Nov. 25, 1969 W. L. CHERRY ET AL 3,480,752

SWITCH ACTUATOR

Filed July 26, 1968

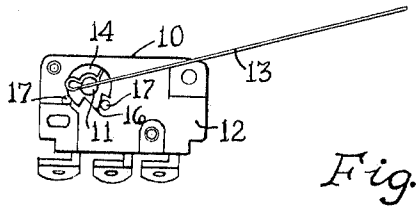


Fig. 1.

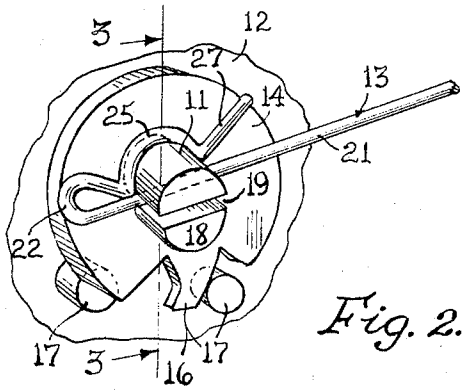


Fig. 2.

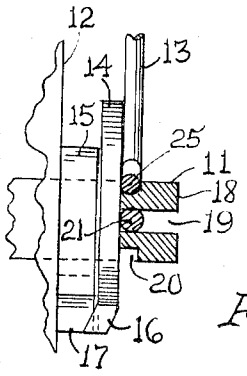


Fig. 3.

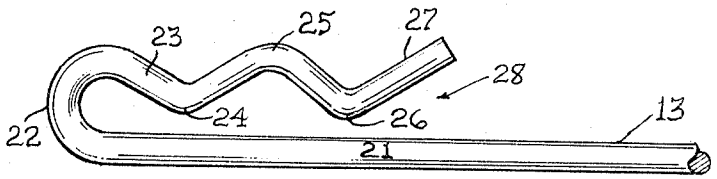


Fig. 4.

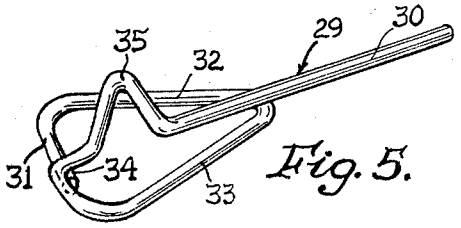


Fig. 5.

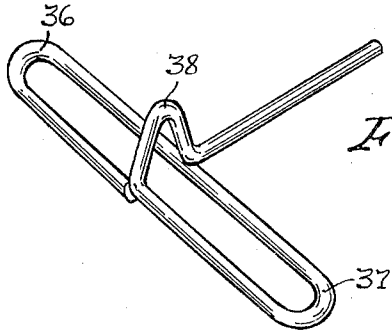


Fig. 6.

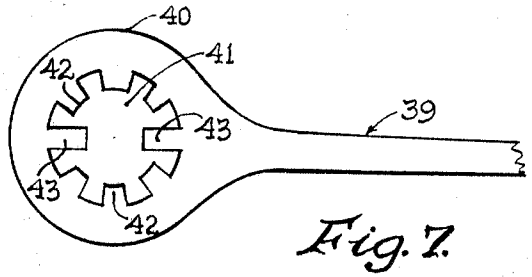


Fig. 7.

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SWITCH ACTUATOR

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ABSTRACT OF THE DISCLOSURE

An actuator for an assembled switch including an elongated actuating lever that provides a connecting portion by which it is mounted on to and rotatable with an exposed end of the switch actuator, which connection is obtained without the necessity of special tools or application of force that would be harmful to the assembled switch.

SUMMARY OF THE INVENTION

In the past external actuating levers have been connected to switch actuators by a retaining washer which was press fitted upon the exposed actuator end and the external actuating lever. This action placed stress upon the assembled switch components resulting in misalignment thereof and in many instances inoperativeness of the switch. Also such type of assembly resulted in a permanent connection between the external actuating lever and the switch actuator thus limiting the employment of the switch to a predetermined environment.

The present invention resides in an external actuating lever which includes a clamping means whereby the lever may be readily and easily connected to the switch actuator after the switch has been assembled.

DETAILED DESCRIPTION

The invention will be best understood by reference to the accompanying drawing in which there is shown the preferred form of construction of the external switch actuating lever and its means of connection to the switch actuator and in which:

FIG. 1 is a side elevational view of an assembled switch with an external actuating lever connected thereto;

FIG. 2 is an enlarged fragmentary perspective view of the structural arrangement which comprises the means of connection between the external actuating lever and the switch actuator;

FIG. 3 is a fragmentary detailed sectional view taken on lines 3—3 of FIG. 2;

FIG. 4 is a fragmentary side elevational view of the connecting end of the external switch actuating lever;

FIG. 5 is a perspective view of a modified form of the switch actuator;

FIG. 6 is a perspective view of another modified form of the switch actuator; and

FIG. 7 is a perspective view of yet another modified form of a connecting means for the switch actuator.

As shown in FIG. 1 the actuating lever of this invention is adapted to be associated with a switch encased in a housing **10**. A rotatable switch actuator **11** projects out of the side wall **12** of the housing **10** and has connected thereto the external actuating lever **13**.

Forming a part of the rotatable actuator **11** is a circular retaining plate **14**. This plate **14** is journaled on the exposed end of the actuator **11** which projects out of a bearing **15** formed integrally with the sidewall **12** of the housing **10**.

A portion of the plate **14** has been formed to provide a stop finger **16** bent out of the normal plane of the plate

14 so as to lie between two spaced apart stops **17** carried by the side wall **12** of the housing **10**. By the deployment of the switch finger **16** movable between the stops **17** the degree of rotation of the actuator **11** by the external actuating lever **13** is limited.

The circular exposed end **18** of the actuator **11** is provided with a slot **19** cut through the diameter thereof and to a depth up to the face of the plate **14**. A circumferentially extending groove **20** is formed about the actuator **11** in alignment with the innermost end of the slot **19**, as clearly shown in FIG. 3. The slot **19** and groove **20** cooperate to receive and removably connect the clamp end of the actuating lever **13** to the rotatable actuator **11**.

The actuating lever **13** comprises an elongated stem **21**, which at one end is reversely curved to provide an arcuate end **22** that continues into a first arm portion **23** that extends angularly with respect to the longitudinal length of the stem **21**.

The first arm portion **23** terminates into a curved shoulder **24** that lies in a spaced relation to the stem **21** of the lever **13**. A continuation of the shoulder **24** results in a concaved clamp segment **25** having a radius equal to that of the groove **20** and which terminates into a corresponding shoulder **26** which generally lies in lateral alignment with the shoulder **24** and is likewise spaced from the stem **21** of the lever **13**. The shoulder **26** terminates into a second arm portion **27** which extends angularly with respect to the longitudinal length of the stem **21** in a direction diagrammatically to the first arm portion **23**, and forms an extranceway **28** for the actuator **11**, as hereinafter described.

In connecting the externally actuating lever **13** to the rotatable actuator **11** a portion of the stem **21** is placed in the slot **19** until it abuts the face of the retaining plate **14**. The lever **13** is then moved from left to right as seen in FIGS. 1 and 2 such that the stem **21** thereof will slide through the slot **19** causing the exposed end **18** of the actuator **11** to pass through the entranceway **28** between the second arm portion **27** and stem **21** until the shoulder **26** snaps about the actuator **11**. At this point the second arm portion **27** will engage the circumferentially extending groove **20**, and by further forceful movement of the stem **21** through the slot **19**, the shoulder **26** will move through the groove **20** and snap thereabout so as to dispose the clamping segment **25** of the end portion of the stem **21** in the groove **20**. The shoulders **24** and **26** will be disposed within the groove **20** on opposite sides of the actuator **11** with the clamping segment **25** within the groove **20** and embracing the actuator **11**. Thus the external actuating lever **13** is connected to the actuator **11** and by movement thereof will effect limited rotation of the actuator **11**.

Shown in FIGS. 5, 6 and 7 are modified forms of the actuating means that are associated with the rotatable actuator and which embody the concept of the present invention as claimed.

In FIG. 5 the actuating means or lever terminates at one end into a substantially triangularly-shaped clamping member **29**, which extends in a plane normal to the elongated portion **30** of the lever and which provides arms **31**, **32** and **33** spaced from each other a distance less than the diameter of the circular exposed end **18** of the actuator **11**. However, because the wall **31** is partially composed from the free end **34** of the lever the triangularly disposed walls are yieldable with respect to each other such that they can be slipped over the exposed end **18** of the actuator **11** and snapped into the base groove **20** provided thereby. This arrangement prevents radial movement of the lever relative to the actuator **11** while connecting the lever thereto for rotational movement. A portion of the clamping member **29** provides, within the

confines of the triangularly disposed walls, an inverted V-shaped retainer **35** that extends peripherally to the normal plane of the lever, and which is adapted to be inserted within the slot **19** formed in the end **18** of the actuator **11** to provide rotationable connection between the actuator **11** and the level.

Referring to the modification as shown in FIG. 6, the method of connecting the actuating lever to the rotatable actuator is achieved through two oppositely extending elongated loop portions **36** and **37** formed by the free end of the lever such that the parallelly extended elongated wall portions of such loops may be yieldably compressed over the exposed end **18** of the actuator **11** until they snap into the base groove **20**. The lever is provided with an inverted V-shaped retainer **38** which functions in the same manner as does the retainer **35** shown in FIG. 5 and hereinbefore described.

In FIG. 7 the actuating lever **39** may be constructed from a piece of material such as to provide a circular end **40** in which is formed a center opening **41** of a diameter equal to the diameter of the groove **20** formed in the base of the exposed actuator **11**. The circular end **40** would provide a plurality of tabs **42** struck from a diameter that is equal to the diameter of the exposed end **18** of the actuator **11**. By this arrangement the actuating lever **39** may be snapped over the actuator **11** with the tabs **42** bending about the actuator until they may snap into the base groove **20**. As shown in FIG. 7, the circular end **40** provides oppositely extending yieldable fingers **43** which have a length greater than the tabs **42** which when the circular end **40** is placed over the actuator **11** will project into the slot **19** formed in the actuator so as to connect the actuated lever **39** to the actuator for rotation therewith.

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

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

1. An external switch actuator for an assembled switch comprising:

(a) an axially rotatable switch actuator exposed from the assembled switch,

(b) an elongated actuating means mounted on the exposed switch actuator,

(c) means provided by said exposed switch actuator for receiving portion of said actuating means for connecting the same thereto for rotational movement therewith,

(d) means on one end of said actuating means connecting the same to said exposed switch actuator with said means extending radially with respect thereto, and

(e) means provided by said exposed switch actuator cooperating with said means on one end of said actuating means preventing radial movement between said actuating means and said exposed switch actuator.

2. An external switch actuator as defined by claim **1** wherein said means provided by said exposed switch actuator cooperating with said means on said one end of said actuating means comprises a peripheral groove formed in the exposed switch actuator with said groove

yieldably receiving a portion of said means on one end of said actuating means so as to prevent radial movement of said actuating means relative to the exposed switch actuator.

3. An external switch actuator as defined by claim **1** wherein said means provided by the exposed switch actuator for receiving a portion of said actuating means comprises a diametrical slot formed in the free end of the exposed switch actuator and through which is projected a longitudinal portion of said actuating means for connecting the same together for rotational movement about the axis of the exposed switch actuator.

4. An external switch actuator as defined by claim **3** wherein said means provided by said exposed switch actuator that incorporates with said means on said one end of said actuating means comprises a peripheral groove formed in said exposed switch actuator with said groove receiving a portion of said means on one end of said actuating means so as to prevent radial movement of said actuating means relative to said exposed switch actuator.

5. An external switch actuator as defined by claim **1** wherein said means on one end of said actuating means connecting the same to said exposed switch actuator for rotation therewith comprises a spring clip on one end of said actuating means frictionally contacting a portion of the peripheral edge of said exposed switch actuator to prevent radial movement of said actuating means with respect to said exposed switch actuator.

6. An external switch actuator as defined by claim **5** wherein said means provided by said exposed switch actuator cooperating with said means on said one end of said actuating means comprises a peripheral groove formed in the exposed switch actuator with said groove yieldably receiving a portion of said means on one end of said actuating means so as to prevent radial movement of said actuating means relative to the exposed switch actuator.

7. An external switch actuator as defined by claim **5** wherein said means provided by the exposed switch actuator for receiving a portion of said actuating means comprises a diametrical slot formed in the free end of the exposed switch actuator and through which is projected a longitudinal portion of said actuating means for connecting the same together for rotational movement about the axis of the exposed switch actuator.

8. An external actuator as defined by claim **4** wherein said means on one end of said actuating means connecting the same to said exposed switch actuator for rotation therewith comprises a spring clip having a portion thereof yieldably projected into said peripheral groove formed in said exposed switch actuator, and another portion of said clip projected through said slot formed in the free end of said exposed switch actuator for connecting the same together for rotational movement about the axis of said exposed switch actuator.

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