

[54] SWITCH WITH AN INDICATOR
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[57] **ABSTRACT**

In a switch which is opened or closed by pressing an actuator wherein the actuator is transparent or translucent, there being an indicating piece disposed beneath the inner portion of said actuator, and a character, symbol or color on the indicator is displayed out through the surface of the actuator.

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3 Claims, 7 Drawing Figures

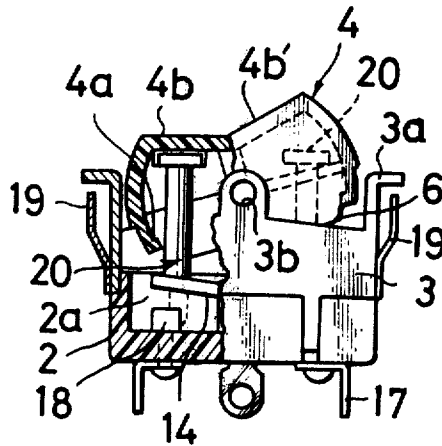


Fig-1

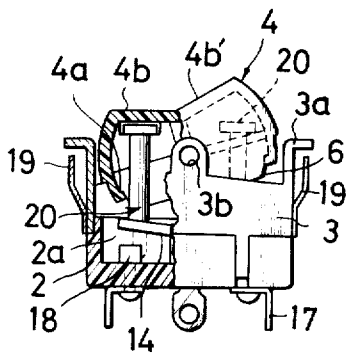


Fig-4

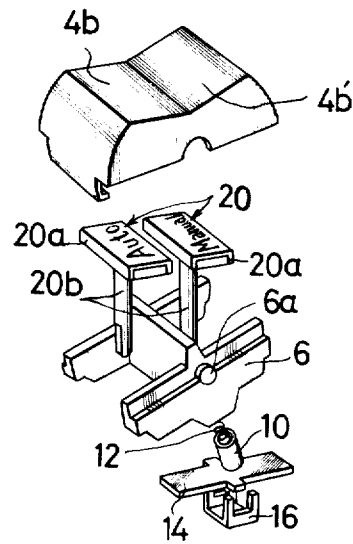


Fig-2

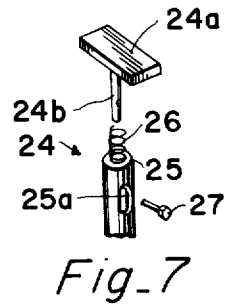
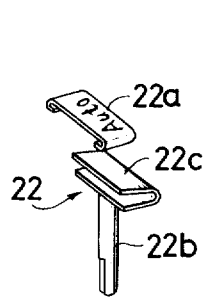
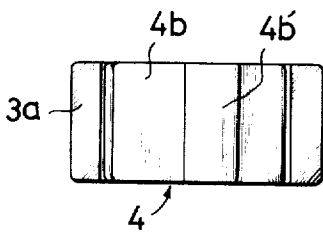


Fig-3

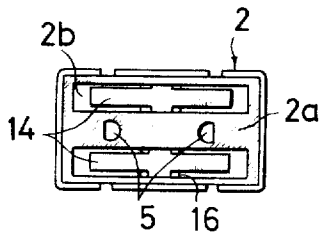
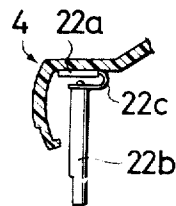


Fig-5

Fig-6



SWITCH WITH AN INDICATOR

This invention relates to a switch with an indicator and more particularly to improvements in the indicating portion of the switch in which the operation of opening or closing of the switch is performed by inclining or pressing an actuator.

In a conventional rocker-type switch, provisions such as putting a mark on the opposite sides of the actuator or button, scribing a character or a symbol on both surfaces of the actuator, and scribing characters on the switch panel have been suggested to give information showing the switch conditions such as ON and OFF. However, with the trend to miniaturization and other advances in the industrial fields in recent years, it became necessary to mount many switches on a panel surface, with the result that numerous accidents due to operator's mistake of information of a switch condition occurred. Recently, commercially available back-lighted type switches in which the actuator portion is lit by the light emitted from self-contained lamp and on-off condition of the switch is made known by the light have been developed.

However, the back-lighted type switch having an enclosed lamp has a disadvantage that the wire of the lamp is easily broken with resulting short life of the lamp. Further since the switch is constructed so that the on-off condition of the switch is indicated by the light emitted from the lamp, when the lamp is broken, the switch may cause serious accident due to its erroneous indication. Further disadvantages of the back-lighted type switch are that since the switch contains a lamp, it is limited as to miniaturization and it is troublesome to replace the damaged lamp and it must contain a lamp circuit specially designed for indication purpose.

The present invention is provided for eliminating the above-mentioned disadvantages of the prior art. One object of the invention is the provision of a new switch having an indicator in which color, character or a symbol may be clearly seen through the actuator by making the actuator transparent or translucent, disposing an indicating piece under the inside lower portion of the actuator and bringing an inner surface of the actuator and an upper surface of the indicating piece into physical contact with each other.

It is a further object of the present invention to provide a new switch with an indicator which will prevent a mistake by an operator by changing the color which appears through the surface of the actuator when the actuator and the indicator are brought into physical contact with each other and by an indication, clearly visible only at the side in which the actuator is inclined or pressed down.

It is still a further object of the present invention to provide a new switch with an indicator in which on-off condition of the switch may be indicated accurately and clearly by provision of a simple structure.

The above described objects and other objects and features of the present invention will be apparent by reading the following detailed description thereof and by reference to the embodiments shown in the accompanying drawings, in which;

FIG. 1 is a front elevational view, partly in section, of a switch provided with an indicator;

FIG. 2 is a top plan view of the switch of FIG. 1;

FIG. 3 is a top plan view of the switch body with a cover cap, actuator, indicating piece and turn key removed from the switch;

FIG. 4 is an exploded perspective view of the main portion of the switch FIG. 1;

FIG. 5 is an exploded perspective view showing an embodiment of the indicator utilized in the switch;

FIG. 6 is a side elevational view showing condition in which an indicating plate of the indicator shown in FIG. 5 is in contact with a lower surface of the actuator;

FIG. 7 is an exploded view showing another embodiment of an indicator utilized in the switch of the present invention.

Referring now to FIGS. 1 to 4, there is shown a switch provided with an indicator. Reference numeral 2 shows the well known prior art switch body, which body 2 includes a plurality of contact points 18 driven into the inner bottom surface, movable contact piece receivers 16 secured to the inner bottom surface, movable contact pieces 14 oscillating on said receivers 16 in response to the oscillations of the actuator, turn keys 6 transmitting the movement from the actuator to said movable contact pieces 14 and other members for providing the necessary switching operations. The switch body 2 includes a cover cap 3 at the top thereof and flanges 3a are formed on the upper end of said cover cap. Switch mounting plates 19 are provided on the left and right sides corresponding to the flanges 3a of the cover cap 3 which are used in mounting the switch on the panel. Although the plug-in type clamps are used for the flanges 3a, in the embodiment shown herein, it is apparent that the flanges may be made such that they are fastened by screws. Axle 6a is provided in the turn key 6 and thereby the turn key 6 is pivotally mounted on the cover cap 3. The turn key shown in FIG. 4 is in the shape of an H, and other shapes such as rectangular may be employed instead. Thus, the axle 6a is formed integral with the turn key in the embodiment herein shown, it is also possible to form the axle and the turn key 6 separately, to secure the axle to the cover cap 3 or mount it pivotally on the cover cap 3 and to mount the turn key pivotally on said axle. Further, bearing holes 3b are provided in the cover cap 3 for supporting the axle 6a, and when the structures are such that the turn key is always biased upwardly by a force as induced from a spring, a lower facing receiver to prevent the axis from moving upwards may be used in the portion of the bearing holes 3b of the cover cap 3 instead of said bearing holes. Holes (not shown) are cut into the lower end of the turn key 6 and the slides 10 are inserted therein along with springs 12.

The button or actuator, generally designated at 4, is removably mounted on the upper portion of the turn key 6 by closely contacting the legs 4a thereof with the said walls of the turn key 6. It is necessary that the button or actuator 4 be made of materials having slight resilience such as synthetic resin and also transparent or opaque in nature. Experiments taken by the inventor showed that the appropriate results may be obtained by using a nearly transparent material as the actuator and making the inner surface of the actuator like that of frosted glass. Button or actuator 4 could have different colors on the upper surfaces 4b and 4b', respectively, and other portions than the upper surfaces, instead of making the entire parts transparent or opaque, and further it will be appreciated that only upper surfaces 4b and 4b' may be made transparent or translucent and

other portions than these upper surfaces may be made opaque. Furthermore, each upper surfaces 4b and 4b' only may be removably secured, so and in that case it is not necessary to mount removably the entire actuator assembly on the turn key.

A plurality of holes 5 (there are two in the illustrative embodiment) are provided on the rib 2a of the switch body 2 and supporting members 20b of indicating pieces 20 in an indicator are inserted into each one of the holes 5. Indicating plates 20a are affixed on the upper part of each individual supporting member, and in the embodiment herein shown, the actuator 4 is pressed toward left and the character " Auto " shown on the left hand indicating piece 20a is exhibited through the left side upper surface 4b of the actuator 4. When the indicator piece 20 is inserted into the holes 5 of the switch body, the insertion of the coil spring (not shown) into said holes beforehand so as to cope with the slight variations in heights of the actuator and indicating pieces brings the indicating plates 20a and the actuator 4 into contact with each other, with the result that a clear and desirable indication is obtained.

Next referring to FIGS. 5 and 6, there are shown other embodiments of an indicating piece for use in the indicator of the switch in accordance with the invention. In these figures, the indicating piece 22 comprises an indicating plate 22a, a supporting member 22b and a spring plate 22c. Namely, the indicator plate 22a is fixed securely on the upper surface of the spring plate 22c secured to the supporting member 22b. In other words, the indicator plate 22a is secured to the supporting member 22b through the spring plate 22c, and in this respect indicating piece 22 is different from the indicating piece 20 shown in FIGS. 1 and 4. As shown in FIG. 6, the presence of this spring 22c brings the indicating plate 22a and the inside upper surface of the actuator 4 into contact with each other, so character and symbol on the indicating plate are clearly visible. Furthermore in this case the pressure eliminates the need for a coil spring between the supporting member 22b and the hole 5. Thus, in the alternative embodiment of the invention, both the indicating piece 22a and a leaf spring 22c are secured to each other by pressing the indicator piece 22a onto the leaf spring 22c, but it is apparent that the arrangement may be employed such that both the indicating piece and the leaf spring are secured to each other by pressing the leaf spring from underneath onto the indicating piece.

Referring to FIG. 7 next, there is shown still another embodiment of the indicating piece for use in the switch in accordance with the present invention. The indicating piece, generally designated at 24, comprises an indicating plate 24a, a supporting member 24b secured to the indicating plate 24a, a supporting cylinder 25, coil spring 26 and pin 27. The supporting cylinder 25 may be formed on the rib 2a of the switch body integral therewith or inserted into the holes 5 of the switch body. A coil spring 26 is inserted into supporting cylinder 25 through the supporting member 24b and the pin 27 is secured to the member 24b through an elongated slot 25a provided in the cylinder 25. Thus, since the upward force is always applied to the indicating plate 24a by the spring 26, the pin 27 is kept in contact with the upper end of the elongated slot 25a in the normal condition thereof. When the indicating plate 24a is pressed downwardly, said plate 24a is moved down against the force of the spring 26 and stopped by engaging the pin

27 with the lower end of the elongated slot 25a. Thus, the range of movement of the indicating plate between the lower end and the upper end of the elongated slot 25a is determined by the length of the slot. Such a structure brings the upper inside surface of the actuator and the upper surface of the indicating plate into contact with each other, the resultant condition of the indicating piece becomes clear.

And it may be possible to mount the supporting member directly on the rib 2a instead of providing the holes 5 in the rib 2a of the switch body as shown in FIG. 3, in other words, it may be possible to form the supporting member integral with the switch body 2. In this case, an appropriate indicating plate is supported directly or through a spring on said supporting member.

Still further, when the inside surface of the actuator is made rough as that of a frosted glass, coating of the upper surface of the indicating plate with suitable transparent liquid makes the indication of character, or mark on the indicating plate more clear.

The present invention may be arranged as described above and characters on the indicating plate of the left side indicating piece are indicated through the upper left side 4b of the actuator when the actuator is inclined left as shown in FIG. 1 and the lower surface of the upper left side 4b of the actuator is close to or in contact with the left side indicating piece, and in contrast to this condition, character on the indicating plate of the right hand indicating piece are not indicated because of the fact that the upper right side 4b of the actuator is spaced apart and biased apart from the right indicating piece. When the right side of the actuator is pressed down and the actuator is inclined toward right, the relationship between the actuator and the indicating piece are reversed, and character on the right side indicating plate are indicated and character on the left side indicating plate are not observed. Thus in this way, in accordance with the present invention, the switch has a characteristics of displaying a suitable character, mark and/or color on the indicating piece by bringing mechanically the actuator and the indicating piece close to or into contact with each other, with the result that the indicating function thereof is accurate and clear and positive, and further is effective in preventing an operator from mistaking the on-off conditions of the switch.

Furthermore, the switch provided with the indicator in accordance with the present invention is simple in construction and thus also has an advantage of providing a semipermanent life thereof.

The present invention has been described in connection with the embodiments shown in the accompanying drawings heretofore, it is noted that these are illustrative only and have not limited sense at all. Therefore, various changes may be made and embodied in the invention without departing from the spirit and scope of the present invention. In other words, the present invention may be applied to, for example, the so-called push button type switch instead of the rocker-type switch and may provide nearly the same effect, but it is to be understood that all these things mentioned above are included within the scope of the present invention and the following claims.

What I claim is:
1. A switch in which the opening or closing of the switch is performed by inclining an actuator leftward and rightward, said switch comprising:

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an actuator formed with the interior thereof being visible from the exterior;
 an indicating piece provided within a cavity located below said actuator;
 a coil spring interposed between a supporting cylinder of said indicating piece and a supporting member of an indicating plate inserted into said supporting cylinder to bring an upper surface of said indicating plate and an inside upper surface of said actuator into contact with each other when said actuator is inclined;
 a pin secured to said supporting member through an elongated hole provided in said supporting cylinder

der;
 whereby the indication on said indicating piece is indicated on the surface of said actuator by bringing said indicating plate and the inside of said actuator into contact with each other.

2. A switch with an indicator as set forth in claim 1, wherein said actuator is transparent.

3. A switch with an indicator as set forth in claim 1, wherein only the upper surface of said actuator is transparent or translucent and other surfaces of said actuator are opaque.

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