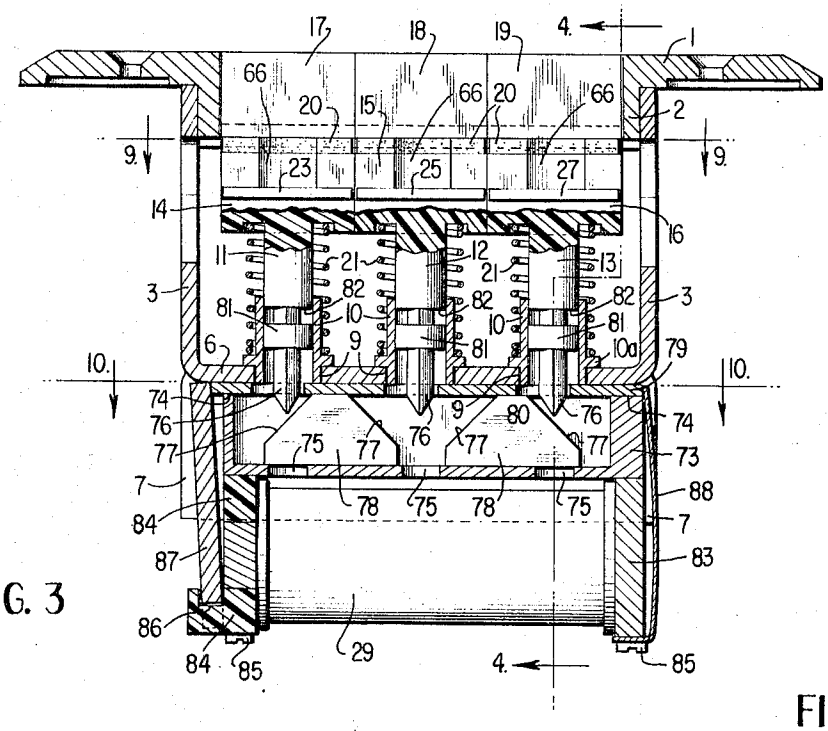


FIG. 3

FIG. 5

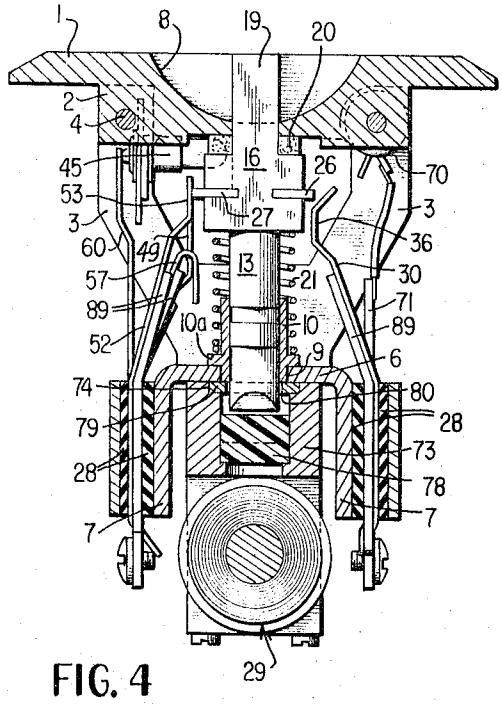
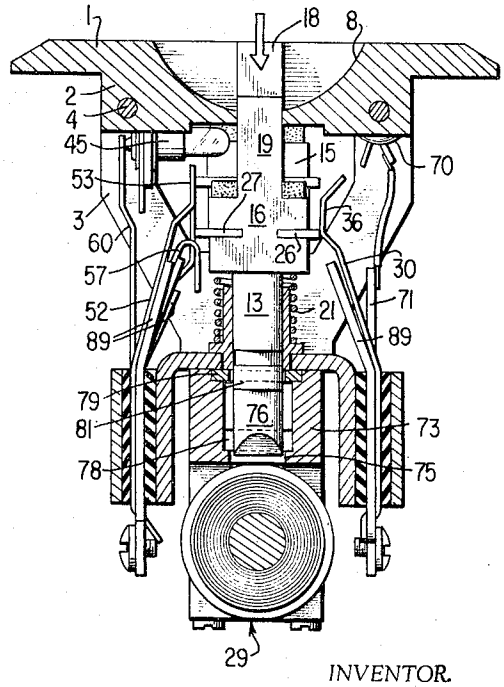


FIG. 4



INVENTOR.
MARSHALL F. THOMPSON

BY Rupert J. Brady

ATTORNEY

Jan. 17, 1967 M. F. THOMPSON 3,299,222

PUSH BUTTON MECHANISM WITH INTERLOCKING APPARATUS AND ENERGIZING MEANS THEREFOR

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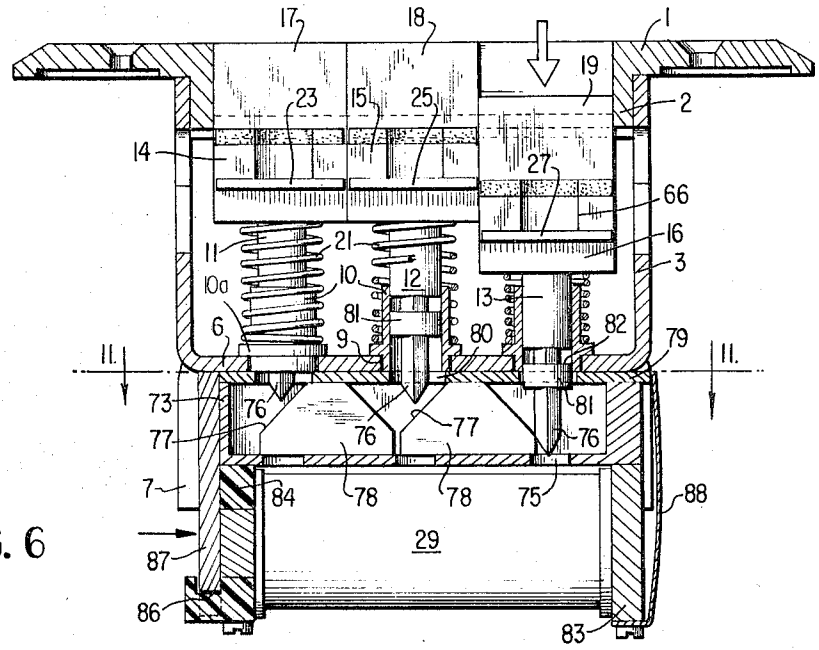


FIG. 6

FIG. 7

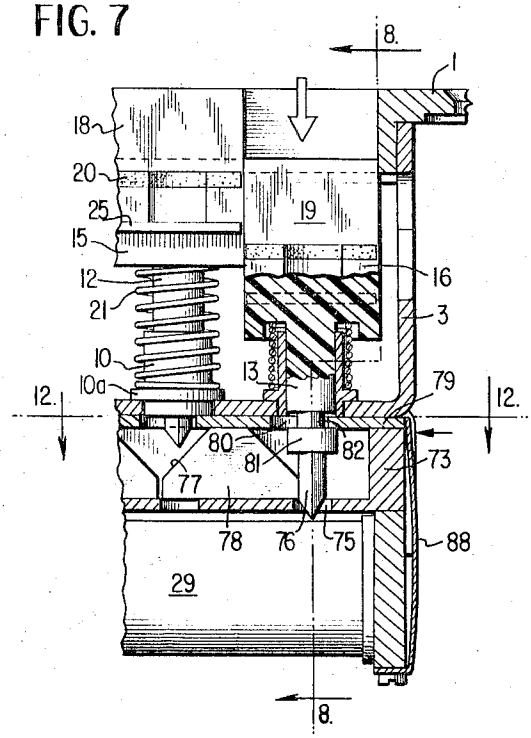
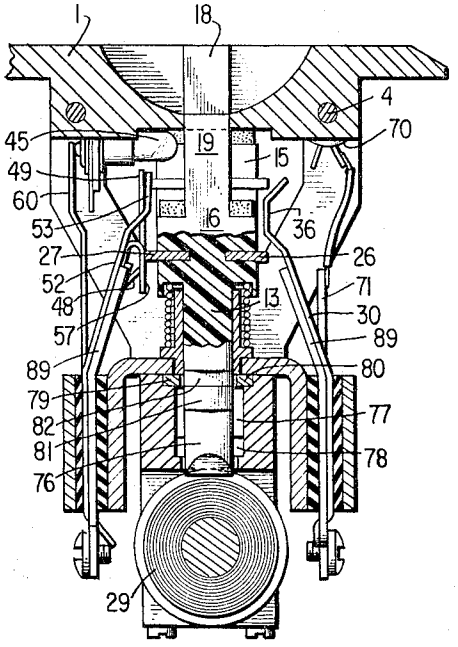


FIG. 8



INVENTOR.
MARSHALL F. THOMPSON
BY Rupert J. Brady
ATTORNEY

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Patented Jan. 17, 1967

3,299,222

PUSH BUTTON MECHANISM WITH INTERLOCKING APPARATUS AND ENERGIZING MEANS THEREFOR

Marshall F. Thompson, 3112 W. Marshall St., Richmond, Va. 23220

Filed Oct. 23, 1964, Ser. No. 406,025
18 Claims. (Cl. 200—5)

This invention relates broadly to parliamentary electrical voting systems, and more particularly to a remote selective control switch device for actuating the voting circuits of a remotely located electrical voting system.

One of the objects of the invention is to provide a novel construction of selection control voting switch of the push button type which registers, NOT VOTING, YEA, NAY, or PRESENT or ABSTENTION in the voting circuits of an electrical voting system.

Another object of the invention is to provide a construction of voting switch for electrical voting systems having novel means which enable the voting party to easily reverse a vote erroneously entered on the switch prior to the recording thereof.

Another object of the invention is to provide a construction of voting switch which is much simpler to operate than similar type switches heretofore known in the art.

Still another object of the invention is to provide a switch device which is relatively simple and compact in construction and by manipulation of three push buttons is capable of signifying a selected one of four available switch states.

A further object of the invention is to provide a construction of remote voting switch for electrical voting systems having a simplified magnet operated locking mechanism for remotely locking the switch from use, for maintaining the selected push button in depressed position, and for remotely locking the switch from further change prior to recording the vote.

Still a further object of the invention is to provide a simple construction of voting switch requiring only one simple movement to register a positive vote, and having means to clearly indicate the vote registered on the switch.

Other and further objects of the invention reside in the construction of the push button mechanism of the voting switch, the manner in which the various circuits are completed in the switch by the push buttons, the push button lighting circuits, the magnetically operated slide mechanism for locking the ends of the push buttons, the manner in which the switch can be controlled remotely as well as other features which will become apparent to one skilled in the art from the detailed description in the specification hereinafter following by reference to the accompanying drawings, in which:

FIG. 1 is a top perspective view of the selective control device of the invention connected on a horizontal surface;

FIG. 2 is a schematic wiring diagram showing the electrical circuit of the selective control or switch device and showing the contacts of opposite sides of the switch device in side elevation;

FIG. 3 is an enlarged vertical sectional view taken substantially along line 3—3 of FIG. 1;

FIG. 4 is a cross sectional view taken substantially along line 4—4 of FIG. 3 and particularly showing the relation between the push button and associated contacts in the normal unoperated position;

FIG. 5 is a cross sectional view similar to FIG. 4, showing one of the push buttons partially depressed, with the NOT VOTING circuit opened and in position just prior to deenergization of the magnet and registration of the vote;

FIG. 6 is a vertical, sectional view similar to FIG. 3,

but showing the voting switch in the position of FIG. 5;

FIG. 7 is a fragmentary vertical sectional view similar to FIG. 6, with parts shown in breakaway section, and showing one button in the depressed locked vote registering position;

FIG. 8 is a cross sectional view taken substantially along line 8—8 of FIG. 7, and particularly showing the completion of the vote registering circuit;

FIG. 9 is a transverse sectional view taken substantially along line 9—9 of FIG. 3;

FIG. 10 is a transverse sectional view, with parts omitted, taken substantially along line 10—10 of FIG. 3, showing the latching plate in the normal position;

FIG. 11 is a view similar to FIG. 10, taken substantially along line 11—11 of FIG. 6, showing the latching plate laterally shifted by the magnet; and

FIG. 12 is a view similar to FIGS. 10 and 11, taken substantially along line 12—12 of FIG. 7 and showing the latching plate locking one of the push buttons in the depressed position.

Over the years applicant and his brother Charles F. Thompson have made many contributions to the art of parliamentary voting systems, including patents covering a variety of methods for registering the votes by means of switches, which, while primarily designed for vote registering purposes, could be used in other fields of electrical signal handling. The switch of the present invention may, therefore, have application wherever there is a requirement of registering only one of a possible plurality of available signals while locking out and rendering inactive the other possible signals. This switch is also adaptable for use where a switch position is required to be remotely locked in its set position and then remotely reset to the normal position. When the switch of the present invention is used as a remote control switch for actuating the voting circuits of an electrical parliamentary voting system, the normal switch position automatically registers the switch operator as NOT VOTING, unless the switch is moved to a position indicating the contrary before the vote is recorded.

The structures of parliamentary voting switches have changed over the years as requirements of recording a greater variety of types of votes and of recording them at greater speeds due to an increased number of votes being cast, have necessitated the changes.

Patent 1,219,053, issued to M. F. Thompson et al. in 1917, discloses a voting apparatus having plain push buttons of the door-bell type, and locking relays in combination therewith to hold the chosen voting circuit closed and other voting circuits open. Later Patent 1,773,891 was issued to applicant in 1930 which eliminated the locking relays and used instead an interlocking push button construction with a latching plate and interlocking plates, wherein the latching plate was controlled by two built-in solenoids, one of which unlocked the switch, and the other of which reset the switch. Both solenoids were subject to remote control.

In 1940 Patent 2,192,211 issued to Charles F. Thompson, for a voting switch which substituted a pivoted handle, acting as a toggle for the previously mentioned push button structure. When the handle was thrown one way the switch recorded YEA and recorded NAY when thrown in the opposite direction. If the switch was left unoperated it automatically recorded NOT VOTING. This toggle switch structure proved to be ideal for manually registering YEA and NAY votes but to register an additional vote such as PRESENT or ABSTENTION, as the art was demanding, unwarranted complications would be required in this type structure. To meet the requirements of the industry the voting switch disclosed in Patent 2,942,076, which issued to applicant in 1960, was designed to

record the additional PRESENT or ABSTENTION vote by combining the push button principle with the pivoted handle or toggle principle, so that a single knob push button could be laterally rotated to the YEA, PRESENT or ABSTENTION, or NAY position and then pushed down to register the selected vote, or if not pushed down to register NOT VOTING. The single rotatable push button when depressed made a momentary electrical contact energizing a solenoid that pushed a latching lever out of the path of the push button. When the push button was further depressed, the momentary contact was broken and the latching lever locked the push button in the down position. A separate Error button was required on the switch to release the main voting push button. This construction, while simple mechanically, was complex to operate, and required the main voting push button to be moved downwardly slowly enough to allow the solenoid to operate.

The switch of the present invention was therefore developed to register the same number of votes that were possible with the switch disclosed in Patent 2,942,076, but to enable the vote to be more simply entered on the switch. The switch of the present invention is an advancement of the interlocking push button switch structure disclosed in Patent 1,773,891, with the newly developed switch being half the size of the former push button switch, enabling the same to be mounted in a standard steel electrical outlet switch box. The switch structure of the present invention has eliminated all of the faults and failures in the former push button device, and utilizes three push buttons for registering YEA, PRESENT or ABSTENTION and NAY and if none of the push buttons are depressed the switch automatically registers NOT VOTING. All three push buttons are equipped with the contacts for registering YEA, PRESENT or ABSTENTION and NAY, plus NOT VOTING on one side of the switch with each of the push buttons on the opposite side of the switch being equipped with a momentary contact arrangement for energizing a magnet to move the latching plate out of the path of the push buttons and for releasing push buttons erroneously latched in the depressed position. The present switch thus eliminates the necessity of a separate error button by permitting any button not in use in release the depressed button. This new switch structure has replaced the solenoid of Patent 2,942,076 with a much faster operating relay-type of magnet disposed in a different position for moving the latching plate.

Referring to the drawings in greater detail—reference numeral **1** designates the face plate for the switch unit having a backwardly protruding body portion **2**, preferably integral therewith, to which support bracket **3** is connected by means of screws **4**. As indicated in FIG. 1, face plate **1** is adapted for connection with a standard receptacle box indicated in dotted lines at **5**, in the normal manner, and as a standard electrical switch plate.

Support bracket **3** includes a body portion **6** disposed substantially parallel with the face plate and having a pair of side brackets **7** connected along opposite edges and extending backwardly therefrom at substantially right angles. The face plate **1** carries a central recessed portion **8** on the face thereof with a longitudinal slot in the bottom extending the length of the recess and extending through the body portion **2**. Body portion **6** of support bracket **3** carries three apertures **9** therethrough positioned in longitudinal spaced relation and in alignment with the slot through face plate **1** and body portion **2**. An individual guide sleeve **10** is loose-fitted into each aperture **9**, extending toward body portion **2**, to serve as guides for shafts **11**, **12** and **13** of generally rectangular push button members **14**, **15** and **16**. Guide sleeves **10** are free floating and self-aligning to eliminate sticking push buttons, and are held in place by springs **21** abutting flanges **10***a*. These push button members are provided with portions of reduced rectangular cross sections as indicated at **17**, **18** and **19**, respectively, extending from the ends of push

button members **14**, **15** and **16**, respectively, opposite the shafts **11**, **12** and **13**. Portions **17**, **18** and **19** extend through the slot in face plate **1** and body portion **2**, such that their outer ends are normally flush with the face plate when the resilient sound-deadening pads **20** are disposed in abutment with the back surface of body portion **2** as indicated in FIG. 3. Shafts **11**, **12** and **13** extend into guide sleeves **10** and in sliding engagement therewith, such that the guide sleeves and the face plate slot maintain the push button members in side-by-side relation and enable the push button members to be moved only in axial direction. Compression springs **21** connected about guide sleeves **10** between body portion **6** and push button members **14**, **15** and **16** tend to urge the push button members outwardly to maintain pads **20** in abutment with body portion **2** and the ends of push button portions **17**, **18** and **19** flush with the outer surface of face plate **1**.

Push button members **14**, **15** and **16** and the associated shafts **11**, **12** and **13** and portions **17**, **18** and **19**, respectively, are preferably constructed as integral push button units and are constructed of an electrical insulation material, such as plastic or the like. As shown in FIGS. 2, 3, 4, and 9 each push button member **14**, **15** and **16** is generally rectangular in cross section and carries individual pairs of spaced electrical contact bars **22**, **23**; **24**, **25**; and **26**, **27** on opposite side surfaces thereof disposed substantially parallel with the face plate. A plurality of elongated stationary electrical contact fingers are connected on opposite sides of the switch structure to side brackets **7**, extending into the path of movement of the contact bars and terminating in electrical connection terminals on side brackets **7**. As particularly shown in FIGS. 4, 5 and 8 the stationary contact fingers and associated terminals are electrically insulated, as indicated at **28**, from the side brackets **7** on which they are supported.

In the lower side elevational view of the switch structure shown in FIG. 2, the side of the selector switch, carrying the stationary contacts whose circuits control the operation of magnet-type relay **29**, has been illustrated, while the upper side elevational view of FIG. 2 illustrates the stationary electrical contacts which are adapted to register the vote entered on the switch and illuminate the lamp corresponding to the depressed push button member. Referring first to the lower side elevational view illustrated in FIG. 2, a plurality of spring fingers **30**, **31**, **32**, **33**, **34** and **35** forming stationary electrical contacts are connected to and electrically insulated from side bracket **7** in such manner that the spring fingers present relatively short contact portions **36**, illustrated more clearly in FIG. 4, extending in the path of movement of the contact bars **26**, **24** and **22**, and positioned so as to normally be disposed out of contact with said bars. The spring fingers and their contact portions **36** are laterally aligned in parallel relation with spring fingers **30** and **31** connected in the path of movement of contact bar **26**, spring fingers **32** and **33** connected in the path of movement of contact member **24** and spring fingers **34** and **35** connected in the path of movement of contact bar **22**. Upon push button member **14**, **15** or **16** being depressed, the respective contact bar moves into electrical contact with the respective pair of spring fingers to complete an electrical circuit between the pair of fingers.

In the electrical voting system utilizing the selector switch unit of the present invention, a D.C. power source (not shown) is preferably used for energizing the circuits. The positive terminal of the D.C. power source is connected through conductor **37** to switch terminal **38** and one end of the coil of magnet-type relay **29** is connected to input switch terminal **38** while the other end is connected through conductor **39** to spring fingers **30**, **32** and **34** as well as to one side of normally open reset switch **40**, with the other side thereof connected to a negative source of D.C. power. Spring fingers **31**, **33** and **35** are commonly connected through conductor **41** to one side

of lock switch 42, which has the other side thereof connected to the opposite side of the input D.C. power line. When the system is not in operation lock switch 42 is normally open to prevent operation of any of the push button members, as more fully explained further in the specification. When the system is placed in operation to register a vote, switch 42 is closed. Thereafter, if push button member 14, 15 or 16 is depressed, electrical contact bar 22, 24 or 26 is moved into contact with the associated pair of stationary contact spring finger member 34, 35; 32, 33; or 30, 31, thus completing the circuit between conductors 39 and 37 to place the coil of magnet-type relay 29 across the D.C. power supply, thus energizing the same. The function of the magnet-type relay in locking the desired push button in the depressed position is explained later in the present specification. Reset switch 40, which is normally open, may be operated when lock switch 42 is in the closed or open position. This switch performs the function of bypassing the switching action of the contact bars on the push buttons and by closing the same conductor 39 may be immediately connected to a negative source of D.C. power to energize the magnet-type relay, resulting in the release of any push button which may be locked in the depressed position, as explained more fully hereinafter following.

In the side elevational view shown at the top of FIG. 2 the opposite side of the vote switch structure is disclosed. The contacts on this side of the switch determine the vote which is registered and illuminate the lamp 43, 44 or 45 corresponding to the push button member 14, 15 or 16, respectively, which is depressed. Stationary electrical spring contact members 46, 47 and 48 are connected to and electrically insulated from side brackets 7 in a position extending axially of the push button members with each of these spring contacts having a relatively long contact portion 49 disposed in electrical contact with contact bars 23, 25 and 27 of push button members 14, 15 and 16. Contact portions 49 are of such a length as to remain in contact with the respective contact bar even when the associated push button member is in fully depressed position. These spring contacts are thus in constant electrical contact with the contact bars and are used to form an electrical circuit through the bars.

Stationary electrical spring contact members 50, 51 and 52, having relatively short contact portions 53 normally disposed in sliding electrical contact with contact bars 23, 25 and 27, respectively, are connected to side bracket 7 and electrically insulated therefrom, with spring contact member 50 electrically connected at its mounting terminal with spring contact member 47, and spring contact 51 electrically connected with spring contact member 48 at a common mounting terminal to thus complete an electrical circuit through the contact bars of the push buttons from input switch terminal 38 to output switch terminal 54. The circuit thus completed in the normal position of the switch extends from terminal 38 through members 46, 23, 50, 47, 25, 51, 48, 27 and 52 to output terminal 54 which is connected to the NOT VOTING circuit of an electrical parliamentary voting machine. If no buttons are depressed when the system is placed in operation the circuit from input conductor 37 is automatically completed to output terminal 54 to automatically energize the NOT VOTING circuit and register such a vote for the switch operator.

The relatively short contact portions 53 of spring contact members 50, 51 and 52 are of such a length, as indicated in FIG. 5, that electrical contact between the spring contact and the associated contact bar is broken when the associated push button is depressed, before the circuit between the opposite contact bar on the same push button and its associated pair of spring fingers 30, 31; 32, 33; or 34, 35 is broken. In the operation of the NOT VOTING circuit, for example, if push button member 15 was depressed, bar contact 25 would slide along the relatively short contact portion 53 of spring contact member 51, and as soon as these members move out of contact with each other, as indicated in FIG. 5, the NOT VOTING circuit is broken and such a vote is no longer registered for the party operating the switch, because the electrical circuit between bar members 25 and 27 is broken.

Vote registering spring contact members 55, 56 and 57 are connected to side bracket 7 and electrically insulated therefrom, as shown in FIGS. 2, 4 and 9. These stationary contacts extend axially with the push button members and terminate in the path of and in axially spaced relation with contact bars 23, 25 and 27, respectively. As indicated in FIGS. 4, 5 and 8 the vote registering spring contact members 55, 56 and 57 are of such a length that contact is made with the associated contact bar only after the pair of contact bars of the particular push button have broken contact with the associated spring fingers controlling the energization of magnet-type relay 29 and the associated spring contact member having the relatively short contact portion 53. Vote registering spring contact 55 is preferably connected between spring contact members 46 and 50, while vote registering spring contact members 56 and 57 are preferably connected between spring contact members 47, 51 and 48, 52, respectively. Signal lamp contacts 58, 59 and 60 are respectively electrically connected with vote registering contacts 55, 56 and 57, with the respectively connecting vote registering contact members and signal lamp contacts connected with each other at output terminals 61, 62 and 63, respectively connected to energize the YEA, PRESENT or ABSTENTION and NAY circuits of the electrical voting system. The terminating ends of signal lamp spring contacts 58, 59 and 60 are connected above the plane of the terminating ends of the other spring contact members on one side of the switch, as indicated in FIG. 4, such that they are out of the path of movement of the push button contact bars. An insulation plate 64 is connected to face plate body portion 2 by means of screws 65 and serves as a mounting plate for three lamp receptacles carrying signal lamps 43, 44 and 45 extending laterally toward recesses 66 in push button members 14, 15 and 16, respectively. The push buttons, as previously indicated, are preferably constructed of a plastic material which is light-transmitting, such that when a signal lamp is illuminated, the corresponding portion 17, 18 or 19 of the push button, viewable from the front of face plate 1, is illuminated. Signal lamp spring contacts 58, 59 and 60 respectively abut the ends of signal lamps 43, 44 and 45, serving to hold them by spring pressure in their respective receptacles while at the same time completing the electrical circuits from the signal lamps to output terminals 61, 62 and 63. The receptacles of signal lamps 43, 44 and 45 are connected by individual conductors 67, 68 and 69 through individual series connected sections of three-section resistor 70 to a common terminal 71 on the opposite side of the switch structure which is connected through conductor 72 to one side of a D.C. power source. Resistor 70 is connected in a recess in body portion 2, on the opposite side of the body portion from the signal lamps and is connected therein by means of the same screws 4 which connect support bracket 3 to body portion 2. Having individual resistance sections in series with individual signal lamp circuits prevents feedback signals between output voting circuits.

When push button 16 is depressed electrical contact bar 27, as it moves downwardly, first breaks contact with the relatively short contact portion 53 of stationary spring contact member 52, as indicated in FIG. 5, thus breaking the NOT VOTING circuit, by interrupting the circuit from input terminals 38 to output terminal 54. As push button 16 is further depressed, as shown in FIG. 8, contact bar 27 moves into contact with vote registering spring contact member 57, thus causing the potential on conductor 37 to be applied to output terminal 63 through the

series connected circuit of members 38, 46, 23, 50, 47, 25, 51, 48, 27 and 57, to thus energize one of the voting circuits, such as NAY circuit in the remote electrical voting system. It is of course to be understood that any desired circuit may be energized by any particular push button depending upon the sequence in which they are connected to the remote circuits. Since vote registering spring contact member 57 and signal lamp spring contact 60 are commonly connected at terminal 63, when contact bar 27 makes electrical contact with vote registering spring 57 it simultaneously connects one side of signal lamp 45 through contact 60, and the circuit previously described, to one side of the power source represented by conductor 37 to illuminate the signal lamp corresponding to the push button which has been depressed. The other side of lamp 45 is connected through conductor 67, one section of resistor 70, terminal 71 and conductor 72 to the opposite side of a power source, such that contact bar 27 and vote registering contact 57 constitute the switch for registering a NAY vote and for illuminating signal lamp 45.

When push button 15 is depressed, when the other push buttons are in the normally raised position, contact bar 25 moves downwardly and breaks the NOT VOTING circuit when it moves out of the electrical sliding contact with spring contact member 51. As it continues its downward movement and makes electrical contact with vote registering spring contact member 56 it applies power from conductor 37 over the circuit including members 38, 46, 23, 50, 47, 25 and 56 to output terminal 62 to energize the PRESENT or ABSTENTION circuits in the electrical voting system, at the same time the circuit of signal lamp 44 is completed over this same circuit and signal lamp spring contact 59 to illuminate the lamp, as the other side of the lamp is connected through conductor 68, one portion of resistor 70, terminal 71 and conductor 72 to the opposite side of the power supply.

Push button 14 operates in the same manner when it is depressed, breaking the NOT VOTING circuit when contact bar 23 moves out of contact with stationary spring contact member 50 and energizing the YEA circuit in the electrical voting system, which is connected to output terminal 61 when the contact bar moves into electrical contact with vote registering spring contact member 55 over the series circuit of members 37, 38, 46, 23 and 55. One side of signal lamp 43 is normally connected to one side of the power supply by conductor 69, one portion of resistor 70, terminal 71 and conductor 72, and since spring contact 58, connected to the other side of lamp 43, is commonly connected with vote registering spring contact 55, the lamp is illuminted as contact bar 23 moves into electrical sliding contact with vote registering contact member 55.

A housing 73, having one open side with a guideway 74 formed thereon and through opposite ends thereof is longitudinally connected to body portion 6 of support bracket 3 with guideway 74 positioned adjacent body portion 6. The wall of housing 73 opposite guideway 74 is provided with apertures 75 disposed in axially aligned registration with apertures 9 in the support bracket. Apertures 75 are preferably of irregular shape, such as elliptical, to coincide with the irregular or elliptical cross section of the reduced diameter portions 76 of the terminating ends of push button shafts 11, 12 and 13. The terminating ends of these shafts are outwardly converging, as indicated, for coacting with the sloping surfaces 77 of freely movable bodies 78 slidably connected within housing 73. Bodies 78 are preferably constructed of plastic material, such as nylon, and are of such length that the pair of them, as shown in FIGS. 3, 6, 10, 11 and 12 can only cover two of the three apertures 75 at any one time. Slide locking plate 79 is connected in guideway 74 of housing 73 and, as indicated, particularly in the above mentioned figures, it is free to move longitudinally within the guideway a predetermined amount.

Slide locking plate 79 carries three apertures as indicated at 80 therein of a diameter to enable the generally circular cross section portions 81 of shafts 11, 12 and 13 to pass therethrough when depressed. Apertures 80 are normally disposed out of registration with apertures 9 as indicated in FIGS. 3 and 10, but when slide plate 79 is shifted longitudinally of the switch structure, as indicated in FIGS. 6 and 11, they are disposed in registration with apertures 9.

Push button shafts 11, 12 and 13 are provided with recesses 82 about the perimeter thereof inwardly of shaft portions 81, providing a reduced diameter shaft portion in this area of preferably the same general elliptical cross section as reduced diameter portions 76.

Magnet-type relay 29, including a core and a coil wrapped therearound is longitudinally mounted to housing 73 by end brackets 83 and 84 and screws 85 which secure the relay structure and housing 73 to body portion 6. Support bracket 3 including body portion 6 and side brackets 7 are preferably constructed of a non-magnetic material such as brass. End bracket 84 is also constructed of a non-magnetic material preferably of a plastic material, and includes a hook portion 86 cooperating with a notch in a relay plate 87 which extends into contact with one end of slide plate 79. Relay plate 87 is thus in effect hinged at 86 to end bracket 84. The opposite end of slide plate 79 is urged inwardly by spring 88 connected to end bracket 83 to hold relay plate 87 in a position outwardly of the relay and to disposed apertures 80 in plate 79 out of registration with apertures 9.

All three switch sections operate substantially identical so that the overall operation of only one of the switch sections will be described.

Normally, an electrical voting system of the parliamentary type includes a plurality of voting switches as disclosed herein. The system is normally de-energized before taking a vote by maintaining a lock switch 42 in open position. In this position the buttons can be depressed only a certain amount until shaft portions 81 abut slide plate 79, but they cannot be depressed a sufficient amount to energize any circuits. In any event, lock switch 42 is connected in one side of the line so that the actuating control circuits from the switch are normally de-energized until switch 42 is closed. When a vote is to be taken, switch 42 is then closed. This may be a multi-contact rotary switch or the like which closes all of the vote switches in the system.

Starting with the switch in the normal position, as indicated in FIGS. 3 and 4, if the switch operator wishes to register a NAY vote he pushes downwardly upon portion 19 to depress push button 16. The normal switch position is shown in FIGS. 3 and 4. As switch button 16 moves downwardly contact bar 26 moves into contact with portions 36 of spring fingers 30 and 31, shunting the contacts and placing magnet-type relay 29 across the source potential, thus energizing the same. When magnet-type relay 29 is energized, the magnetic field produced draws relay plate 87 inwardly, as shown in FIGS. 6 and 11, shifting slide plate 79 longitudinally to the right against the pressure of spring 88, placing apertures 80 in registration with apertures 9 and guide sleeves 10. At the same time the reduced diameter end portion 76 of shaft 13 moves into housing 73 and into contact with the sloping surface 77 of one of the freely movable bodies 78, causing the body or bodies to slide longitudinally to the left as the push button is further depressed.

Electrical contact bar 27 on the opposite side of push button 16 then breaks contact with the relatively short contact portion 53 of spring contact 52, as shown in FIGS. 5 and 6, as the push button is further depressed, removing electrical power from terminal 54 which results in breaking the NOT VOTING circuit in the remote electrical voting system. Portion 81 of push button shaft 13 then enters the corresponding aperture 80 of 79 while bodies 78 continue sliding to the left by force exerted thereon by the end of shaft 13.

As shown in FIGS. 7 and 8 the downward travel of push button **16** next results in contact bar **26** breaking contact with momentary contact portions **36** of spring fingers **30** and **31** de-energizing magnet-type relay **29**, and immediately thereafter contact bar **27**, which is connected to one side of the power supply as previously described, moves into electrical sliding contact with vote registering spring contact member **57** energizing the NAY voting circuit through terminal **63** and illuminating signal lamp **45** which lights up portion **19** of push button **16** as it reaches the bottom of its travel, and its reduced diameter end portion **76** enters aperture **75** in the opposite wall of housing **73**. When magnet-type relay **29** is de-energized spring **88** urges slide locking plate **79** longitudinally to the left as shown in FIGS. 7 and 12, moving aperture **80** therein out of registration with aperture **9**, causing the edge of aperture **80** to enter recess **82** as shown in FIG. 7, thus locking push button **16** in its fully depressed position.

If prior to recording of the vote entered upon the voting switch the operator wishes to change his vote, by depressing either of the other two push buttons, their respective contact bars **24** or **22** move into contact with portions **36** of their respective pair of spring fingers to energize magnet-type relay **29** before the ends **76** of the push buttons are locked from further downward travel by abutting surface **77** of the corresponding body **78**. Energization of relay **29** shifts slide locking plate **79** longitudinally to the right, removing plate **79** from locking engagement with recess **82** in shaft **13**, causing push button **16** to be released and returned to its normal position as indicated in FIG. 3 by the energy stored in compression spring **21**. The operator is then free to depress another button to register the proper selected vote or state of the switch.

In the electrical vote system, after the votes have been entered on the voting switches, or if no buttons are manipulated so as to register NOT VOTING, lock switch **42** is opened which breaks one side of the line from the power source to render further manipulation of the switch impossible so that the votes as entered on the various switches in the system can be recorded at the electrical voting machine. Thus if a push button is locked in a depressed position, as shown in FIGS. 1, 7 and 8, when switch **42** is opened, it is not possible for the operator to release the push button.

With push button **16** locked in its fully depressed position, if an attempt is made to depress any of the other push buttons, it will be seen, by referring to FIG. 6, that the ends **76** of the push button shafts will abut the sloping surfaces **77** of bodies **78** which are locked against sliding motion by the end of push button shaft **13** thus preventing the remaining push buttons from releasing the depresed button since power is removed from the circuit of the relay.

After the votes have been recorded in the voting system remote reset switch **40** is closed which, in effect, bypasses the switching action of contact bars **22**, **24** and **26** of the push buttons by connecting conductor **39** directly to one side of the power source to energize relay **29** in the voting switch. When relay **29** is energized relay plate **87** shifts locking plate **79** laterally to the right against the pressure of spring **88**, removing the plate from locking engagement with the recess **82** in the depressed push button shaft, resulting in the push button being returned to its normally raised position by compression spring **21**. In this manner all of the voting switches in the system can be reset from a remote location at the same time to set up the system for recording another vote. Reset switch **40** is then opened as shown in FIG. 2 and lock switch **42** is again closed to energize the switches. The reset switch may be operated when lock switch **42** is in either the open or closed position. Thus the voting switch of the invention is capable of remote control by remotely located

switches **40** and **42**. Switch **40** also may be of the multicontact rotary type or the like.

As indicated, the protruding portions **17**, **18** and **19** of the push buttons are housed within central recessed portion **8** below the outer surface of face plate **1**. The voting switch is normally mounted horizontally in the top of a desk or the like, as indicated in FIG. 1, and with this construction, if books or papers are laid on top of the switch it is impossible for the books to depress one of the push buttons which could result in registering a false vote. A hinged locking cover with a key-lock may be connected to the face plate **1** so as to cover the push buttons and prevent any one but the key holder from gaining access to the push buttons, or an electrical lock may be used at each desk in series with circuit **41** as shown in dotted lines in FIG. 2, at **90**.

The spring fingers **30–35** and electrical spring contacts **45–48**, **50–52** and **55–57** are preferably constructed of relatively thin spring metal and preferably have their motion limited by back-stop terminal members indicated generally at **89**, disclosed in abutting relation behind each of the contact members. As indicated at **90** a cover connected to support bracket **3** may be provided for completely enclosing the relay and slide locking plate mechanisms.

While the invention has been described in certain preferred embodiments it is realized that modifications may be made and it is to be understood that no limitations upon the invention are intended other than may be imposed by the scope of the appended claims.

What is claimed is:

1. An electric circuit control switch comprising, a face plate, a frame structure connected in spaced relation with said face plate, a plurality of push button members connected in side-by-side relation and slidably connected at opposite ends to said face plate and said frame structure for axial movement, an individual contact member connected to each of said push button members between said frame structure and said face plate for movement therewith, first and second stationary contacts for each of said push button members insulatingly supported on said frame structure, said first and second stationary contacts having contact portions disposed substantially parallel with the axes of said push button members and extending into sliding contact with the respective contact members, said contact member of each push button member and said first and second stationary contacts of each push button member connected to form a normally closed series circuit, from one end of the control switch to the other end thereof, said contact portions of said first stationary contacts being of a length to remain in sliding contact with the respective contact members throughout the axial movement of the respective push button members, and said contact portions of said second stationary contacts being relatively short, whereby upon depressing one of said push button members the series circuit between the respective contact member and second stationary contact is broken while contact with the respective first stationary contact is maintained.

2. An electric circuit control switch as set forth in claim **1** in which said first and second stationary contacts of an inner push button member of said plurality of side-by-side push button members are respectively commonly connected with the second and first stationary contacts of separate adjacent push button members.

3. An electric circuit control switch as set forth in claim **1**, including third stationary contacts for each of said push button members insulatingly supported on said frame structure, contact portions on said third stationary contacts disposed substantially parallel with the axes of said push button members and extending into the paths of movement of said respective contact members to make sliding contact therewith when said push button members are axially depressed, terminals connected indvidual to

each of said third stationary contacts, whereby upon axial depression of a push button member the contact member thereof breaks the said normally closed series circuit and then makes electrical contact with said contact portion of said third stationary contact to complete a circuit to the output terminal thereof.

4. An electric circuit control switch as set forth in claim 3, including individual lamp means connected behind said face plate adjacent said push button members, said push button members constructed of a light transmiting material, individual circuits including said lamp means and third stationary contacts for each push button member whereby said lamp means for the respective push button member is adapted to be illuminated to illuminate the push button member when the contact member thereof moves into electrical contact with the contact portion of said third stationary contact.

5. An electric switch controller comprising a face plate, a frame structure connected to said face plate in spaced relation, a plurality of push button members slidably connected at opposite ends to said face plate and said frame structure for axial movement, said frame structure having apertures therein adjacent the terminating ends of said push button members, a housing connected longitudinally of said frame structure, electrical coil means connected to said frame structure, locking plate means having apertures therein connected for sliding longitudinal movement between said frame structure and said housing, plate body means connected between said electrical coil means and one end of said locking plate means and adapted to shift said locking plate means laterally when said coil means is energized, body means slidably connected in said housing adjacent the ends of said push button members and adapted to be moved longitudinally in said housing by the terminating ends of said push button members when depressed, stationary electrical contact means insulatingly supported on said frame structure and connected in electrical circuit with said electrical coil means, contact means connected to each of said push button members, and adapted to contact said stationary contact means when said push button members are depressed, whereby upon depression of one of said push button members said coil means is adapted to be energized to shift said locking plate registering the apertures therein with the apertures in said frame structure thereby permitting the end of the push button member to extend into said housing and slide said body means beneath the ends of the remaining push button members.

6. An electric switch controller as set forth in claim 5 including spring means connected to the opposite end of said locking plate means normally urging said locking plate means in a direction disposing the apertures therein out of registration with the apertures in said frame structure.

7. An electrical switch controller as set forth in claim 5 in which said housing is connected between said frame structure and said electrical coil means, and said plate body means is pivotally connected to said electrical coil means and extends laterally thereof and said housing.

8. An electric switch controller as set forth in claim 5 in which said stationary electrical contact means include momentary contact surfaces for sliding engagement with said contact means, whereby said contact means on the push button members make and break contact with said momentary contact surfaces as said push button members are depressed.

9. An electric switch controller as set forth in claim 5 in which said body means comprises at least a pair of freely slidable bodies, and downwardly sloping surfaces on said bodies adjacent the ends of said push button members.

10. An electric switch controller as set forth in claim 8 in which said push button members carry recesses adjacent the ends thereof movable into alignment with said locking plate means when the push button members are depressed, and spring means connected to urge said locking plate means into the recess of a depressed push button when said coil means is de-energized to lock the push button member in depressed position.

11. An electric switch controller as set forth in claim 3 in which said contact portions of said second and third stationary contacts are disposed in substantially the same plane parallel with the axes of said push button members and spaced from each other axially of said push button members.

12. An electric switch controller as set forth in claim 3 in which said third stationary contacts are spaced between said first and second stationary contacts transversely of the axes of said push button members and in substantially the same plane.

13. A voting switch for electrical voting systems having a plurality of different voting circuits, said switch comprising, a plurality of axially movable manually operable push button members, first and second electrical contact means carried by each of said push button members, pairs of stationary contacts connected in the paths of movement of said first electrical contacts on each of said push button members, relay means connected in circuit with said pairs of stationary contacts and adapted to be energized when one of said first electrical contact means move into electrical contact with a respective pair of stationary contacts, locking means connected transversely of the ends of said push button members, a movable plate connected for control by said relay means connected to longitudinally shift said locking means, a plurality of second stationary contact members connected adjacent said push button members and in sliding contact with said second electrical contact means of each push button member, said second electrical contact means of each push button member and said plurality of second stationary contact members connected in a normally closed series circuit, certain of said second stationary contact members having relatively short contact portions in contact with said second electrical contact means, whereby upon axial depression of a push button member said first and second electrical contacts thereof energize said relay means to longitudinally shift said locking means to the unlocked position enabling the push button to be further depressed resulting in the opening of the normally closed series circuit, and de-energizing of said relay means causing the locking means to shift into locking engagement with the push button member to retain the latter in depressed position.

14. A voting switch for electrical voting systems as set forth in claim 13 in which said first and second electrical contact means comprise contact bars on opposite sides of said push button members disposed substantially normal to the axes of the push buttons.

15. A vote registering electrical switch for electrical voting systems as set forth in claim 13 including third stationary contacts connected adjacent each of said push button members and extending into the paths of movement of the respective second electrical contact means, said third stationary contacts forming individual output circuits adapted to be energized by said second electrical contact means after de-energization of said relay means.

16. A selective vote registering switch for electrical voting systems comprising, a face plate, a frame structure connected in spaced relation with said face plate, a plurality of push button members slidably connected at opposite ends to said face plate and said frame structure for axial movement, first and second contact means connected to each of said push button members between said frame structure and said face plate, first and second stationary contacts for each of said push button members insulatingly supported on said frame structure and extending into sliding contact with said first contact means, said first contact means of each push button member and said first and second stationary contacts connected to form a normally closed series circuit, third

stationary contacts insulatingly supported on said frame structure and extending in the paths of movement of said first contact means of each push button member when the latter are depressed, said third stationary contacts forming individual output circuits adapted to be energized when connected to said first contact means, pairs of fourth stationary contacts connected in the paths of movement of said second contact means for each of said push button members, relay locking means connected in circuit with said pairs of fourth stationary contacts and adapted to be energized when one of said second contact means moves into electrical contact with a respective pair of fourth stationary contacts, said relay locking means connected to said frame structure adjacent the terminating ends of said push buttons and adapted to retain said push buttons in depressed position, whereby upon depressing a push button member said relay locking means is energized and then de-energized after said normally closed series circuit is opened to lock the push button member in depressed position as said push button completes the respective individual output circuit of the third stationary contact.

17. An electric circuit control switch as set forth in claim 1 including guide sleeve means loosely connected to said frame structure and connected in sliding relation about said push button members adjacent the ends thereof to form the slide connection between the push button members and said frame structure, and spring means connected between said push button members and said guide sleeve means to maintain said guide sleeve means in floating engagement against said frame structure.

18. An electric circuit control switch as set forth in claim 1 including floating guide bearing means connected between said push button members and said frame structure to form the slide connection therebetween.

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ROBERT K. SCHAEFER, *Primary Examiner.*

J. R. SCOTT, *Assistant Examiner.*