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PUSH BUTTON SWITCH FOR ELEVATORS

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Fig. 1.

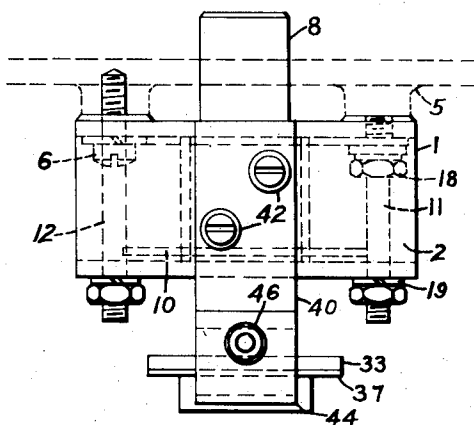


Fig. 2.

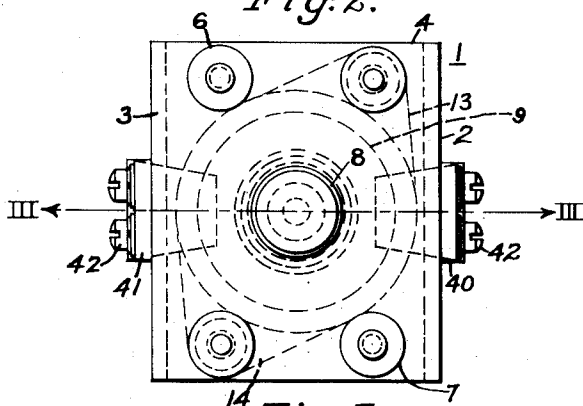
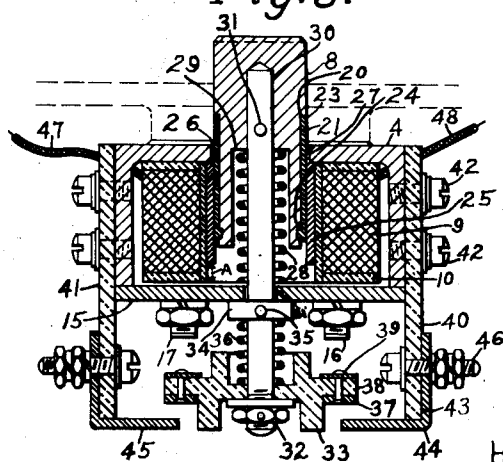


Fig. 3.



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PUSH BUTTON SWITCH FOR ELEVATORS

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My invention relates to switches and has particular relation to switches for use in elevator-control systems.

An object of my invention is to provide for maintaining a switch in a position to which it may be actuated until the happening of some predetermined subsequent event.

Another object of my invention is to provide for automatically setting into operation, by the operation of a switch of the push-button type, mechanism which will retain the switch in the position to which it is actuated.

Another object of my invention is to provide a switch of the push-button type wherein the switch, when operated, is maintained in its operated condition by means of a holding device, the effectiveness of which is controlled by a subsequent operation of the devices with which the switch is associated.

Another object of my invention is to provide a switch of the push-button type having a magnetic means for maintaining the switch in positions to which it is operated, which maintaining means will be energized upon actuation of the switch and be deenergized in response to some predetermined operation of the controlling devices with which the switch is associated.

My invention is described with reference to the accompanying drawings, wherein:

Figure 1 is a side elevational view of my switch associated with a suitable supporting structure.

Fig. 2 is a plan view of the front portion of my switch structure, and

Fig. 3 is a sectional view, taken along the line III—III of Fig. 2.

As shown in Fig. 1, the switch structure comprises a shell 1 formed of magnetic material, and preferably, in a substantially U-shape configuration having side walls 2 and 3 and a top wall 4. The shell may be suitably secured in any well-known manner, such, for example, as by means of screws 6 and 7, to a supporting structure 5.

Through the center of the top portion 4 of the shell 1, a press button 8 projects, the button being formed of magnetic material to provide a core for a solenoid structure to be hereinafter described.

A magnet coil 9, having terminal conductors 47 and 48, and wound upon a suitable insulating spool 10, is mounted within the shell 1 by means of screws 11 and 12, which project through extended portions of one end of the insulating spool 10 upon which the coil 9 is wound, these extensions being designated as 13 and 14, respectively.

The lower portion of the shell 1 is closed, as shown in Fig. 3, by a suitable plate 15 formed of magnetic material and secured to the shell by means of extensions 16 and 17 provided on the screws 11 and 12. The assembly of the coil 10, the shell 1 and the plate 15 is effected, in the usual manner, by suitable nuts 18 and lock washers 19.

The press button 8 has a recess 20 formed therein which receives a sleeve 21 formed of non-magnetic material, the upper end of which abuts against the shoulder 23 of the recess 20 and the lower end of which is pressed inwardly to engage a recess 24 formed in the lower portion of the press button 8. It will be obvious, of course, that any other suitable means for securing the non-magnetic sleeve 21 within the recess 20 may be substituted.

As may readily be seen from an inspection of Fig. 3, the magnet coil 9 and the press button 8 constitute, respectively, the coil and core of a solenoid structure, in the magnetic circuit of which the cup-like or U-shaped shell 1 and the plate 15 are also included. It is desirable, under some conditions of operation to which my push-button may be applied, to have the coil 9 energized at times when the button 8 is in its outwardly projected position and, in order to prevent such energization from moving the button 8, means is provided for diverting the flux in the magnetic circuit from the button.

This flux-diverting means comprises a sleeve 25 formed of magnetic material surrounding the button 8 and suitably secured to the top 4 of the shell 1, as by pressing the reduced upper portion 26 into a counter-sunk opening 27 in the top 4. The sleeve 25 extends slightly below the lower end of the press button 8, when the button 8 is in its normal position.

As may be readily observed, one magnetic

circuit is completed, by way of the gap A, between the plate 15 and the sleeve 25. When the push button 8 occupies the illustrated position, the majority of the flux of coil 9 passes through the above traced magnetic circuit, and push button 8 is, therefore, subjected to very little force.

However, when the button 8 is depressed, the lower extremity of the button touches the plate 15, thus diverting a considerable proportion of the flux through the path including button 8, which is thereby maintained in the depressed position.

A spring 28 disposed in a recess 29, which is formed in the press button 8, to bias the press button 8 and plate 15, moves the press button 8 to its projected position, when the magnet coil 9 is deenergized.

The effect of the residual magnetization in the iron of the shell 1, plate 15 and the sleeve 25 upon the magnetizable press button 8 tends to maintain the button depressed even after deenergization of coil 9, and it is to avoid this effect that I provide the non-magnetic sleeve 21 on the button 8.

A pin 30, suitably secured in the center of the press button 8, as by a pin 31, projects through an opening 31' in the plate 15 and carries, on its lower portion 32, a contact-carrying structure 33. The contact-carrying structure is preferably constructed of insulating material and formed substantially in the shape of a double cup.

A stop-motion collar 34, secured to the pin 30 by a pin or rivet 35, constitutes means for limiting the outward motion of the press button 8 biased by the spring 28 and further acts as a seat for a spring 36 which bears upon the contact-carrying member 33. The pin 30 and the contact-carrying member 33 are, therefore, connected yieldingly for simultaneous movement when the button is depressed or released. The contact-carrying member 33 has a contact member 37 mounted thereon that is preferably formed in the shape of an annular ring of suitable conducting material secured to the projecting flange 38 on the contact-carrying member 33 by means of screws or rivets 39.

Arranged upon opposite sides of the cup-like housing structure 1 are two strips of insulating material 40 and 41, that are suitably secured to the cup 1 by screws 42 and each of which carries, on its lower end, a contact segment. The contact member carried by the strip 40 is designated by the reference numeral 44 and the one carried by the strip 41 is designated by the numeral 45. The contact segments may be secured to the strips 43 by screws 46.

The double-cup configuration of the contact-carrying member 33 achieves the double function of providing a readily insulatable and yieldable connection between the pin 30 and the contact ring 37 and that of per-

mitting a relatively large contact area on the contact member 37 to be effectively engaged with contact members 44 and 45.

By mounting the contact-carrying members 33 for operation by the spring 36, a positive contact between the ring 37 and both of the contact members 44 and 45 is insured. Moreover, this mounting of the contact ring 37 also permits the ring 37 to be rotated under the influence of the successive operations of the press-button 8 to thereby present new contact surfaces for engagement by the contact members 44 and 45 and, in this manner, prolong the life of the contact ring 37 and insure good contact between the cooperating members.

Moreover, the yieldable connection between the contact member 37 and the press button 8 permits the end of the button 8 to be seated firmly on the plate 15 without producing undue strain on contact members 44 and 45.

One application for the use of my push-button structure is in connection with control systems for elevators and similar machinery, wherein the operation of a button initiates the operation of the associated machine and wherein it is desired to maintain the machine operative for either a predetermined time or until the machine has been operated through a predetermined distance of travel or cycle of operations. When the machine has completed its predetermined operation, it is desirable that the starting push-button shall be restored to its normal position. With this and similar types of apparatus, the magnet coil 9 may be connected to be energized through the contact members 44 and 45 to which contacts the controlling devices for the associated machine may also be connected. In elevator systems of other types, independent means may be employed to control the circuit to coil 9. By connecting a suitable stop device in circuit with the coil 9, the coil may be deenergized at the proper time, after which the spring 28 will force the press-button 8 to its normal outwardly projected position.

Since the present embodiment of my invention is merely illustrative, I do not desire to be limited to the details shown herein except as defined in the appended claims.

I claim as my invention:

1. In a circuit-controlling switch, a contact member, a second contact member, a magnetizable press button for moving said contact members into and out of cooperative relation, a magnet, means forming an open magnetic circuit for said magnet, exclusive of said press button, means mounting said press button for movement into the magnetic circuit of said magnet to close said magnetic circuit, whereby the magnet is rendered effective to maintain said press button in the position to which it is moved.

2. In a circuit-controlling switch, cooperating circuit-controlling contact members, manually operable means, a portion of which is formed of magnetizable material, for moving said contact members into and out of engagement, a magnet, means for mounting said manually operable means and said magnet in juxtaposition, means for shielding said manually operable means from the effects of said magnet when said manually operable means is in one position, and rendering said magnet effective to control the position of said manually operable means when said manually operable means is in another position.

3. In a circuit-controlling device, cooperating circuit-controlling contact members, movable means, a portion of which is constructed of magnetic material, contact bridging means controlled by said movable means, means for holding said movable member comprising an energizable magnet and means for mounting said movable means for movement from one position to a second position within the magnetic circuit of said magnet, means mounting said contact members for bridging by movement of said movable means whereby the force of said bridging depends upon the influence of said magnet on said movable means, and means for resiliently mounting said bridging means on said movable means.

4. In a circuit-controlling device, cooperating circuit-controlling contact members, manually movable means, a portion of which is constructed of magnetic material, contact-bridging means controlled by said movable means, means for holding said movable member comprising an energizable magnet and means for mounting said movable means for movement from one position to a second position within the magnetic circuit of said magnet, means mounting said contact members for bridging by the movement of said movable means whereby the force of said bridging depends upon the force of said magnet upon said movable means, and means to provide a resilient engagement of said contact means by said bridging means.

5. In a circuit-controlling device, spaced stationary contacts, a movable contact ring for engaging both of said stationary contact members, means for moving said ring into engagement, means for yieldably mounting said ring on said moving means to permit resilient engagement of said movable and said stationary contact members, and a cup insulator for insulating the mounting means, said ring being mounted at the exterior base of said cup, said mounting means comprising a spring seated in said cup and bearing upon a portion of said moving means.

6. In a circuit-controlling switch, a push button, a portion of which is constructed of magnetic material, a magnetizable plate nor-

mally spaced from the magnetizable portion of said push button, means for mounting said push button and said plate for movement of said magnetizable portion of said push button into contact with said plate, stationary contact members, a contact member for cooperation with said stationary contact members, and means yieldably mounting said cooperating contact member on said push button, whereby movement of said push button will engage said stationary contact members and said cooperating contact member and said magnetizable portion of said push button may be moved into contact with said magnetizable plate without producing strain upon said stationary contact members.

7. In a circuit-controlling device, an energizing coil operable to set up a magnetic flux and having a central aperture, means defining an open magnetic circuit for said coil flux, magnetizable means manually movable from one position to another position in said aperture to close said magnetic circuit and reduce the reluctance thereof, whereby said coil is rendered effective to maintain said movable means in said other position, and circuit-controlling contact members disposed for actuation by said movable member when said movable member is in said other position.

8. In a circuit-controlling device, an energizable coil operable to set up a magnetic flux and having a central aperture, means defining an open magnetic path for said coil flux, a magnetizable core member, manual means for moving said core member from one position to another position in said aperture to close said magnetic circuit and reduce the reluctance thereof, whereby said coil is rendered effective to maintain said core in said other position, and circuit-controlling contact members disposed for actuation by said core member when said core member is in said other position.

9. In a circuit-controlling device, an energizable coil operable to set up a magnetic flux and having a central aperture, means defining an open magnetic circuit for said coil flux, a magnetizable core member, manual means for moving said core member from one position to another position in said aperture to close said magnetic path and reduce the reluctance thereof whereby said coil is rendered effective to maintain said core in said other position, circuit-controlling contact members disposed for actuation by said core member when said core member is in said other position, and means effective to divert said coil flux away from said core member where said core member is in said one position.

10. In a circuit-controlling device an energizable coil operable to set up a magnetic flux and having a central aperture, means defining a magnetic circuit of a predetermined reluctance for said coil flux, means defining

a second magnetic circuit of normally higher reluctance than said first named circuit, a magnetizable core member, manual means for moving said core member from one position to another position in said aperture to reduce the reluctance of said second magnetic circuit to a value lower than that of said first named magnetic circuit whereby a sufficient portion of said coil flux is diverted through said second circuit to maintain said core member in said other position, and circuit-controlling contact members disposed for actuation by said core member when said core member is in said other position.

In testimony whereof, I have hereunto subscribed my name this 12th day of September, 1927.

HAROLD W. WILLIAMS.

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