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Fromknecht et al.

[11] **3,778,577**

[45] **Dec. 11, 1973**

[54] **MOISTURE SEALING DEVICE FOR TOGGLE SWITCHES**

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[73] Assignee: **The Singer Company**, New York, N.Y.

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[52] **U.S. Cl.** ..... **200/168 G**, 200/172 A

[51] **Int. Cl.** **H01h 9/04**

[58] **Field of Search** ..... 200/168 G, 172 A

[56] **References Cited**

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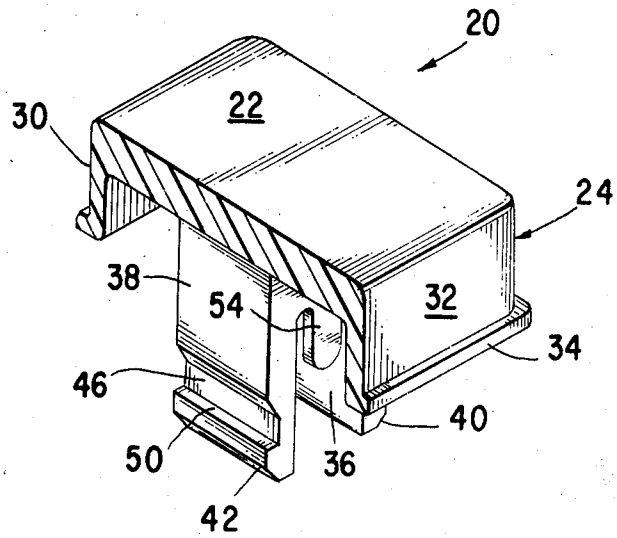
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Assistant Examiner—William J. Smith
Attorney—Marshall J. Breen et al.

[57] **ABSTRACT**

A cap and wall structure for sealing a toggle switch against entry of moisture. The cap comprises an annular skirt encapsulating an annular wall formed about an opening in the wall structure or cover plate. The cap includes a pair of legs which lock it to the wall or plate but allows the cap to slide while a pair of tabs entrap the switch actuating member to actuate the same in response to movement of the cap.

13 Claims, 7 Drawing Figures



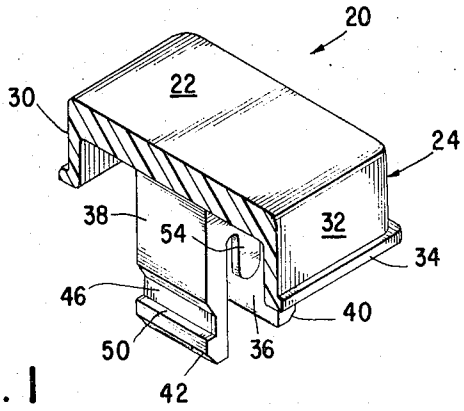


Fig. 1

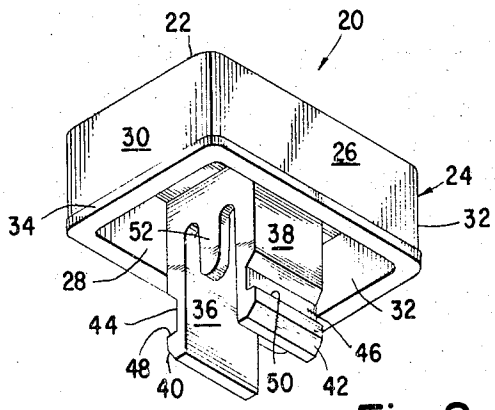


Fig. 2

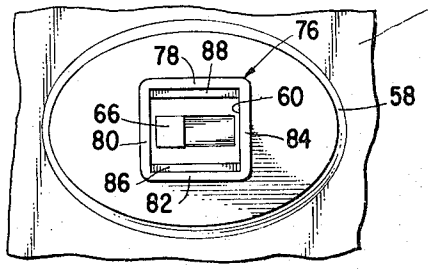


Fig. 5

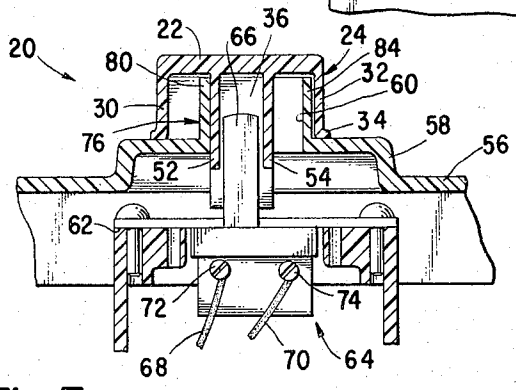


Fig. 3

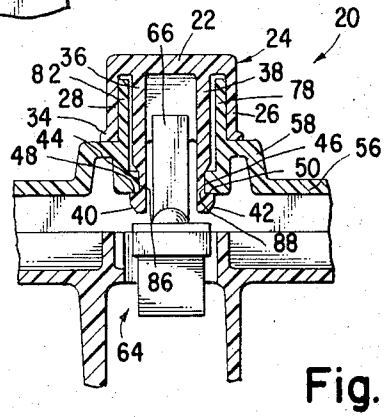


Fig. 4

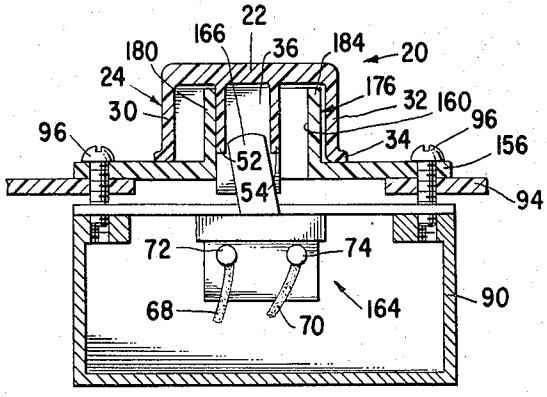


Fig. 6

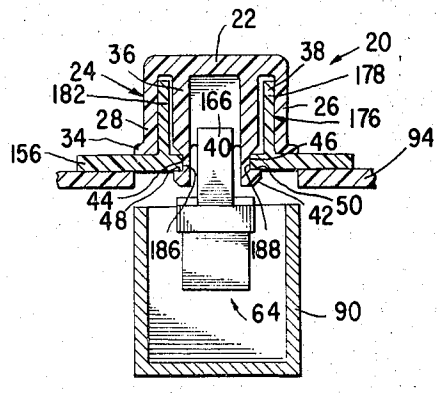


Fig. 7

MOISTURE SEALING DEVICE FOR TOGGLE SWITCHES

BACKGROUND OF THE INVENTION

This invention relates to moisture proofing devices, and more particularly to a structure adapted to prevent the entry of liquids to a conventional toggle type switch.

In addition to the conventional wall switch, most electical appliances utilize conventional toggle type switches actuated by the finger of an operator. Many of these appliances are required to operate outside the home. For example, utility type suction cleaners such as those disclosed in co-pending U.S. Pat. No. 3,732,667, patented May 15, 1973 and U.S. application No. 320,802 filed Jan. 3, 1973 are used outside for vacuuming patios, driveways, walks, etc., and may be inadvertently left outdoors. If the weather changes overnight and a rainstorm develops the switch may be rendered useless or hazardous unless it is properly sealed against the entry of moisture. Moreover, there is a trend to build appliances for outdoor use with a double insulation to protect the user against a dangerous shock in the event the primary insulation fails. Furthermore, the conventional wall switch utilized in the home may not be safe under certain situations, such as those existing in the bathroom, kitchen or laundry room due to the use of large amounts of water and the possibility of one operating such switches being grounded. Moreover, conventional toggle switches may be utilized outside the home on the patio or deck area and thus exposed to the elements of the weather.

Although the known prior art has provided many water proof switch constructions none have provided a simple and effective solution to this problem.

SUMMARY OF THE INVENTION

It is therefore a primary object of this invention to provide a simple and effective device for sealing a toggle switch against the entry of liquid.

Another object of the present invention is the provision of a moisture proofing switch cap and a cooperating wall or plate structure which prevents entry of moisture to a toggle type switch.

A further object of this invention is the provision of a switch cap in combination with the wall construction of an appliance or the like which will effectively seal a toggle type switch against entry of moisture.

A still further object of the invention is to provide a switch cap and a cooperating cover plate for moisture proofing a conventional toggle switch.

Briefly, these objects are obtained by providing a switch cap having an annular skirt cooperating with an annular wall formed about an opening in the wall structure or cover plate. The cap includes a pair of legs which snap beneath the wall construction or cover plate to secure the cap thereto while allowing the cap to slide to actuate the toggle switching lever.

BRIEF DESCRIPTION OF THE DRAWINGS

The particular features and advantages of the invention as well as other objects will become apparent from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a top perspective view partially broken away of a moisture sealing cap constructed in accordance with the present invention;

FIG. 2 is a bottom perspective view of the cap of FIG. 1;

FIG. 3 is a cross-sectional view of a portion of an appliance floor or wall incorporating a first embodiment of the present invention and illustrating the moisture cap and cooperating wall structure thereof;

FIG. 4 is a cross-sectional view of the construction shown in FIG. 3, but taken at right angles thereto;

FIG. 5 is a top plan view of the wall construction of FIG. 3 with the cap removed;

FIG. 6 is a cross-sectional view similar to FIG. 3 but of a second embodiment of the present invention illustrating the moisture sealing cap and a cooperating wall cover plate, for convenience the wall has been rotated from the vertical to a horizontal position; and

FIG. 7 is an elevational view taken through the second embodiment of FIG. 6, but at right angles thereto.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the accompanying drawings wherein like reference numerals denote similar parts throughout the various views, a moisture sealing cap constructed in accordance with the teachings of the present invention is generally indicated by the reference numeral **20**. The cap includes a top wall **22** which in the preferred embodiments is substantially rectangular in plan, but may be of any other convenient shape. Depending downwardly from the top is an annular skirt **24** comprising parallel side walls **26** and **28**, and parallel end walls **30** and **32**. Each side and end wall of the skirt includes at its lowermost edge a flange **34** which seats against a wall or plate surface as will hereinafter become apparent from the description. Depending downwardly from and formed preferably integral with the bottom surface of the top wall **22** is a spaced pair of legs **36** and **38**. The legs are parallel to the side walls **26** and **28** and spaced inwardly therefrom. The free end of each leg includes a respective beveled edge **40** and **42** above which is formed a respective recess or groove **44** and **46**. A respective ledge **48** and **50** is thereby defined at the bottom of the respective groove **44** and **46**. For reasons which would become clear, the beveled edges **40** and **42** act as camming surfaces for aiding in insertion of the cap in a wall or plate, while the grooves **44** and **46** and the ledges **48** and **50** act to secure the cap properly therein. Also depending downwardly from the bottom surface of the wall **22**, preferably parallel to the end walls, is a pair of actuating tabs **52** and **54** which act, and should be of length, to entrap the actuating finger member of a conventional toggle type switch. The cap, and each of its elements, may be conveniently molded from a high impact polypropylene material.

In the first embodiment the cap may be used in combination with a wall structure **56** such as that forming the top of the vacuum cleaner disclosed in the latter of the aforesaid Patent Application. This particular wall structure includes a raised portion **58** to elevate the position of the cap, but it should be understood that the wall may be planar and that the raised portion is merely a result of the particular vacuum cleaner design. The wall **56** in substantially the central portion of the raised portion **58** is formed with an opening **60** which preferably may be of the same shape as the cap. Secured by conventional means to a surface **62** beneath the open-

ing is a conventional toggle switch generally illustrated at **64.**

A toggle switch is defined herein and used throughout the specification and claims as a two-position electrical switch with a short knob or actuating finger member such as **66** that is flipped up or down, or from side to side, to open or close a circuit. Examples of such switches are the conventional slide switches illustrated in FIGS. **3** and **4,** and the conventional pivotable switch such as the wall type mounting switch illustrated in FIGS. **6** and **7.** It should be understood, however, that the actuating member **66** is shiftable in a single plane, that being the plane of the paper in FIGS. **3** and **6.** In the embodiment of FIG. **3** the member **66** is slidable while in FIG. **6** the member **166** is pivotable from right to left and vice versa. Conventinal electric wires **68** and **70** lead to and from the terminals **72** and **74** of the switch. In the horizontal installation of FIGS. **3** through **5** the member **66** projects upwardly from, but not necessarily out, of the opening **60.**

Forming a border about the opening **60,** is an upstanding annular wall **76** of the same geometrical shape in plan as the skirt **24** of the cap, and is defined by the walls **78, 80, 82** and **84.** Since the cap preferably is rectangular the walls **80** and **84** are parallel to each other and the walls **78** and **82** are parallel to each other. The lateral spacing between the outer surfaces of walls **78** and **82** is substantially equal to the spacing between the inner surfaces of the cap walls **26** and **28,** while the lateral spacing between the walls **80** and **84** is less than that between the cap walls **30** and **32** to thus define a clearance space therebetween. Furthermore, the height of the walls defining the annular wall **76** is equal to or less than the height of the wall defining the skirt **24** as measured from the bottom of the flange **34** to the bottom surface of the wall **22.** Preferably the edges of the wall forming the opening **60** parallel to the plane of movement of the member **66** includes a respective lip **86** and **88.**

It should now be clear that the cap **24** may be mounted in the floor structure **56** by inserting the legs **36** and **38** into the opening **60** while the skirt **24** circumscribes the wall **76** and the tabs **52** and **54** entrap the member **66** therebetween. The legs **36** and **38** are squeezed slightly toward each other as they are inserted until the cams **40** and **42** snap beneath the floor opening. When the flange **34** engages the floor the lips **86** and **88** may be received within the groove **44** and **46** if the location of the grooves is designed properly. The cap may then slide left to right and vice versa as shown in FIG. **3** while the ledges **48** and **50** secure the cap vertically in the hole aided by the lip and groove arrangement. The clearance space previously defined by the difference in space between the walls **80** and **84** and the walls **30** and **32** is provided for the shifting movement of the member **66** during actuation from on to off and vice versa.

In the embodiment of FIGS. **6** and **7,** a conventional metal electrical wall box **90** is disclosed mounted within an opening **92** formed in a wall **94.** For convenience of illustration, the subject matter of FIGS. **6** and **7** have been turned on heir side. A conventional pivotable toggle switch **164** is conventionally mounted within the box **90** and includes an actuating member **166.** The cap illustrated in these Figures is substantially the same as the cap of FIGS. **1** through **5** but for a shortening of the legs, and therefore the same reference numerals are applied to the cap of the second embodiment. In this embodiment the cover plate **156** is utilized in place of the floor of the first embodiment and is secured to a wall **94** and to the box **90** by conventional means such as screws **96.** The plate **156** in all other respects is similar to the floor **56** but for the absence of a raised portion such as **58.** It therefore includes an opening **160** boarded by an upstanding annular wall **176** defined by walls **178, 180, 182** and **184** and may include the lips **186** and **188.** The manner of inserting and the manner of operating the cap in the second embodiment is the same as that illustrated and described in the first embodiment.

It should thus be clear to one skilled in the art that the annular walls **76** and **176** provide a moisture barrier about the switches and that the construction of the cap in combination with the annular wall prevents moisture from entering the switches.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus described the nature of the invention, what is claimed herein is:

1. In combination, a wall structure having an opening frmed therein, an annular forward facing wall forming a border about the opening, a toggle switch arranged within the opening and having a forwardly projecting planarly shiftable actuating member, and a moisture sealing cap, said cap comprising a substantially forwardly facing wall, an annular skirt rearwardly depending from the forwardly facing cap wall, the depth of said skirt from the rear surface of said cap wall being at least equal to the forward facing depth of the annular wall, said annular skirt having the same annular shape as the annular wall, the skirt in a plane parallel to the plane of movement of said member being longer than said annular wall so as to form a clearance space for movement of said member, and in a plane normal to the plane of movement of said member the interior width of said skirt is substantially equal to the exterior width of said annular wall, said cap including a pair of legs spaced from the skirt parallel to the plane of movement of the member depending rearwardly into the opening beyond the wall structure, each of said legs including means for securing the cap to the wall structure while allowing the cap to slide in the plane of member movement, and means in the cap for entrapping the member so that movement of the cap moves the member.

2. In the combination recited in claim **1** wherein said means for securing the cap to the wall structure comprises a ledge formed on the leg, each ledge facing away from said plane of member movement and underlying the wall structure.

3. In the combination recited in claim **2** wherein said means for entrapping the member includes a pair of tabs depending from the cap and spaced on either side of said member in the plane of member movement.

4. In the combination recited in claim **3** wherein said securing means includes a groove formed in each of said legs adjacent said ledge for receiving the wall

structure forming each edge of said opening in planes parallel to member movement.

5. In the combination recited in claim **1** wherein said opening, annular wall and skirt are substantially rectangular.

6. In combination, a moisture proofing cover plate and cap for a wall mounted electrical toggle switch, said plate having a substantially rectangular opening formed therein, an annular forward facing wall forming a border about said opening, said switch being mounted behind the opening and having a forwardly projecting planarly shiftable activating member, said cap comprising a substantially forwardly facing wall, a rectangular annular skirt rearwardly depending from the forwardly facing cap wall, the depth of said skirt from the rear of said cap wall being at least equal to the forward facing depth of the annular wall, the skirt in a plane parallel to the plane of movement of said member being longer than said annular wall so as to form a clearance space for movement of said member, and in a plane normal to the plane of movement of said member the interior width of said skirt is substantially equal to the exterior width of said annular wall, said cap including a pair of legs spaced from the skirt parallel to the plane of movement of the member depending rearwardly into the opening beyond the plate, each of said legs including means for securing the cap to the plate while allowing the cap to slide in the plane of movement, and means in the cap for entrapping the member so that movement of the cap moves the member.

7. In the combination recited in claim **6** wherein said means for securing the cap to the plate comprises a ledge formed on the leg, each ledge facing away from said plane of member movement and underlying the plate.

8. In the combination recited in claim **7** wherein said means for entrapping the member includes a pair of tabs depending from the cap and spaced on either side of said member in the plane of member movement.

9. In the combination recited in claim **8** wherein said securing means includes a groove formed in each of said legs adjacent said ledge for receiving a lip of the plate forming each edge of said opening in planes parallel to member movement.

10. A moisture proofing cover plate and cap adapted for use over a conventional wall mounted electrical toggle switch having a forwardly projecting planarly shiftable activating member, said plate having a substantially rectangular opening formed therein, an annular forward facing wall forming a border about said opening, said cap comprising a substantially forwardly facing wall, a rectangular annular skirt rearwardly depending from the forwardly facing cap wall, the depth of said skirt from the rear of said cap wall being at least equal to the forward facing depth of the annular wall, the skirt in a plane parallel to the plane of movement of said switch member being longer than said annular wall so as to form a clearance space for movement of said member, and in a plane normal to the plane of movement of said member the interior width of said skirt is substantially equal to the exterior width of said annular wall, said cap including a pair of legs spaced from the skirt parallel to the plane of movement of the member depending rearwardly into the opening beyond the plate, each of said legs including means for securing the cap to the plate while allowing the cap to slide in the plane of movement, and means in the cap for entrapping the member so that movement of the cap moves the member.

11. In the combination recited in claim **10** wherein said means for securing the cap to the plate comprises a ledge formed on the leg, each ledge facing away from said plane of member movement and underlying the plate.

12. In the combination recited in claim **11** wherein said means for entrapping the member includes a pair of tabs depending from the cap and spaced on either side of said member in the plane of member movement.

13. In combination recited in claim **12** wherein said securing means includes a groove formed in each of said legs adjacent said ledge for receiving a lip of the plate forming each edge of said opening in planes parallel to member movement.

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