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ELECTRIC SWITCH OPERATING MEANS

Filed June 10, 1968

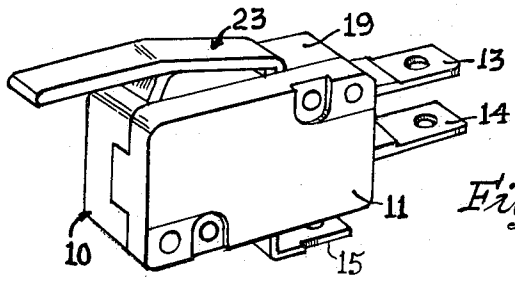

Fig. 1.

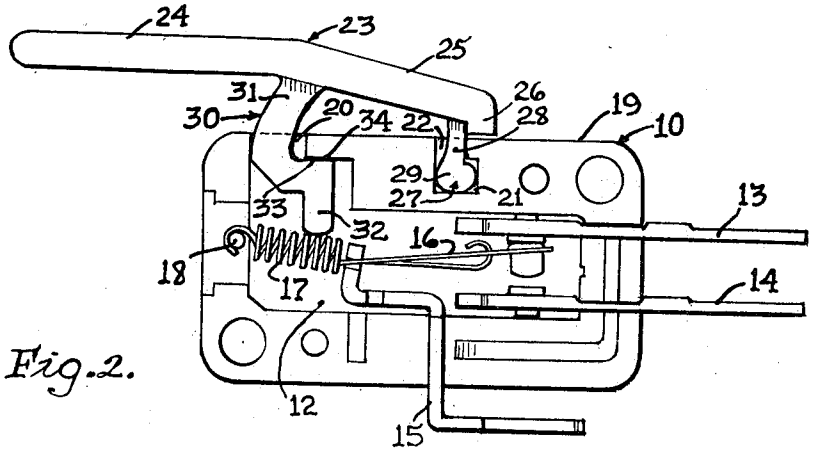

Fig. 2.

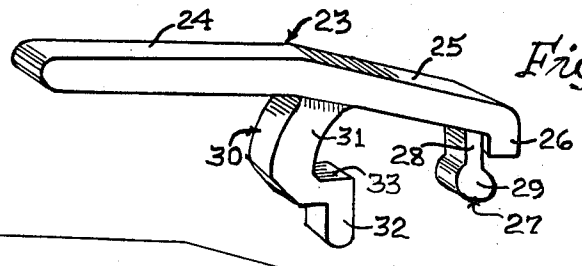

Fig. 3.

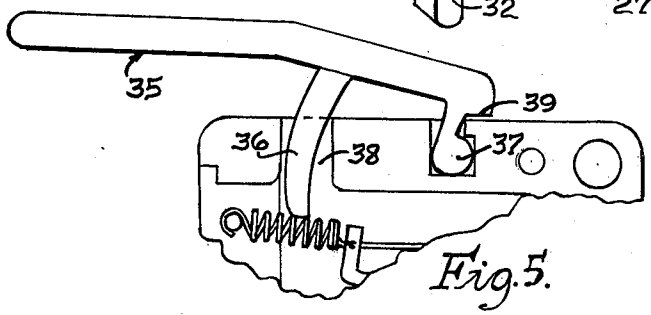

Fig. 5.

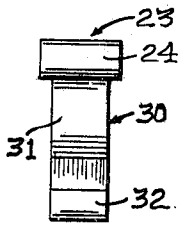

Fig. 4.

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ELECTRIC SWITCH OPERATING MEANS

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U.S. Cl. 200—172 7 Claims

ABSTRACT OF THE DISCLOSURE

A switch operating means comprises a one-piece actuator for a switch structure contained in a closed housing providing a top wall having an opening formed therein through which a portion of the actuator projects into contact with a component of the switch structure, and a compartment for pivotally receiving a hinge element provided by the actuator by which the actuator is movably connected to the housing.

SUMMARY OF THE INVENTION

An actuator for a switch, the components of which are contained in a closed housing providing a top wall having a passage formed therethrough and a compartment formed therein. The one-piece actuator consists of an elongated lever portion having a free end externally juxtapositioned with respect to the top wall of the housing. The lever terminates at its opposite end into a stop shoulder that engages the top wall of the housing adjacent the compartment formed therein to arrest pivotal movement of the actuator in one direction. An internally located hinge element depends from the lever, and is pivotally contained within the compartment formed in the top wall of the housing. An internal depending actuator finger projects through the opening and has its inner end in contact with a component of the switch structure within the housing, which when depressed by the movement of the actuator effects actuation of the switch structure.

DETAILED DESCRIPTION

The invention consists in the novel structure to be hereinafter described and claimed, and will be best understood by reference to the accompanying drawings showing the preferred form of construction and in which:

FIG. 1 is a perspective view of the electric switch operating means as it is associated with a switch housing;

FIG. 2 is a side elevational view of the actuator and switch components within the housing, with its side cover removed;

FIG. 3 is a perspective view of the switch actuator;

FIG. 4 is an end elevational view of the switch actuator; and

FIG. 5 is a fragmentary side elevational view of a modified form of switch actuator.

The switch operated means or actuator of this invention is adapted to be normally associated with an open-sided switch housing **10** which is adapted to be closed by a complementary side cover plate **11**. Within the housing **10** there is provided an internal cavity **12** containing the components of the switch mechanism.

The components of the switch mechanism, as shown, make up no part of the present invention except for their functional relation to the switch operating means or actuator to be hereinafter more fully described. However, in order to more fully understand the functional operation of the actuator, the component of the switch structure as shown, include a pair of spaced apart fixed contact bearing terminals **13** and **14**, and a fixed terminal-pivot post **15**. Pivotally mounted on the terminal-pivot post **15**

is a movable contact bearing switch blade **16**. The switch blade **16** has connected thereto one end of a tension member **17**, which is in the form of a coil spring that has its opposite end hooked upon a stud post **18** provided by the housing **10**.

Formed in the top wall **19** of the switch housing **10** is a passage **20** that has communication with the internal cavity **12**. Also formed in the top wall **19** of the switch housing **10** is a compartment **21** having a reduced entrance **22**, the purpose of which will be hereinafter explained. Both the passage **20** and compartment **21** have their open sides closed when the cover **11** is mounted on to the housing **10** as shown in FIG. 1.

The operating means or actuator **23**, as shown in perspective in FIG. 3, comprises an elongated substantially rectangularly shaped body divided into two angularly disposed sections **24** and **25**, with the latter section providing a depending end flange **26**. Also depending from section **25** of the actuator **23** adjacent the end flange **26** is a circular bearing member **27**. This bearing **27** consists of a relatively thin leg section **28** of a length greater than and a width less than the end flange **26**, and terminates into an enlarged circular head **29** which functions as a hinge for the actuator **23**. The bearing member **27** is adapted to be projected into the compartment **21** formed in the top wall **19** through the open side of the switch housing **10**, with the circular head or hinge **29** disposed therein, and with the leg section **28** positioned in the reduced entrance **22** provided by the compartment **21** as clearly shown in FIG. 2.

Extending in a downward direction from the underside of the actuator **23**, in alignment with the point of angular displacement between the sections **24** and **25** thereof, is a plunger or actuating finger **30**. This plunger **30** provides an arcuated medial portion **31**, the configuration of which conforms to a peripheral line subscribed about a center point or axis projected through the circular head **29** of the hinged bearing **27**.

The actuating plunger **30** terminates into a trip end **32** which is laterally offset with respect to the medial portion **31** and generally lies in a plane parallel to the leg section **28** of the bearing **27**. At the junction between the trip end **32** and the medial portion **31** of the actuating finger **30** there is provided a stop shoulder **33** adapted to engage the underside **34** of the top wall **19** adjacent to the passage **20** formed therein as clearly shown in FIG. 2.

When the actuator **23** is operatively associated with the switch housing **10** the hinge bearing **27**, as aforementioned, is positioned in the compartment **21**, while the actuating finger **30** is projected into the passage **20** formed in the top wall **19** of the housing **10**. The cover **11** when placed over the open side of the housing **10**, closes the open sides of the passage **20** and compartment **21**, and retains the actuating finger **30** as well as the hinge bearing member **27**, respectively, therein. In such position the trip end **32** will engage the spring **17** of the switch components positioned within the switch housing **10**. The normal resiliency of the spring **17** will pivot the actuator **23** into its first position as shown in FIG. 2 wherein the stop shoulder **33** engages the wall **34**, and resists further upward pivotal movement of the actuator **23**.

Upon depression of the actuator **23** through movement of the end section **24** in an anticlockwise direction, as shown in FIGS. 1 and 2, the actuator **23** will pivot about the circular head **29** of the hinge bearing **27** so that the medial portion **31** of the actuating finger **30** will move through the passage **20** with the trip end **32** thereof depressing the spring **17** to effect pivotal movement of the switch blade **16**.

As shown in FIG. 5 the modified actuator **35** may be designed to provide a simple arcuated actuating finger **36**

which lies in a peripheral line subscribed about the axis of the circular hinge member **37** positioned within a compartment **38** formed in the switch housing. In such a modified form the upward or clockwise movement of the actuator **35**, as seen in FIG. 5, is arrested by the stop **39** formed at the one end of the actuator **35**.

From the foregoing it is apparent that I have provided an integral switch lever and actuator, which is conveniently pivotally connected to a switch housing, and correctly positioned with respect to the switch components contained within the housing for proper actuation thereof when the switch operating means is pivoted relative thereto. The actuating portion which includes the trip end is moved through a guided path within the housing **10** so that it engages and deforms the spring at a proper time and to a determined degree to effect pivotal movement of the switch blade associated therewith.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. An actuator for a switch including an open-sided housing for the switch components, one of which comprises a spring member, the top wall of the housing having formed therein and spaced from each other a normally open-sided compartment and passage which, with the housing, are closed by a side cover wherein the improvement comprises:

(a) an elongated substantially rectangularly shaped actuator lever exteriorally of the top wall of the housing and having a first position above the spaced apart compartment and passage formed therein,

(b) means provided by said lever adjacent one end thereof and contained within the compartment for pivotally connecting the lever to the housing,

(c) a plunger depending from said lever and spaced from said means so as to be movably positioned in the passage formed through the top wall of the housing, and providing an end member movable against the spring for effecting actuation of the switch when said lever is pivoted about said means relative to the top wall of the housing,

(d) with the spring yieldably resisting inward movement of said plunger through said passage so as to maintain said lever in its first position with respect to the housing, and

(e) means provided by said lever for arresting pivotal movement of said plunger by the spring in one direction relative to the top wall of the housing and for maintaining said lever in its first position.

2. An actuator for a switch as defined by claim **1** wherein said means pivotally connecting said lever to the housing comprises a circular hinge-like bearing member placed into the compartment formed in the top wall of the housing through its open side and contained therein by the side cover.

3. An actuator for a switch as defined by claim **1** wherein said plunger includes a portion actuated along a peripheral line subscribed about the axis of said first mentioned means with said portion movable through the passage into said housing, said plunger providing an offset end portion in contact with the spring at a predetermined point along the length thereof so as to effect movement of the spring by pivotal movement of said lever relative to the top wall of said housing and said plunger through said passage to effect actuation of the switch.

4. An actuator as defined by claim **2** wherein said plunger includes a portion arcuated along a peripheral line subscribed about the axis of said circular hinge-like bearing member contained in the compartment formed in the top wall of the housing and an offset end portion within said housing and in contact with the spring at a predetermined point so as to effect movement of the spring as said plunger is moved through said passage as said lever is pivoted about said hinge-like bearing member to effect actuation of the switch.

5. An actuator for a switch as defined by claim **1** wherein said means which arrests pivotal movement of said plunger by the spring in one direction relative to the top wall of the housing comprises a stop shoulder formed on said plunger positioned within the housing and adapted to contact the under side of the top wall thereof adjacent the passage formed therethrough.

6. An actuator for a switch as defined by claim **5** wherein said means pivotally connecting said lever to the housing comprises a circular hinge-like bearing member placed into the compartment formed in the top wall of the housing through its open side and contained therein by the side cover.

7. An actuator for a switch as defined by claim **5** wherein said plunger includes a portion arcuated along a peripheral line subscribed about the axis of said circular hinge-like bearing member contained in the compartment formed in the top wall of the housing and an offset end portion within said housing and in contact with the spring at a predetermined point so as to effect movement of the spring as said plunger is moved through said passage as said lever is pivoted about said hinge-like bearing member to effect actuation of the switch.

References Cited

UNITED STATES PATENTS

2,410,899	11/1946	Pye	200—157 X
2,898,428	8/1959	Holden.	
3,073,923	1/1963	Anderson et al.	
3,098,904	7/1963	Anderson.	
3,141,075	7/1964	Brevick et al.	
3,336,458	8/1967	Hadley.	
3,382,339	5/1968	Anderson.	

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