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V. H. ARDIA

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SWITCH

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FIG. 1

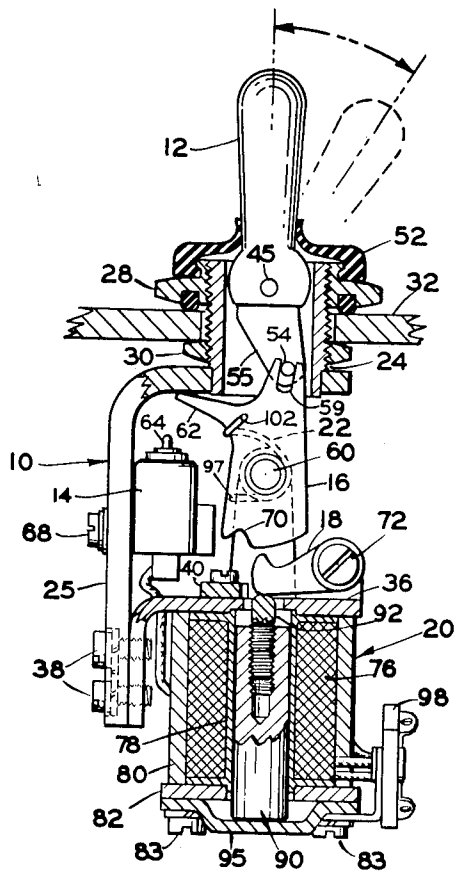


FIG. 2

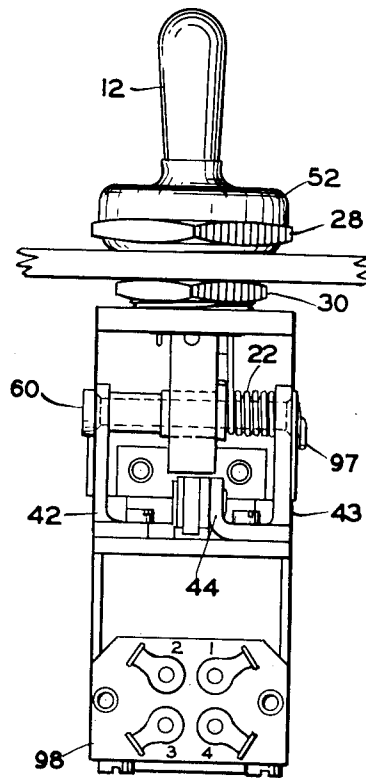


FIG. 3

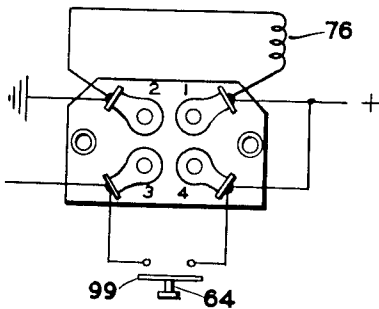
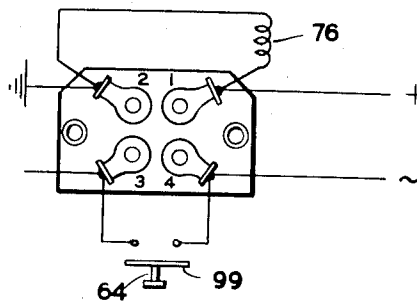


FIG. 4



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SWITCH

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4 Claims. (Cl. 200—106)

This invention relates generally to switches and, more particularly, to switches which return to a predetermined position upon failure of a selected circuit.

Personnel may be trained to operate control systems more readily when the switches for the system move only in one direction from a neutral position. This type of switch is particularly desirable for installations involving complex switching arrangements, or possibly hazardous operations, or requiring rapid responses on the part of the operators. In such installations, the center position may represent a safe condition while the displaced position represents a condition requiring vigilance on the part of the operator. One may quickly recognize the operating condition from the position of the switch. In an emergency or any case requiring rapid reflex action, one can quickly recognize the position of the switch and move it to its correct position.

An object of the present invention, therefore, is to provide a novel switch which is operable only in one direction from a neutral position.

Another object of the invention is to provide a novel switch which can be displaced from a first position to a second position and which will return to the first position automatically upon a failure of a selected circuit.

A further object is to provide a switch which can be moved to either of two positions and which will remain at either position until it is moved again unless a predetermined failure occurs, at which time the switch will automatically move to a specified one of the positions.

The above and further objects and novel features of the invention will appear more fully from the following detailed description when the same is read in connection with the accompanying drawing. It is to be expressly understood, however, that the drawing is not intended as a definition of the limits of the invention but is for the purpose of illustration only.

In the single sheet of drawing:

Figure 1 illustrates an elevational side view of the novel switch of the present invention with certain sections broken out;

Figure 2 illustrates the elevational front view of the novel switch;

Figure 3 illustrates a schematic wiring diagram of the novel switch of the present invention; and

Figure 4 illustrates an alternate schematic wiring diagram for the invention.

Referring now to Figure 1, the novel switch of the present invention is comprised, generally speaking, of a support 10, a manually operable lever 12, a contact switch 14, a cam 16, a pawl 18, a solenoid 20 and a spring 22.

Support 10 includes a threaded sleeve 24 and a depending portion 25. Tightening the two nuts 28 and 30 on sleeve 24 against a panel 32 secures the support to the panel. Depending portion 25 of the support has another support plate 36 suitably secured to it as by bolts 38. In turn, plate 36 has secured to it a further support 40 having three upstanding legs 42, 43 and 44.

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Manually operable lever 12 pivots on a pin 45 which is mounted in sleeve 24. A flexible seal 52 associated with the sleeve and lever keeps foreign matter from falling into the switch mechanism. A pin 54 projecting from the bottom portion 55 of lever 12 engages a slot 59 in cam 16 to form a pin and slot joint.

Cam 16 rotates on a pin 60 mounted in upstanding arms 42 and 43. As lever 12 is moved forwardly, cam 16 is rotated about pin 60. At this time, an arm 62 projecting from cam 16 engages a post 64 of a conventional contact switch 14 that is secured to bracket 10 by suitable means such as bolts 68. The displacement of cam 16 in one direction is limited by the engagement of arm 62 with the inner wall of support portion 25.

Lever 12 is locked in its forward position. To this end, a recess 70 in cam 16 coacts with pawl 18. This pawl pivots about a pin 72 which projects from upstanding leg 44. Solenoid 20, when energized, biases pawl 18 upwardly against cam 16. As cam 16 is angularly displaced, the biasing action of solenoid 20 urges pawl 18 to ride on the cam surface and into recess 70. This locks cam 16 and lever 12 in the displaced position.

Solenoid 20 may be of a conventional type having a winding 76 mounted on a spool 78 with an outer protective sleeve 80 surrounding the winding. A plate 82 and suitable means such as bolts 83 secure sleeve 80 and winding 76 to support plate 36. The solenoid has a conventional core 90 movably mounted within spool 78. A pin 92 projects from the core for engagement with pawl 18. Core 90 moves upwardly against pawl 18 when the solenoid is energized and drops downwardly when the solenoid is deenergized. An end plate 95 keeps core 90 from falling out of spool 78. Thus, deenergization of the solenoid permits pawl 18 to disengage from recess 70 and release the locking action.

Torsion spring 22 returns lever 12 to its neutral position when the deenergization of solenoid 20 releases pawl 18 from its locking action with recess 70. This torsion spring surrounds pin 60 and has one end 97 fixed to upstanding leg 43 and the other end 102 fixed to cam 16. The angular displacement of cam 16 by lever 12 stresses spring 22. As soon as the locking action of pawl 18 and recess 70 is released, spring 22 returns cam 16 and, consequently, lever 12 because of the pin and slot connection 54, 59 to the initial position.

Junction block 98 provides a suitable means for connecting the energization and control leads to the switch. Terminals 1 and 2 are connected with solenoid 20 and terminals 3 and 4 with switch 14.

In Figure 3, contact 99 of contact switch 14 has been shown as forming a closed circuit. It is obvious, however, that the circuit may be normally closed; the depression of post 64, then, would cause contact 99 to open the circuit. In Figure 3, solenoid 20 and the circuit operated by contact 99 are energized in parallel by a common source. In the alternate wiring arrangement shown in Figure 4, the circuit which contact post 64 makes and breaks can be a circuit separate from that circuit which energizes solenoid 20. In either event, lever 12 is returned to its initial position when a failure occurs in the energization source for solenoid 20.

The operation of the novel switch of the present invention now becomes obvious. As shown in Figure 3, terminals 1 and 4 of the junction block may be energized by the control source of current. At this time, solenoid 20 is energized, tending to urge pawl 18 upwardly. As lever 12 is pushed forwardly, cam 16 is angularly displaced about pivot 60 and arm 62 depresses post 64 to close the control circuit. As recess 70 comes in registry with pawl 18, the biasing action of solenoid core 90 forces pawl 18 into the recess to lock lever 12 and cam 16 in their displaced position. Lever 12, now, may be

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returned to its initial position in either of two ways: the lever can be manually pulled back to its initial position, overcoming the resistance of the pawl and recess lock; or solenoid 20 can be deenergized, and spring 22 will return the lever to its initial position automatically. Should the excitation to solenoid 20 fail, the solenoid becomes deenergized and the pressure exerted against pawl 18 by core 90 to hold the pawl in recess 70 is removed as the core falls against end plate 95. The torsion of spring 22 overcomes the locking action; pawl 18 drops out of recess 70; and the spring returns lever 12, as well as cam 16, to their initial position.

The foregoing has presented a novel switch arrangement in which a lever is operable manually from a normal position to a displaced position. Upon the deenergization of a predetermined circuit of the switch, the lever is automatically returned to a normal position. The switch can be easily manipulated manually to either of the two positions and the operator can tell instantly which position the lever is in.

Although two embodiments of the invention have been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit and scope of the invention as will now be understood by those skilled in the art.

What is claimed is:

1. A switch comprising a support, a manually movable member mounted on said support for angular movement to either of two positions, a contact adapted for operating an electrical circuit, a contact operating cam pivotally mounted on said support and engageable with said manually movable member, whereby said cam is also movable angularly by said manually movable member to either of two positions, said cam having a slot therein, and means for selectively retaining said member in one position and returning it to the other position including a pawl engageable with said slot, a solenoid engageable with said pawl for rendering the pawl effective and ineffective to engage said slot to lock said cam for retaining said manually operable member in one position, and a spring engageable with said cam for actuating the latter for returning said manually operable member to the other of said positions when said pawl is rendered ineffective to engage said slot.

2. A switch comprising a support having an angularly movable member, a biasing member, a locking member, a contact, and a rotatable cam mounted on said support, said cam having several portions, one portion being adapted to engage said contact to actuate the latter to complete a circuit, a second portion being connected with said angularly movable member so that said cam is movable angularly thereby, a third portion being en-

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gaged by said biasing member so that said cam is biased in one direction, and a fourth portion adapted to be engaged by said locking member so that said cam is locked in at least one position, said locking member being actuated by a solenoid which when energized renders said locking member effective to engage said fourth portion.

3. A switch for a normally energized circuit, comprising a contact adapted to control said circuit, a support having a manually movable member, a biasing member, a locking member, and a rotatable cam mounted on said support, said manually movable member being displaceable angularly from a normal position, said cam having a plurality of portions, one portion being adapted to engage said contact so that the latter may be actuated to control said circuit, a second portion being engageable with said manually movable member to form a toggle arrangement so that said cam is movable angularly with the angular movement of said manually movable member, a third portion being engaged by said biasing member so that said cam is biased in one direction, and a fourth portion engageable with said locking member so that said cam may be locked in at least one position, said locking member being actuated by a solenoid operated from said circuit for rendering said locking member effective when said circuit is energized and ineffective when said circuit is deenergized, said biasing member being adapted to rotate said cam to return said manually movable member to normal position when said locking member is rendered ineffective.

4. A switch comprising a support, a manually movable lever mounted on said support for angular movement to either of two positions, a contact adapted for operating an electrical circuit, a contact operating cam having a slot therein and being pivotally mounted on said support, said lever engaging said cam to form a toggle arrangement for moving said cam angularly to engage said contact, means for locking said lever in one of said positions including a pawl and a solenoid, said pawl being engageable with said slot for locking said cam to retain said manually operable member in said one position, said solenoid operatively connected to the pawl so that the pawl is effective and ineffective to engage said slot, and a spring operatively connected with said cam for urging the cam to return said manually operable member to the other of said positions.

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