

[54] ILLUMINATED MINIATURE SWITCH

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[51] Int. Cl.H01h 9/16

[58] Field of Search200/167 A, 153 R,
200/153 A, 153 G

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[57] ABSTRACT

An illuminated miniature switch which is switched ON or OFF by rocking motion of an actuator, wherein a projected portion of the actuator is provided inclined relative to the side face of the body portion of the switch, and the fulcrum portion of a movable contact plate receiving element is offset from a straight line vertical to the bottom surface of the switch body portion and passing through the axial portion of the actuator, whereby a space is formed in the opposite side from the offset position of the receiving element to dispose an illuminator such as a lamp, neon bulb or luminous diode therein, so as to illuminate the actuator from thereunder.

8 Claims, 6 Drawing Figures

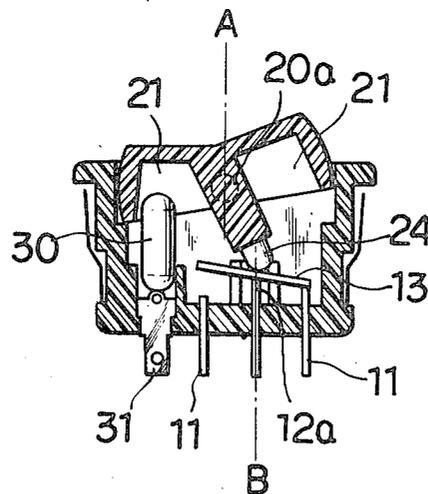


FIG-1

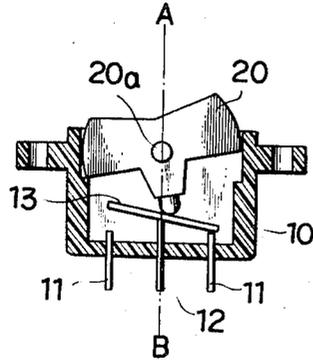


FIG-2

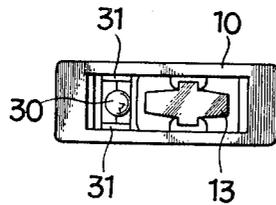
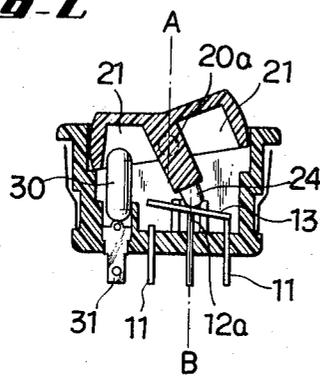


FIG-3

FIG-4

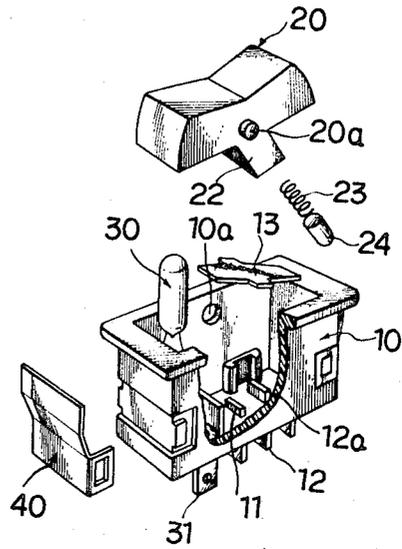


FIG-5

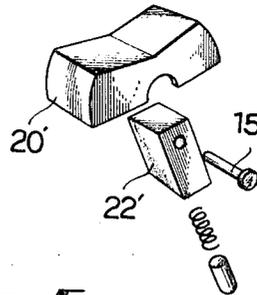
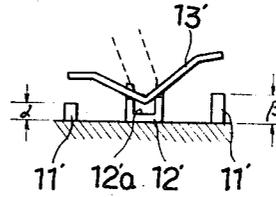


FIG-6

ILLUMINATED MINIATURE SWITCH

This invention relates to an illuminated type miniature switch having a rocker mechanism, and more particularly it relates to a switch of the type described in which improvements have been made particularly in the mechanism of the actuator, the disposed position of the movable contact plate receiving element and the position of the illuminator.

The conventional switches having a rocker mechanism are mostly so arranged that the line connecting the axial position, or fulcrum, of the actuator and the supporting point of the movable contact plate receiving element (for example, the line A-B in FIG. 1 which shows a section of a conventional switch) is vertical to the bottom surface of the body portion of the switch. In other words, the supporting point of the receiving element is positioned on a line vertical to the fulcrum of the actuator. Therefore, in case a lamp or other type of illuminating means is disposed in one of the two (right and left) spaces in the switch box, the other space (that is, the space where no illuminating means is disposed) is left vacant. This not only produces an idle space but also necessitates enlargement of the lateral width of the switch box and impedes miniaturization of the switch assembly.

As an attempt to overcome such problem, there has been proposed a method in which the axis, that becomes the fulcrum of the actuator, is provided biased either rightwise or leftwise from the center position of the actuator, and the receiving element is positioned on a vertical line through said axis so that one of the spaces in the switch box is formed wider than the other, and an illuminator such as a lamp is disposed in the wider space. However, according to such construction, if the switch is of a miniature size, one side of the upper face of the actuator is extremely diminished to not only impede smooth mechanical operation but also impair the external appearance of the switch.

The present invention has been devised to eliminate the conventional defects and inconveniences such as mentioned above, and it is therefore an object of the present invention to provide an improved illuminated switch which is small in size, high in performance and long in service life, and wherein a protuberance for supporting a slider relative to a vertically swingable actuator is provided aslant or displaced to one side, and the fulcrum point or the central point of the fulcrum of a receiving element for receiving and supporting a movable contact plate relative to the axial position of said actuator is provided biased either rightwise or leftwise so that an illuminator such as a lamp can be conveniently positioned in the other space without inviting any inconvenience such as mentioned before.

It is another object of the present invention to provide an illuminated miniature switch in which, in spite of the fact that the inside of the actuator and the position of the fulcrum of the movable contact plate receiving element are arranged eccentrically, the outside of the actuator is formed symmetrically as in the ordinary switches of this type, thus allowing smooth mechanical operation and excellent external appearance of the switch.

According to the present invention, the supporting point or fulcrum of the actuator is positioned at the central part thereof in the direction of its operation, while the fulcrum of the movable contact plate receiv-

ing element is provided biased either rightwise or leftwise from a line vertical to the bottom face of the body portion of the switch, so that one side of the inside bottom face of the switch body can be broadened. Therefore, it is possible to contain an illuminator, such as a lamp, neon bulb or luminous diode, within the body portion of the switch while allowing the upper face of the actuator to have symmetrical right and left areas as in the conventional devices. These features bring about the splendid effect to allow not only the easy and smooth switching operation of the switch but also maximum miniaturization of the switch as a whole in spite of the fact that an illuminator is contained therein.

Further, according to the present invention, since the movable contact plate receiving element is positioned biased to a side opposite from the illuminator, it is possible to dispose the illuminator at a position most effective for the illuminating purpose so that uniform illumination is imparted to the illuminated face of the actuator, thus allowing the user to positively know the switched condition of the switch.

Moreover, since the switching mechanism according to the present invention is of a rocker mechanism, there can be obtained a switch which is solid and stout in structure and has a long life. In addition, since the structure is extremely simple for an illuminated type switch and can be manufactured at low cost, it is possible to offer a switch which is of low price.

The above-said and other objects, features and advantages of this invention will become more apparent from reading the following detailed description of the invention in conjunction with the accompanying drawings showing embodiments of the present invention.

In the drawings:

FIG. 1 is a general front view of a conventional wave-formed switch, with parts shown in section;

FIG. 2 is a general front view of an illuminated miniature switch according to the present invention, with parts shown in section;

FIG. 3 is a plan view of the switch according to the present invention, with the actuator being removed;

FIG. 4 is an exploded view of the switch according to the present invention;

FIG. 5 is an illustration of a case where the present invention is adapted in a three-step change-over switch; and

FIG. 6 is a perspective view of the switching mechanism according to the present invention where the switch actuator is mounted detachably relative to the projected portion.

Referring to the drawings, reference numeral 10 designates generally the body portion of the switch which is made of an insulating material. In the inner bottom face of said body portion 10 is disposed a rocker switching mechanism which is of a known type and comprises fixed contacts 11, a movable contact plate receiving element 12 and a movable contact plate 13. Reference numeral 20 denotes an actuator or actuator which has provided at its sides the lobes 20a adapted to be pivotally fitted in the corresponding openings 10a formed at suitable positions in the side walls of the switch body portion 10, whereby said actuator can swing vertically about the pivots 20a. Instead of providing such lobes, it is also possible to form a through-hole extending laterally of the actuator 20 and a pin or the like may be passed through said hole, with both ends of the pin being fitted in the openings 10a in the side walls

of the body portion 10, thereby achieving the same effect as obtained in case of providing the lobes 20a.

Although the actuator 20 is formed integral with the projected portion 22 in the embodiment of FIGS. 2 and 4, said projected portion (which is also called converter) inclusive of the lobes 20a may be separated from the actuator and detachably attached to the latter so as to allow exchange of the lamp and the color of the actuator. An embodying example of this arrangement is shown in FIG. 6 where it will be seen that the projected portion 22' is swingably supported by a pin 15 and the actuator 20' is detachably secured to the top of the projected portion 22'. Any other means may be employed for mounting of the actuator 20, provided that such means allows vertical swinging motion of the actuator.

Reference numeral 30 indicates an illuminator such as a lamp, neon bulb or luminous diode which is disposed in either the right-side space or the left-side space on the inner bottom surface of the switch body portion 10, and 40 a switch fixing plate secured to a side wall of the body portion 10. Said switch fixing plate is made of an elastic insulating material and may be formed integral with the switch body portion 10.

In the present invention, it is essential that the supporting point or fulcrum 12a of the receiving element 12 for the movable contact plate 13 is located at a position which is biased to one side (either rightwise or leftwise) from a line vertical to the bottom surface of the switch body portion and passing through the supporting points 20a, that is to say the axis, of the actuator 20. In other words, the supporting points 20a of the actuator 20 must be offset from a line vertical to the bottom surface of the switch body and passing through the fulcrum 12a on the receiving element 12. As shown in FIG. 2, in the switch according to the present invention, the vertical line A passing through the supporting point 20a does not coincide with the vertical line B passing through the fulcrum 2a. While, in the conventional switch the same lines A and B coincide with each other as shown in FIG. 1. Thus, since the requisite is that the supporting points 20a and 12a of the actuator 20 and the receiving element 12, respectively, are offset from each other, the receiving element 12 itself may be positioned on vertical line to the supporting points 20a of the actuator 20 if its top end is bent or otherwise arranged such that the supporting point 12a of the receiving element 12 is offset from the line vertical through the supporting points 20a of the actuator 20. Below the underside of the actuator 20 are formed the housings 21. These housings 21 may be provided on both sides of the projected portion 22 as in the shown embodiment or may be provided only on one side where the illuminator 30 is disposed. Of course, the housing 21 on the side where the illuminator 30 is located must be formed sufficiently wide to keep the actuator 20 safe from contacting the illuminator 30 when the former is slanted vertically.

The illuminator 30 may be directly connected to the terminal of the lamp circuit as shown, or otherwise it may be detachably mounted by use of suitable means such as for example a socket (not shown). The projected portion 22 at the bottom of the actuator 22 is provided with a hollow or recession adapted to receive a telescopic slider 24 through a spring 23. Thus, the exposed end of said slider 24 is laterally movably pressed against the upper surface of the movable contact plate

13. As said before, the supporting point 12a of the receiving element 12 disposed on the inner bottom of the switch body portion 10 is positioned offset to one side from a line vertical to the axis of the actuator 20, and an illuminator 30 such as a lamp, neon bulb or luminous diode is disposed on the side opposite from said offset supporting point 12a of the receiving element. The illuminator 30 is electrically connected to a terminal 31 of the lamp circuit. The receiving element 12 has rested thereon the movable contact plate 13 so that the latter can swing vertically.

Shown in FIG. 5 is an embodiment of the three-step change-over switch where the middle section is the OFF position. In this case, too, the supporting point 12a' or the central portion of the fulcrum of the receiving element 12' is offset from a line vertical to the axis 20a of the actuator 20, so that it is preferred to make different the heights of the respective fixed contacts 11' provided on both sides of the receiving element 12', for it is possible to substantially equalizing the contact pressures on both sides by changing the heights of both fixed contacts 11' relative to each other. Equalization of the contact pressures on both sides may also be accomplished by simply changing the configurations of the right and left portions of the movable contact plate 13' from one another.

While the invention has been described centering on the embodiments shown in the accompanying drawings, it will be understood that these embodiments are merely illustrative and not restrictive to the scope of the present invention. That is, the present invention can be embodied in many other forms with various changes and modifications without departing from the spirit and the scope of the invention, and all of these changes and modifications are embraced within the scope of the claims that follow.

What is claimed is:

1. An illuminated miniature switch in which the ON and OFF switching is effected by rocking motion of a movable contact plate in accordance with pivotal swing movement of an actuator, wherein the supporting point of a movable contact plate receiving element is positioned offset from a line perpendicular to the bottom face of the switch body portion and passing the pivoting axis of said actuator perpendicularly thereto, and an illuminator is disposed on the side opposite from the offset position of said receiving element so as to illuminate the actuator from thereunder.

2. An illuminated miniature switch according to claim (1), in which said actuator is provided with a projected portion adapted to support a slider therein, said projected portion being inclined to one side.

3. An illuminated miniature switch according to claim 1, in which said illuminator is detachably mounted.

4. An illuminated miniature switch according to claim 1, in which said actuator and said projected portion are detachably secured to each other so that the latter can be separated from the former along with the lobes in the axial position of the former.

5. An illuminated miniature switch according to claim 1, in which the switch body portion is formed integral with a switch fixing plate made of an insulating material.

6. An illuminated miniature switch according to claim 1, in which said illuminator is a lamp.

7. An illuminated miniature switch according to claim 1, in which said illuminator is a neon bulb.

8. An illuminated miniature switch according to claim 1, in which said illuminator is a luminous diode.

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