

United States Patent

Sorenson

[15] 3,701,870

[45] Oct. 31, 1972

[54] SWITCH CASE CONSTRUCTION

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[73] Assignee: **Carling Electric, Inc.**, West Hartford, Conn.

[22] Filed: **Sept. 20, 1971**

[21] Appl. No.: **182,001**

[52] U.S. Cl.**200/168 C, 200/167 A, 200/67 G**

[51] Int. Cl.**H01h 9/18, H01h 9/02**

[58] Field of Search. **200/172 R, 172 A, 167 A, 67 G, 200/168 C**

[56]

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Primary Examiner—H. O. Jones

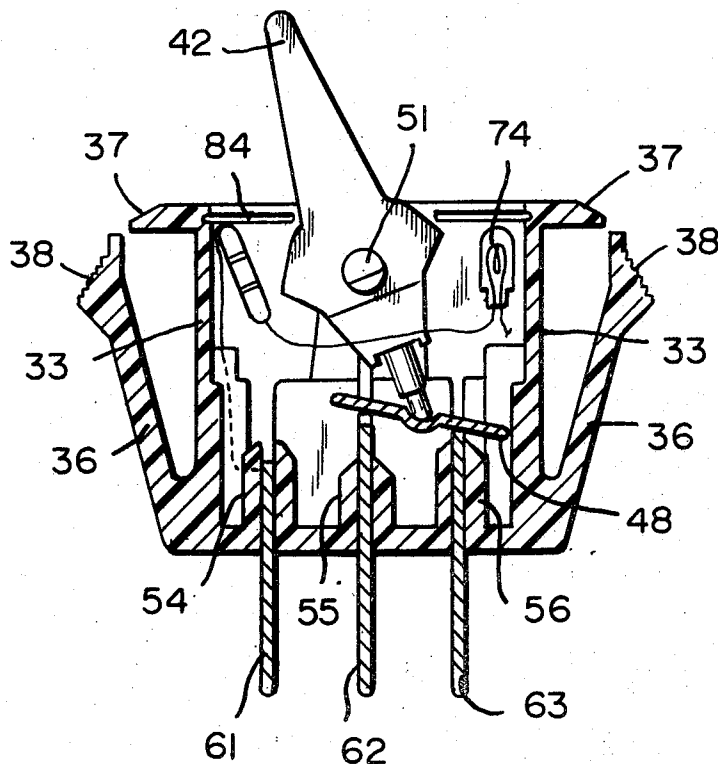
Attorney—I. Jordan Kunik

[57]

ABSTRACT

An electric switch case including modular contact terminal elements, said case being molded and having integrally formed partitions defining channels for protection of electric wiring from the electrically conductive switching elements in said case.

8 Claims, 26 Drawing Figures



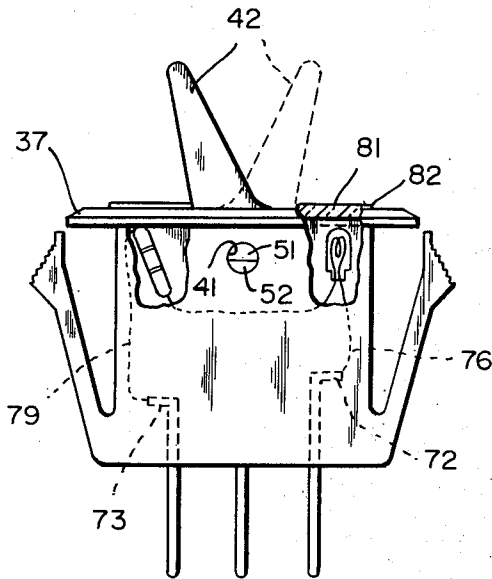


FIG. 2

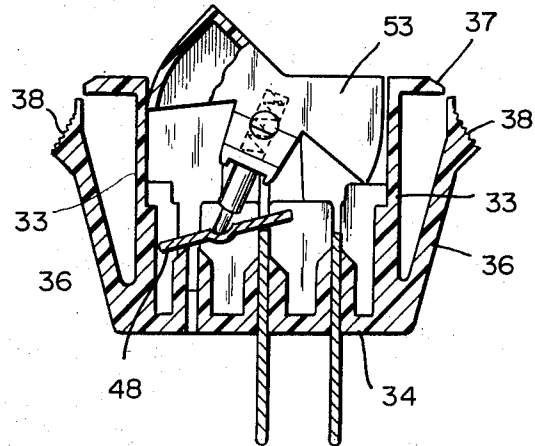


FIG. 5

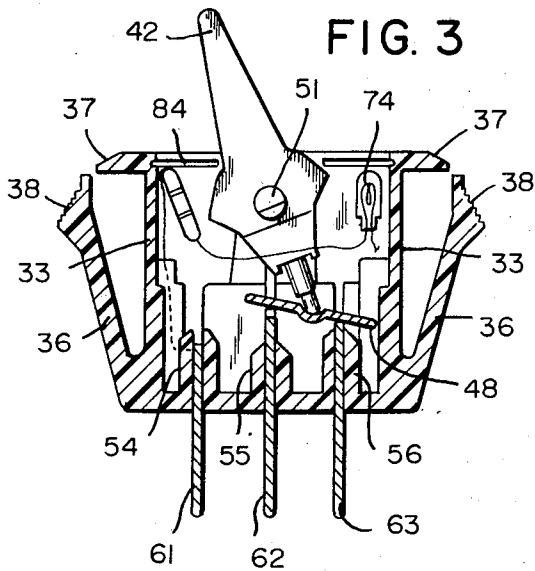


FIG. 3

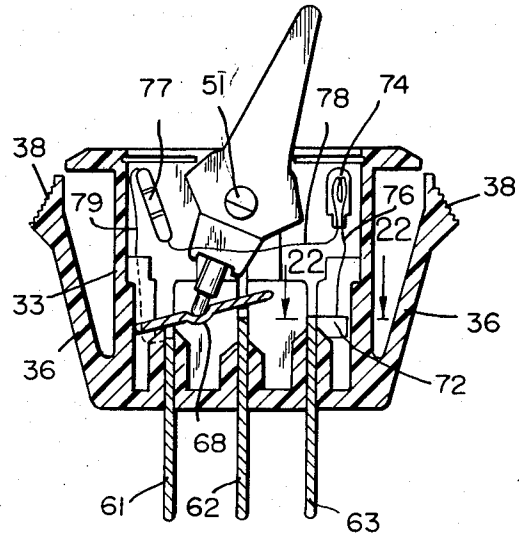


FIG. 4

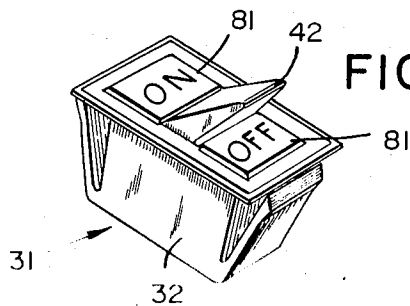


FIG. 1

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FIG. 6

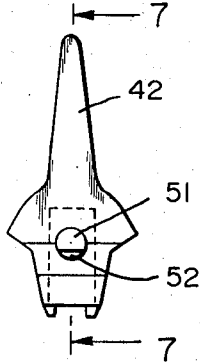


FIG. 7

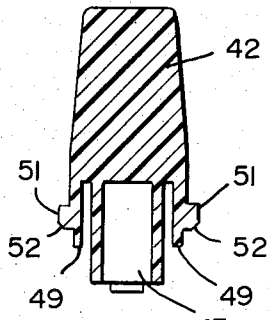


FIG. 20

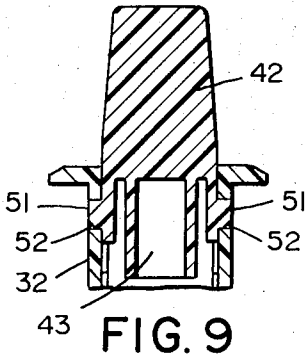
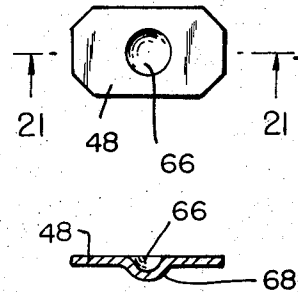


FIG. 9

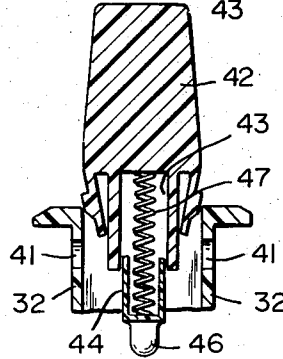


FIG. 8

FIG. 21

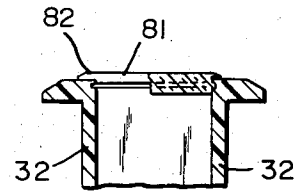


FIG. 10

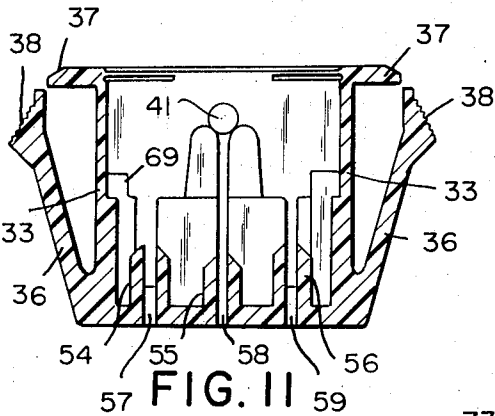


FIG. 11

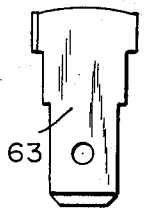


FIG. 13

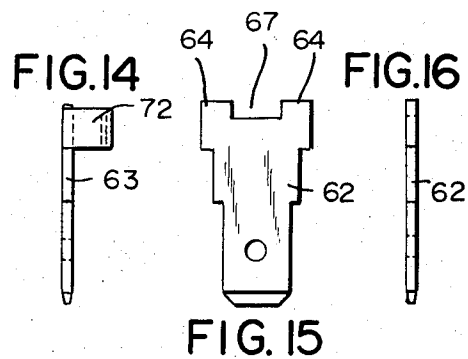


FIG. 15

FIG. 18

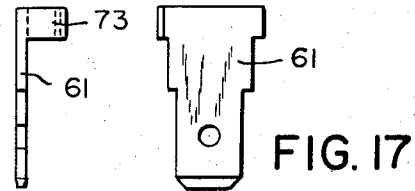


FIG. 17

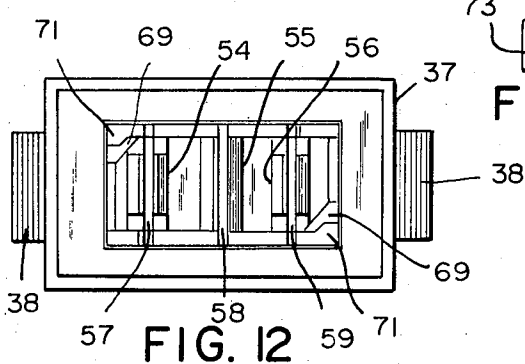


FIG. 12

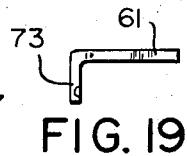


FIG. 19

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FIG. 24

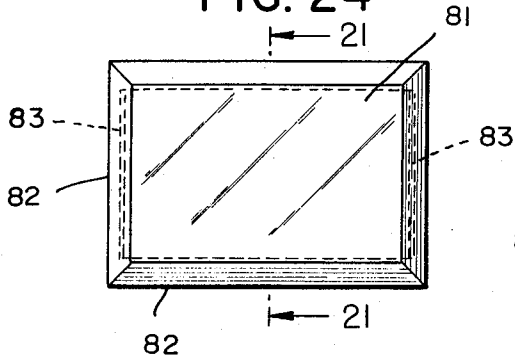


FIG. 25

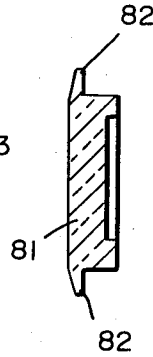


FIG. 26

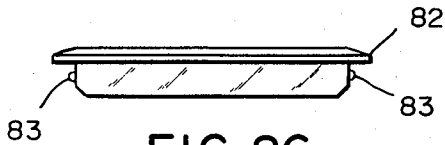


FIG. 22

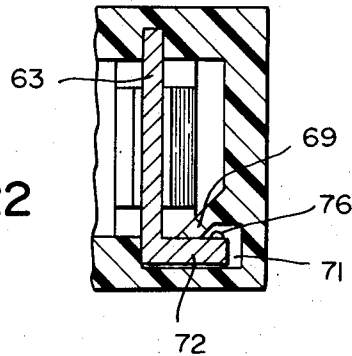
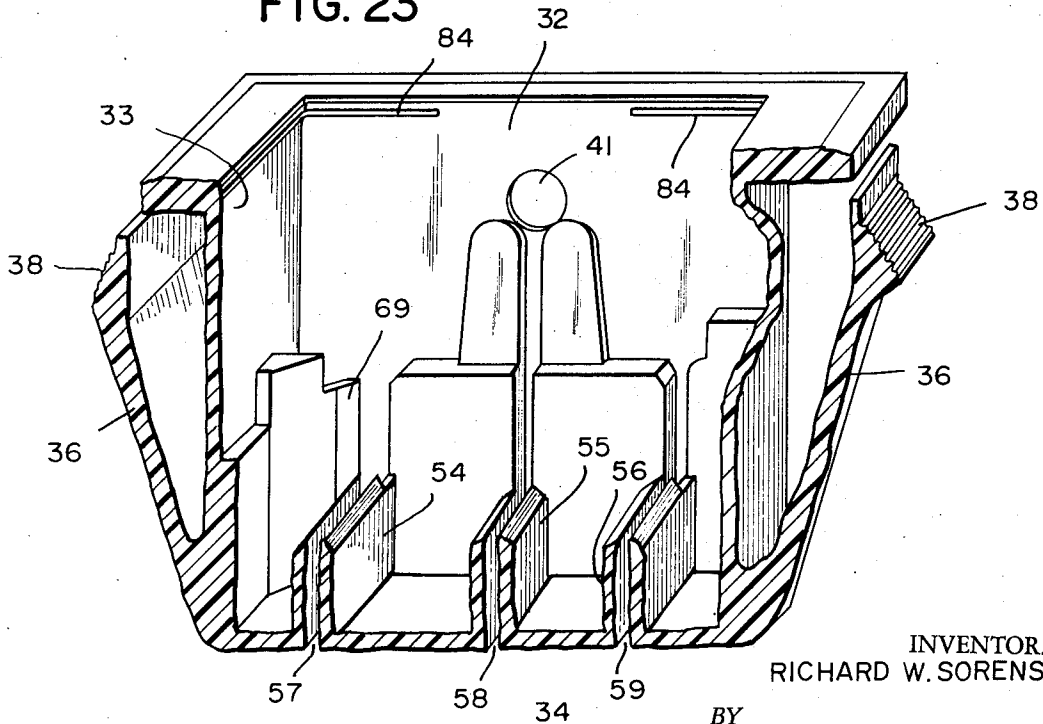


FIG. 23



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SWITCH CASE CONSTRUCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to electric switches and, more particularly, to the interior construction of a switch case which accommodates modular contact terminals and which is formed to define protective channels for electrical wiring connected to one or more contact terminals and protecting such wiring from the switching elements of the apparatus.

Description of the Prior Art

Where small switch cases are required to contain illuminating elements such as neon bulbs and the like, and small registers in circuitry therewith, it is most convenient and expedient to use uninsulated fine wire for connecting the neon bulb and the resistor to the respective contact elements inside the switch case. Since the wiring cannot normally be anchored in any particular manner without increasing the expense of the switch considerably, such uninsulated wires are subject to moving and bending where they might come in contact with the movable electrical switching elements in the interior of the case, such as the contact lever and the lever actuator. Thus, there exists the possibility of short-circuiting of the switch and failure of the equipment which the switch controls.

SUMMARY OF THE INVENTION

In order to obviate the possibility of short-circuiting within the interior of the switch case as described hereinbefore, the present invention is concerned with the construction of an electrical switch case wherein partitions are molded integrally in the interior of the case to form suitable channels through which the uninsulated electric wire can extend and whereby said partitions prevent any possibility of the uninsulated wire from coming in contact with any of the other electrical switching elements. Furthermore, the structure of the switch case provides for the incorporation therein of modular contact terminals, each of which has an angularly extending leg which protrudes into the channel so that the uninsulated wire may be electrically connected to said leg by means of soldering or the like. By providing for a pair of spaced channels for the opposite end portions of the electrical wiring of the neon bulb and resistor within the switch case, said bulb and resistor are stabilized in position within the switch case whereby they will resist dislodgment or other damage due to the movement of the switch actuator or the switch contact lever or any movement of the apparatus in which the switch case is mounted.

These and other novel features and advantages of the present invention will be described and defined in the following specification and claims:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one embodiment of the switch of the present invention;

FIG. 2 is an enlarged side elevation of the switch shown in FIG. 1 with the toggle handle in two alternate positions, some parts being broken away, some parts being in section, and some parts being in dotted outline;

FIG. 3 is a vertical central section of the switch shown in FIG. 2 with the toggle handle being pivoted to the left, some parts being shown in elevation;

FIG. 4 is similar to FIG. 3 with the toggle handle being shown pivoted to the right;

FIG. 5 is a view similar to FIG. 4 showing the utilization of a rocker switch button, some parts being omitted;

FIG. 6 is a side elevation of the paddle type toggle handle in FIGS. 1-4;

FIG. 7 is a view taken on line 7-7 of FIG. 6;

FIG. 8 is a fragmentary view of the switch showing the toggle handle of FIG. 7 being inserted into said switch case;

FIG. 9 is a fragmentary view of the switch case showing the toggle handle set into position within said case;

FIG. 10 is a fragmentary partial section view of the switch case showing the manner in which the lens is secured therein;

FIG. 11 is a vertical central longitudinal section view of the switch case shown in FIGS. 1-5;

FIG. 12 is a top view of the switch case shown in FIG. 11;

FIG. 13 is an elevation view of one of the terminal lugs insertable into the switch case;

FIG. 14 is a left end view of the lug shown in FIG. 13;

FIG. 15 is an elevation of the terminal yoke lug removably insertable into the switch case;

FIG. 16 is an edge view of the lug shown in FIG. 15;

FIG. 17 is a top view of the terminal lug shown in FIGS. 13 and 14;

FIG. 18 is a top view of the contact lever shown in FIGS. 3, 4 and 5;

FIG. 19 is a section view taken on line 19-19 of FIG. 18;

FIG. 20 is a greatly enlarged top view of either one of the lens shown in FIG. 1;

FIG. 21 is a section view taken on line 21-21 of FIG. 20;

FIG. 22 is a side view of the lens shown in FIG. 20;

FIG. 23 is an enlarged fragmentary section view of a portion of the switch case showing the manner in which one of the end terminal lugs is secured therein; and

FIG. 24 is a greatly enlarged perspective, broken away view, of the switch case of the present invention.

FIG. 25 is a section view taken on line 21-21 of FIG. 24.

FIG. 26 is a side view of the lens shown in FIG. 24.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. 1-4, one embodiment of the switch herein comprises a rectangular, box-like case generally designated 31, having spaced apart parallel side walls 32 and spaced apart parallel end walls 33, and a floor 34. Said box-like structure may be formed integrally by molding or the like, and is made of a suitable insulating material such as nylon, Bakelite, or the like. Integrally joined at the lower portions of end walls 33 are upwardly and outwardly extending flexible arms 36. Integrally formed on all four sides of the top of case 31 are outwardly extending flanges 37. When case 31 is inserted into the rectangular aperture of a mounting plate where the dimensions of the aperture are slightly greater than the bottom of case 31 but somewhat less than the distance between the outer edges of flanges 37, arms 36 flex inwardly to permit the insertion of said case until the bottom surfaces of flanges 37 bear against the outer surface of the mounting plate (not

shown), at which time the upper notched or serrated ends 38 of arms 36 engage the bottom edges of the mounting plate aperture and secure the switch case in a fixed position.

Side walls 32 each have respective recesses or apertures 41 axially aligned with each other for pivotally accommodating a toggle element 42 (FIGS. 2, 3 and 4), said toggle element extending through the open top of case 31. The bottom portion of toggle 42 has a longitudinal recess 43 (FIGS. 7, 8 and 9) which telescopically accommodates tube 44 made of insulating material, the lower end of said tube being formed in the shape of a rounded nib 46. Extending longitudinally within recess 43 is a spring 47, one end of which bears against the inner end of aperture 43 and the other end of which bears against the closed inner end of tube 44 whereby nib 46 is normally urged yieldably downward against a movable contact lever 48, the function of which will be described hereinafter.

Toggle element 42 is made of a suitable plastic material such as molded nylon, Bakelite, or the like, and has at both sides thereof a pair of integrally formed, downwardly extending, substantially parallel fins or wings 49 which are somewhat resilient and inwardly yieldable. Integrally formed on the outer surface of each wing 49 is a circular hub 51 which fits rotatably within respective apertures 41. The bottom portion of each hub 51 has a small beveled slope 52 which facilitates the insertion of toggle 42 into case 31, as shown particularly in FIG. 8, whereby the downward movement of said toggle causes the upper edge of the case bearing against beveled slopes 52 to urge wings 49 inwardly until hubs 51 become aligned with respective apertures 41 into which they enter by snap action. The secured position of toggle 42 with hubs 51 located rotatably within apertures 41 in walls 32 is shown in FIG. 9. The provision of resilient wings 49 integrally formed on toggle 42 and of integrally formed hubs 51 obviates the use of pivot pins for mounting toggles in switch cases whereby assembly and disassembly of the device is facilitated. It is evident that the resilient wing formation on toggle 42 may also be incorporated on a rocker button actuator 53, as shown in FIG. 5.

In some embodiments, apertures 41 may take the form of recesses in the interior surfaces of walls 32 without extending completely therethrough. It is understood that the use of the word "aperture" in connection with the structure identified with numeral 41 in the specification and claims herein subsume both apertures and recesses.

When elements 41 comprise recesses, the top portion of bosses 51 may be slightly beveled so that toggle elements 42 may be extracted from case 31 by virtue of the flexibility of wings 49. In such an arrangement, the strength of spring 47 will be less than that which would automatically force toggle element 42 free of case 31.

Where structures 41 comprise apertures extending throughout walls 32, the removal of toggle actuator 42 from case 31 may readily be accomplished by the application of external inward pressure upon the exterior of bosses 51. The dimensions and locations of wings 49 and bosses 51 relative to apertures 41 can be determined empirically for the required or desired cooperating function for pivotally and possibly releaseably securing actuator 42 in case 31.

Integrally formed on floor 34 in the interior of case 31 are three spaced apart, upwardly extending bosses 54, 55 and 56, said bosses having vertical rectangular apertures 57, 58 and 59, respectively. See FIGS. 3, 4 and 23. Apertures 57, 58 and 59, accommodate respective electrically conductive terminals 61, 62 and 63, the bottom portions of which extend below the bottom of switch case 31 for connection to suitable electrical circuits. Terminal element 61 is also shown in FIGS. 17 and 18; terminal element 62 is also shown in FIGS. 15 and 16; and terminal element 63 is also shown in FIGS. 13 and 14; FIG. 19 represents a top view of either one of terminal elements 61 or 63. In some embodiments, terminals 61, 62 and 63 may be molded fast or otherwise secured in case 31 by means well known in the art.

The top portion of terminal 62, in the center of case 31, has a pair of integrally formed, spaced apart and upwardly extending ears 64, the upper edges of which serve as a sliding yoke for contact lever 48. Contact lever 48, as shown in FIGS. 3, 4 and 20, comprises a generally rectangular electrically conductive element in the center of which is formed a downwardly extending recess 66 which serves as a bearing for the rounded bottom surface of nib 46 whereby the transverse movement of said nib caused by the pivoting action of toggle 42 produces the reciprocating movement of contact lever 48 from one end of the interior of case 31 to the other. Formed between ears 64 of terminal element 62 is a recess 67 which permits the central bottom boss 68 underneath recess 66 to pass freely between said ears when contact lever 48 moves back and forth.

Near diagonally opposite corners of the interior of switch case 31 are integrally formed angularly arrayed vertical partitions 69 which establish respective channels 71 into which extend the integrally formed, perpendicular ear 72 of terminal 63 in one corner and the integrally formed, perpendicular ear 73 of terminal 61 in the other corner. See enlarged detail of one corner of the switch case in FIG. 22.

Located near one end of the interior of switch case 31 is a neon bulb 74, one terminal of which is electrically connected by conductor wire 76 to ear 72 of terminal element 63, said conductor wire lying within channel 71.

Located at the other end of the interior of case 31 is a resistance element 77, one end of which is electrically connected to neon bulb 74 by way of conductor wire 78. The other end of resistance element 77 is connected by way of conductor wire 79 extending through the opposite corner channel 71 to ear 73 of terminal element 61.

By providing vertically angled partitions 69, made of insulating material, to form vertical channels 71, protection is provided for the fine gauge electric connector wires 76 and 79 within said channels and which are connected to respective terminal ears 72 and 73 which extend into said channels. Thus, the delicate lead wires are protected against any accidental short-circuiting by the movable contact lever 48.

The corners of contact lever 48 are slanted, as shown in FIG. 20, in order to avoid any physical engagement between said contact lever and angled vertical partitions 69, thereby assuring the free pivoting and sliding movement of said lever.

In the embodiment shown in FIGS. 3 and 4, the upper edge of terminal element 63 extends above the upper edge of boss 56 while the upper edge of terminal element 61 is recessed below the upper edge of boss 54. Normally, terminal 62 is connected to the power line while terminal 63 is connected to the circuit or load to be energized by the switch. Terminal 61 is connected to ground or to an opposite line lead. In this arrangement, when toggle element 42 is in the position shown in FIG. 3, the circuit is closed between terminals 62 and 63 by lever 48 while, at the same time, neon bulb 74 is energized to serve as an indicator of the closed circuit condition of the switch.

When lever 48 is in the position as shown in FIG. 4, the left end portion thereof rests upon the top of boss 54 which is made of insulating material. Since the top edge of terminal element 61 is retracted from the top of said boss, an open circuit condition of the switch obtains and bulb 74 becomes extinguished since there is an open circuit between terminals 62 and 63.

In some embodiments, neon bulb 74 and resistor element 77 both may be replaced by a single low voltage incandescent bulb that does not require a resistor.

In the embodiment of the switch as shown in FIGS. 1-4, 11, 12 and 23, the handle of toggle element 42 extends upwardly through the open top of case 31. The opening may be partially enclosed by a pair of rectangular lenses 81 disposed on opposite sides of toggle 42, said lenses being molded or otherwise formed of transparent or translucent plastic material. The top portion of lens 81 has an integrally formed, laterally and longitudinally outwardly extending flange 82 which rests upon the respective adjacent top surfaces of case 31 surrounding the aperture therein. Integrally formed at opposite ends of lens 81 and spaced slightly apart from the bottom of flange 82 are narrow, elongated bosses 83 which removably engage, by snap action, correspondingly shaped recesses 84 in the side walls 32 of case 31. Accordingly, lenses 81 may be interchangeably replaced with different legends, embossed, engraved or otherwise marked thereon, to indicate various conditions of the switch such as ON, OFF, and the like. Also, at the consumer's option, said lenses may be colored with different hues for functional or esthetic purposes.

Although the present invention has been described with reference to particular embodiments and examples, it will be apparent to those skilled in the art that variations and modifications can be substituted therefor without departing from the principles and true spirit of the invention. The "Abstract" given above is for the convenience of technical searchers and is not to be used for interpreting the scope of the invention or claims.

I claim:

1. An electric switch comprising a unitary molded box-like case made of insulating material, two integrally formed partitions located at opposite diagonal corners

in the interior of said case and forming respective elongated channels therein, two spaced apart terminal elements in the interior of said case, an ear integrally formed on each of said terminal elements and extending into a portion of a corresponding adjacent channel, movable switching elements within said case, said partitions providing insulating and physical protection from said switching elements for wiring in said channels connected to said respective ears.

2. A switch according to claim 1 and further comprising an electrical element in said case, said electrical element being energized and de-energized by the operation of said switching elements, an electrical wire in each of said channels, said electrical element being connected between said wires, the other ends of said wires being connected to respective ears.

3. A switch according to claim 2 wherein said switching elements are movable into either of two positions, said switching elements in only one of said positions closing the circuit for energizing said electrical element.

4. A switch according to claim 1 wherein said electrical element comprises an illuminating bulb.

5. A switch according to claim 4 wherein said electrical element comprises an illuminating bulb and a resistor connected thereto.

6. An electric switch comprising a unitary, molded box-like case made of insulating material, two integrally formed partitions located at opposite diagonal corners in the interior of said case and forming respective elongated channels therein, three integrally formed spaced bosses in the interior of said case, a terminal yoke mounted in the center one of said bosses, a sliding and pivoting contact lever mounted movably on said terminal yoke, first and second terminal elements mounted in respective second and third bosses, the upper end of said first terminal element extending above its respective boss for contact by said contact lever, the upper end of said second terminal element being retracted from the top of its respective boss for insulation from said contact lever, an ear integrally formed on each of said first and second terminal elements, said ears extending into respective adjacent channels.

7. A switch according to claim 6 wherein said contact lever is movable into either of two positions where in one position it forms a bridge between said terminal yoke and said first terminal element, and in the other position it forms a bridge between said terminal yoke and the insulating boss.

8. A switch according to claim 6 and further comprising an electrical element in said case, said element being energized and de-energized by the action of said contact lever, an electric wire in each of said channels, said element being connected between said wires, the other ends of said wires being connected to respective ears.

* * * * *