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3,515,835

ILLUMINATED PUSHBUTTON SWITCH

Filed May 27, 1968

2 Sheets-Sheet 1

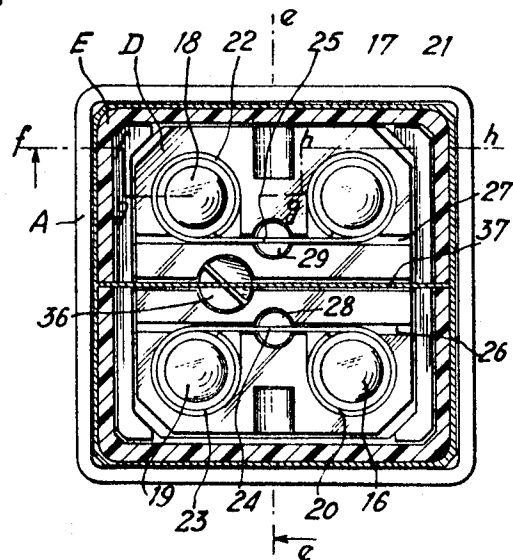
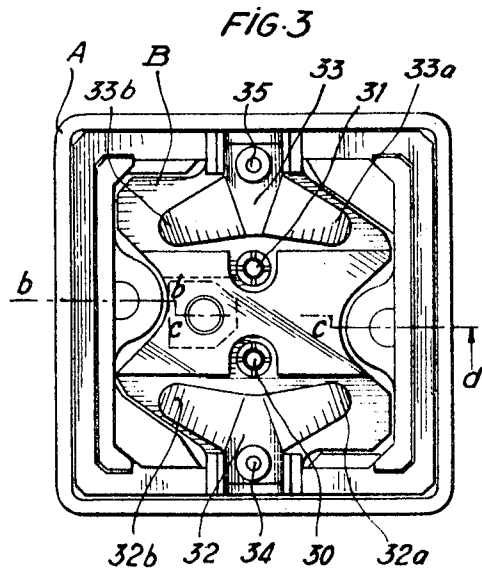
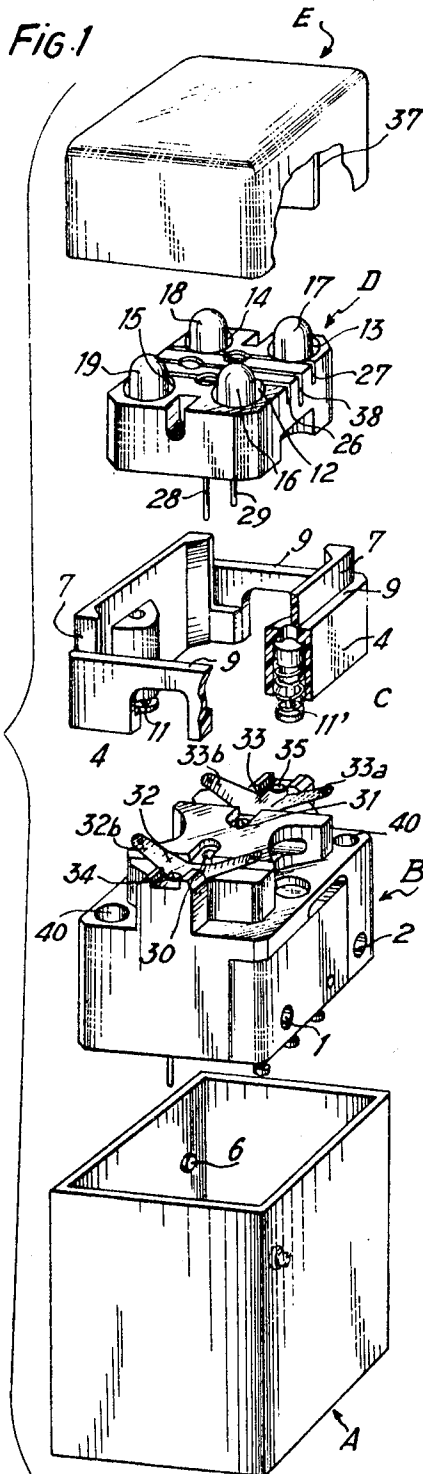


FIG. 2

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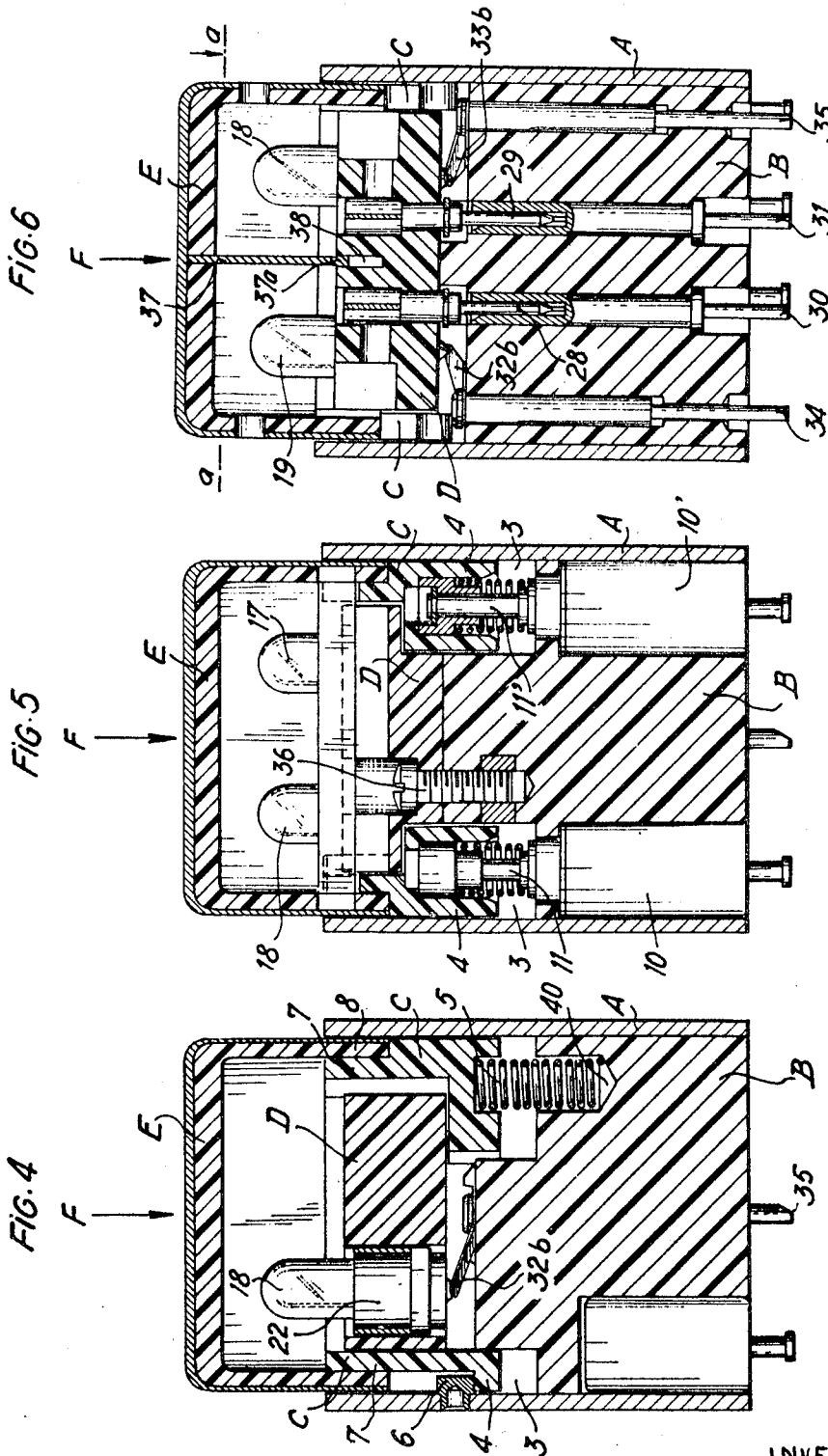
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ILLUMINATED PUSHBUTTON SWITCH

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8 Claims

ABSTRACT OF THE DISCLOSURE

A pushbutton of the type which comprises, in a casing, switch means which can be actuated by being pressed in order to act on the functioning of an electric circuit, and which comprises lamps mounted on a support and adapted to indicate this functioning. A pushbutton, such that the lamp support of the button is easily accessible and can be extracted through the front face of the casing, and which supplies the maximum amount of visual information with a maximum safety.

The present invention relates to a pushbutton.

It is more specifically concerned with a pushbutton of the type which comprises, in a casing, switch means which can be actuated by being pressed in order to act on the functioning of an electric circuit, and which comprises lamps mounted on a support and adapted to indicate this functioning, as is the case, for example, with the pushbuttons described in U.S. Pat. No. 3,267,245 and in French Pat. No. 1,311,485.

When the casing is sunk and fixed in a structure, it frequently happens that only a front face of the casing is accessible, it not being possible to obtain access to the major part of the casing from the side.

A first object of the invention is to provide a pushbutton, such that the lamp support of the button is easily accessible and can be extracted through the front face of the casing.

Another object of the invention is to provide a pushbutton which, for a given size, supplies the maximum amount of visual information with a maximum safety.

For this purpose, the pushbutton comprises, in a casing or housing unit, having the form of a shell: a switch unit sunk and fixed in the housing unit, the said switch unit comprising the switching means of the pushbutton to be connected to the circuit; a lamp-supporting unit detachably mounted on the switch unit, the lamp-supporting unit being fastened to the switch unit by fixing means which are detachable from the face above the lamp-supporting unit, and the lamp-supporting unit comprising holding means for the removable mounting of the lamps of the pushbutton; electric conductors carried by the switch unit and to be connected to the circuit and electric conductors carried by the lamp-supporting unit and associated by contact with the electric conductors of the switch unit when the two units are brought together, for the required functioning of the lamps; a pushbutton body surrounding the lamp-supporting unit and resiliently mounted on the switch unit, the said body being displaceable by sliding movement along the housing, between a lower abutment position and an upper abutment position for controlling by a pressing action the switching means of the switch unit; a separable cap mounted on the pushbutton body between the lamp-supporting unit and the wall of the housing unit for sliding with the said body, the said cap covering the lamp-supporting unit and projecting above the housing unit.

The lamp-support carries four lamps mounted by being fitted tightly into four openings in the support, and the

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conductors are arranged so as to feed in parallel two of the lamps forming a first lamp pair and for feeding in parallel the other two lamps forming a second lamp pair.

The particular features and the advantages of the pushbutton according to the invention will become apparent from reading the following description of one preferred embodiment of the invention and by reference to the accompanying drawings, wherein:

FIG. 1 is an exploded perspective view of the pushbutton according to the invention, the different units which form the said button being shown separated from one another and with some parts broken away;

FIG. 2 is a section of the pushbutton in a plane perpendicular to the direction of displacement of the movable part of the button, at a level situated above the lamps of the pushbutton.

FIG. 3 is a plan view of the pushbutton, after removing the cap and the lamp support;

FIG. 4 is a section of the pushbutton on the line *fg*h of FIG. 2, the different sectional planes being perpendicular to the plane of FIG. 2;

FIG. 5 is a section of the pushbutton along the line *bed* of FIG. 3; and

FIG. 6 is a section of the pushbutton along the plane *e* of FIG. 2.

The pushbutton according to the invention is essentially formed by five units (FIG. 1), namely: a housing A, a switch unit B, a pushbutton body C, a lamp-supporting unit D and a cap E.

When the different units are assembled to form the pushbutton, the switch unit B is enclosed in the housing A at a fixed position in the latter; a peripheral space then remains between the external contour of the switch unit and the internal wall of the housing, and in this space is mounted for sliding movement the pushbutton body C which itself forms a frame in which the lamp support D is accommodated; in addition, between the external contour of the body C and the internal wall of the housing A, a peripheral space exists in which is fitted the cap E which bears on the body C and which serves for pushing the latter in the direction of the switch unit B at the time of operating the pushbutton. The relative dispositions of these various units can best be seen in FIGS. 4 to 6.

The unit B is fixed inside the housing unit A by means of rivets (not shown) extending into suitable perforations in the said housing and switch unit; the holes 1 and 2 of the switch unit (FIG. 1) are the orifices of bores which extend from side to side of this unit and into which extend the rivets or any other locking means.

The upper part of the switch unit is cut away in such a manner that a substantially peripheral space 3 exists between the contour of the said part and the inside wall of the housing, the lower part 4 of the pushbutton body C being capable of sliding in the said space; the body is guided in its displacement by its lateral contact with the upper part of the switch unit. Mounted in corner recesses 40 of the switch unit B are springs 5, which ensure a resilient mounting of the pushbutton body on the switch unit and which tend to space the body C away from the unit B (FIGS. 1 and 4); furthermore, the spacing apart of these two units under the action of resilient means is limited by abutment means 6, which are fixed on the internal face of the housing A and against which corresponding parts of the pushbutton body C are adapted to bear. The number and the nature of these abutment means can vary according to the constructional forms.

A peripheral space exists between the upper part 7 of the pushbutton body and the inside wall of the housing A, and in this space is located the lower part 8 of the cap E, the latter being adapted to rest on horizontal surfaces 9 of the said body. The cap is advantageously a

cover of rectangular or square cross-section, made of synthetic plastics material; this cover has an inherent elasticity, which enables it to be mounted with a tight fit on the upper part 7 of the pushbutton body C, the cap E and the said body C thus forming an assembly which is displaceable as a whole, but which can be separated into its two parts C and E by a suitable manually applied force.

Under these conditions, a pressure exerted on the cap in the direction of the arrow F is transmitted to the pushbutton body C which, on approaching the switch unit B, acts on switches mounted inside the latter unit. Such switches, which are known per se, will not be described in detail. By way of example, two switches are indicated at 10 and 10' with their associated control elements 11 and 11', which are operated by the pushbutton body C when the latter is displaced towards the switch unit B.

The lamp-supporting unit D and its means of electrical supply, which are characteristic elements of the invention, will now be described.

This unit has the general form of a prism with a rectangular or square section and has four openings 12, 13, 14 and 15 which extend through the unit in the height direction. Each of these openings is arranged to receive a lamp, which is inserted in or extracted from the opening by a simple pressure of the finger; each opening also comprises a ring or sleeve made of copper or other conducting metal, into which the lamp is fitted and tightly held, said lamp causing the sleeve to be radially deformed and to bear against the wall of the opening, this ensuring the tight fit of the lamp. The lamp can at will be removed from the sleeve and the opening by an axial pressure exerted on its head. In the figures, the four lamps have been represented at 16, 17, 18 and 19 and the corresponding sleeves at 20, 21, 22 and 23.

The sleeves form for each lamp one of the conductors which connect the lamp to a source of electrical energy. These conductors are in fact so arranged that the lamps are mounted in pairs and in parallel, so that if one lamp becomes inoperative, the other lamp of the pair continues to act as an indicator. In the constructional example which has been illustrated, the sleeves 20 and 23 are formed by the two loop-shaped ends of a metal strip 24 and the sleeves 21 and 22 are formed by the two loop-shaped ends of another strip 25. These strips are each contained in a groove in the unit D, there being in fact a groove 26 for the strip 24 and a groove 27 for the strip 25. In addition, conductor rods 28 and 29 which extend through the unit parallel to its axis and which project beyond the lower face of the unit also end in these grooves; the conductor rod 28 is electrically connected to the strip 24, which extends into a slot in the rod, and the conductor rod 29 is electrically connected to the strip 25 in similar manner.

The switch unit B on which is to be mounted the lamp-supporting unit D comprises two conductor tubes 30 and 31 which are adapted to receive the rod 28 and the rod 29, respectively; these tubes end at the lower face of the switch unit. Furthermore, the unit B is provided with two conducting strips 32 and 33, each having two upwardly bent ends. When the lamp support D is mounted on the switch unit B, the bases of the lamps 16, 19, 17 and 18 are respectively in contact with the ends 32a, 32b, 33a and 33b of the strips 32 and 33. The bending of these ends ensures their elasticity and their contact with the lamp bases.

The conducting strip 32 is electrically connected to a conductor tube 34 which extends through the switch unit so as to end at the lower face of the unit and, in similar manner, the conducting strip 33 is electrically connected to a conductor tube 35 extending through the switch unit to end at its lower face (FIGS. 3 and 6). Under these conditions, the four lamps can be supplied by connecting the conductor tubes 30, 31, 34 and 35 to an electrical

energy source which is beneath the switch unit. It is expedient to design the housing A as a simple shell of rectangular or square section without a base, so that the bottom of the switch unit is directly accessible from the bottom of the pushbutton.

The lamp support D, which is already to a certain degree fastened to the switch unit B when the rods 28 and 29 are inserted into the corresponding tubes 30 and 31, is preferably detachably fixed to the switch unit by another fixing means, for example, by a screw 36 (FIGS. 2 and 5), which can be tightened and slackened from the top of the pushbutton when the cap or cover is removed.

The two pairs of lamps have separate indicating functions, according to their supply circuits, which are different for each of the pairs, and in order to facilitate the visual distinction of these two pairs, the cap is equipped with a transverse internal partition 37 which is situated between the two pairs, and which extends into a groove 38 in the upper face of the lamp support when the cap is mounted on the pushbutton body.

It will be understood that it is within the scope of the invention to increase, if necessary, the number of pairs of lamps by increasing in corresponding manner the number of openings in the lamp support, the transverse partitions of the cap and the electric conductors for supplying the lamps, the two lamps of each pair advantageously being mounted in parallel so that the indicating function of the pair is maintained in the event of failure of one of the lamps of the pair.

It will also be understood that the general form of the different units of the pushbutton which, in the example illustrated, is a prism having a square or rectangular cross-section, can be modified and may be given a prismatic form of more complicated polygonal section or with a circular section, without departing from the scope of the invention.

The housing will preferably be made of metal and the other units of a moulded synthetic plastics material.

I claim:

1. A pushbutton comprising:

- (a) a housing in the form of an open-ended shell,
- (b) a switch unit fixed within the lower region of said housing, said switch unit carrying (I) a switch operable upon application of pressure to it, and (II) electrical conductors for connection to an external circuit to be controlled by said switch, said switch unit and housing formed to provide a space between the periphery of the upper portion of said switch unit and said housing;
- (c) a pushbutton body in the form of a sleeve open at both ends, the lower portion of said pushbutton body located within said space and slidable therein along the axis of said housing between upper and lower limit positions, resilient means urging said body toward its upper limit position.
- (d) a lamp supporting unit detachably secured to said switch unit by means accessible from the top face of said lamp supporting unit, said pushbutton body surrounding said lamp supporting unit, said lamp supporting unit carrying (I) mounting means for detachably securing at least one electric lamp thereto, and (II) electrical conductors for connection to the electrical conductors of said switch unit via the external circuit to be controlled by said switch, whereby said lamp will function, and
- (e) a cap separably mounted on said pushbutton body and slidable within the upper region of said housing, downward pressure on said cap transmitted to said switch via said pushbutton body.

2. A pushbutton as claimed in claim 1, in which the lamp supporting unit carries four lamps tightly mounted in four openings in the lamp supporting unit, and the electrical conductors carried by said lamp supporting unit are designed so as to supply in parallel two of the lamps form-

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ing a first lamp pair and for supplying in parallel the other two lamps forming a second lamp pair.

3. A pushbutton as claimed in claim 2, in which the cap comprises a light-transmitting cover formed with an internal partition situated between the two pairs of lamps, and including a groove in the upper face of the lamp supporting unit for accommodating said partition.

4. A pushbutton as claimed in claim 2, in which the electrical conductors carried by said lamp supporting unit comprise, for each pair of lamps, a tube extending through the switch unit, a rod extending through the lamp supporting unit and adapted to fit into the tube, and a strip electrically connected to the rod, said strip having two ends curved around the two lamps of the pair in the corresponding openings of the lamp supporting unit.

5. A pushbutton as claimed in claim 2, in which the electrical conductors carried by said lamp supporting unit comprise, for each pair of lamps, a strip fixed on the top of said switch unit, a tube extending through the switch unit and electrically connected between said strip and the bottom of the lamp supporting unit, the two ends of said strip bent upwardly so that each comes into contact with the conducting base of a lamp.

6. A pushbutton as claimed in claim 1, in which the detachable fixing means fastening the lamp-supporting unit

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to the switch unit comprise at least one screw accessible from the top of the pushbutton body when the cap is removed.

7. A pushbutton as claimed in claim 1, in which the housing, the switch unit, the push-button body, the lamp supporting unit and the cap have the general form of a prism with a rectangular cross-section.

8. A pushbutton as claimed in claim 1, in which said lower limit position is defined by the switch unit and the said upper limit position is determined by abutment means on the housing.

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