Sept. 27, 1960 A. E. NEUMANN 2,954,452

WATERPROOF SWITCH

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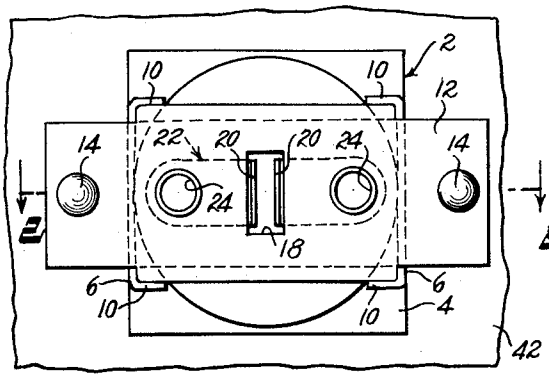


Fig. 1.

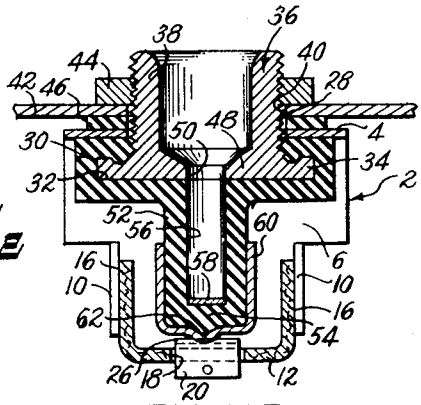


Fig. 3.

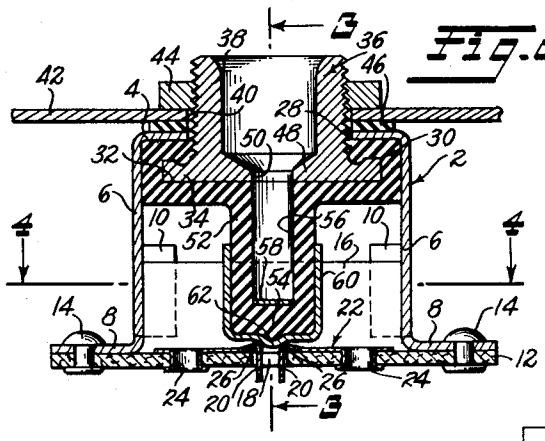


Fig. 2.

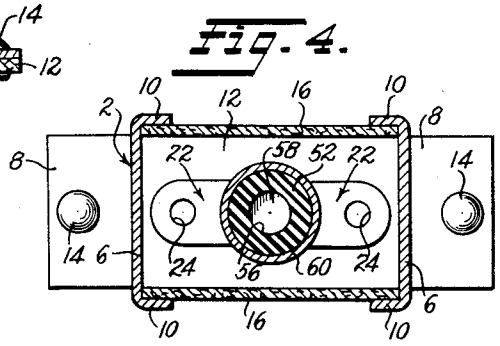


Fig. 4.

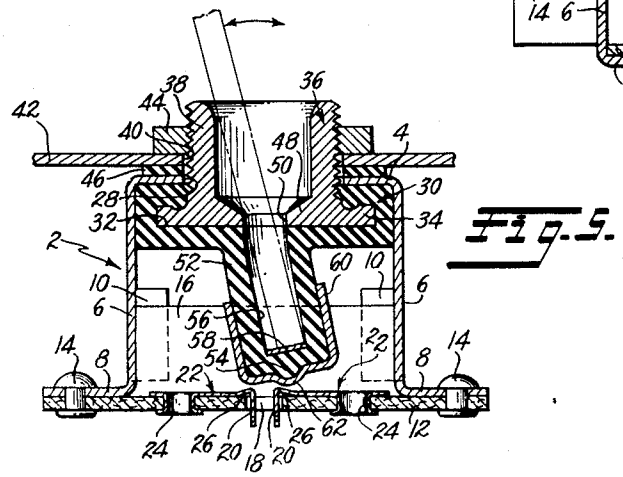


Fig. 5.

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WATERPROOF SWITCH

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9 Claims. (Cl. 200—168)

This invention relates to electrical switches, and particularly to waterproof or weatherproof switches adapted for use in outdoor environments.

Briefly, the waterproof switch comprises a sealing means for an opening in a housing or wall exposed to the weather. The sealing means is secured in sealing relation over the opening and is in the form of a rubber or rubber-like member having an inner portion freely distortable or movable relative to a fixed portion. The inner side of the movable portion carries a contact element adapted to bridge the space between a pair of contacts in a circuit to thereby close the switch. The movable portion of the sealing means is resiliently distorted so as to retain the switch in either open or closed position. In a preferred form the sealing means is provided with a recess open to the weather side of the switch and into which any suitable implement such as a nail, wire or the like may be inserted to serve as a lever to move the inner portion into switch closing or opening position.

It is therefore an object of this invention to provide a waterproof switch that is extremely simple in construction, economical to manufacture, and highly reliable and efficient in operation.

Another object of the invention is to provide such a switch that may be mounted in a conventional opening usually provided for the mounting of switches, in diverse structures.

Still another object is to provide a waterproof switch for mounting at an access opening in a structure and which serves to completely seal the opening and which has a switch contact carried by a distortable portion of the sealing means.

A further object of the invention is to provide a waterproof or outdoor switch free of projecting handles or operating levers and yet wherein no specially designed tool or implement is necessary for its operation.

Other and additional objects and advantages will become apparent to those skilled in the art as the description proceeds with reference to the accompanying drawings, wherein:

Fig. 1 is a bottom plan view of the switch shown in section in Fig. 2;

Fig. 2 is a vertical sectional view taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a transverse sectional view taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a horizontal sectional view taken substantially along the line 4—4 of Fig. 2; and

Fig. 5 is a sectional view similar to Fig. 2 but showing the parts in different relative positions.

The drawings illustrate a preferred embodiment of the invention wherein a sheet metal frame member 2 is formed to a generally U-shaped configuration having a web portion 4 and spaced legs 6. The legs 6 are provided at their free ends with lateral flanges 8. Opposed side edges of the legs 6 are provided with small inwardly directed flanges 10. A member 12 of insulating material,

such as fiber board, is secured at its opposite ends to the flanges 8 by means of rivets 14 or the like. The insulating member 12 thus spans the space between the legs 6 of frame member 2. The lateral edges of the member 12 are turned upwardly to define side flanges 16 extending upwardly between the small flanges 10 of the frame member 2 (see Fig. 3).

The member 12 is provided with a central opening 18 through which contact terminals 20 extend in spaced relation. The contact terminals 20 are provided with suitable openings to which conductors may be secured as by soldering or the like. The contact terminals 20 are defined by downwardly extending flange portions of contact elements 22 secured in any suitable manner to the insulating member 12 in spaced relationship, as shown. As illustrated, the contact members 22 are secured to member 12 by eyelets 24 formed integrally with the members 22 and extending through suitable openings in member 12. The contact members 22 may be provided with humps 26 adjacent the upper ends of the contact terminals 20 although such humps are not essential.

The web portion 4 of frame 2 is formed with a central opening 28, the center of which is aligned with the center of the space between contact terminals 20. A sealing member 30, which may be of vulcanized rubber or other elastomeric material having similar characteristics, constitutes a combined weather seal and movable switch member. The member 30 is molded to provide an undercut recess 32 configured to receive a flange 34 of a mounting fitting 36. The fitting 36 is formed with a tubular portion 38 having external threads and dimensioned so as to extend through an opening 40 in a wall 42 of a housing or other supporting structure, the upper face of which is normally exposed to the weather. A nut 44 clamps the fitting 36, a washer 46, frame member 2 and sealing member 30 securely against the inner face of the wall 42. As will be obvious, the sealing member 30 provides a weather and waterproof seal for the opening 40. The fitting 36 is provided with an inwardly extending flange 48 at its inner end through which a central opening 50 is formed. The member 30 is formed with a downwardly extending distortable tubular portion 52 having a closed lower end 54. The tubular portion 52 has a central opening 56 therein of about the same diameter as the opening 50 in fitting 36. The bottom of the opening 56 is preferably provided with a metal or other rigid bottom piece 58.

A metal cup 60 fits snugly over the closed end of the tubular portion 52 and is frictionally held thereon. Preferably the cup member 60 is provided with a central boss or projection 62.

The parts are so dimensioned that when they are in the relative position of Fig. 2 the cup 60 bridges the space between contact members 22 and thereby completes an electrical circuit through said contact members. It is preferred that, under the conditions shown in Fig. 2, the tubular portion 52 be under slight axial compression so as to firmly hold the cup 60 against the contact members 22. When it is desired to open the switch a suitable implement, such as a nail, rod or twig (see dotted line showing of Fig. 5) is inserted through the fitting 36 and opening 50 into the recess 56 of tubular portion 52. The bottom member 58 is provided to prevent damage to the closed end 54 of the tubular member 52 when a rigid or pointed implement, such as a nail, is used. With the implement inserted in the recess 56 its outer end may be swung laterally and the edges of the opening 50 in fitting 36 function as a fulcrum defining an axis about which the implement can be swung. The lower end of the implement thereupon moves the cup 60 laterally to the position shown in Fig. 5 wherein the switch is open, since the cup 60 is then moved out of

engagement with one of the contacts **22**. The elastic distortability of the member **30**, and particularly the tubular portion **52** thereof, permits the movement described without destroying or breaking the seal previously referred to. Thus the switching contact **60** may be moved to open or closed position without having to project any implement or instrument through the seal provided by member **30**.

As previously stated, the tubular portion **52** is normally under slight axial compression. Thus, movement from the position of Fig. 2 to the position of Fig. 5 causes the projection **62** to snap over a hump **26** and, when in the position of Fig. 5, the axial compression of tubular portion **52** is partially relieved and the switch will stay in the open position even after removal of the operating implement. The junction between the contact terminals **20** and the upper portion of contact members **22** cooperates with the projection **62** in the manner of a cam structure to effect the holding of the switch in open or closed position. It will be obvious to those skilled in the art that the humps **26** may be omitted if desired and the switch will operate in the same manner.

The structure thus described clearly constitutes a completely waterproof and weatherproof switch having no projecting handles or operating means subject to inadvertent displacement and the switch may be operated to open or closed position by means of any readily available implement of the required dimensions and rigidity and will stay in the position set while remaining perfectly sealed. Such a structure is particularly useful for flasher signals or the like adapted to be left out in all kinds of weather as warnings for barricades on highways or the like.

While a single specific structural embodiment has been described in detail, it will be obvious to those skilled in the art that other embodiments incorporating the invention may be resorted to within the scope of the appended claims.

I claim:

1. In a waterproof switch, a pair of spaced contacts, a nonconductive elastomeric tubular member having an open end a closed end, means mounting said tubular member with its open end facing away from said pair of contacts and its closed end adjacent said contacts, and an electrically conductive member secured to the outside of said closed end of said tubular member and held thereby in bridging engagement with both said spaced contacts when said switch is closed, said tubular member being adapted to receive an actuating member through the open end thereof to swing said closed end laterally and move said conductive member laterally out of engagement with at least one of said contacts to open said switch, said tubular member being under slight axial compression when said conductive member bridges said contacts to firmly hold said member in said position.

2. In a waterproof switch, a pair of spaced contacts, a nonconductive elastomeric tubular member having an open end and a closed end, means mounting said tubular member with its open end facing away from said pair of contacts and its closed end adjacent said contacts, and an electrically conductive member secured to the outside of said closed end of said tubular member and held thereby in bridging engagement with both said spaced contacts when said switch is closed, said tubular member being adapted to receive an actuating member through the open end thereof to swing said closed end laterally and move said conductive member laterally out of engagement with at least one of said contacts to open said switch, said conductive member being provided with a cam-like projection positioned between said contacts when said switch is closed whereby to snap over one of said contacts and axially compress said tubular member as said switch is being opened to thereby hold said switch open.

3. A waterproof switch as defined in claim 1 including a fixed rigid annular member at the open end of said tubular member and concentric thereto to provide a fixed fulcrum for an actuating member.

4. In a waterproof switch, a pair of spaced contacts, a nonconductive elastomeric body having an elastically movable portion, means mounting said resilient body with said movable portion adjacent said contacts, an electrically conductive member secured to said movable portion and normally held thereby in bridging engagement with said contacts whereby said switch is closed, said movable portion being manipulatable from the side of said body opposite said contacts to move said elastically movable portion and thereby move said conductive member out of engagement with at least one of said contacts to open said switch, said conductive member and contacts being provided with cooperating cam-like portions arranged to elastically distort said movable portion to selectively hold said switch in opened or closed position.

5. In a waterproof switch, a wall having an opening therethrough, a nonconductive elastomeric member secured to said wall and sealing said opening, a portion of said distortable member on one side of said wall having a conductive member fixedly mounted thereon, a pair of fixed spaced contacts in engagement with said conductive member when said switch is closed, said distortable member being manipulatable from the other side of said wall to move said portion to disengage said conducting member from at least one of said contacts whereby to open said switch, said distortable member being under slight compression when said conductive member engages both said contacts to thereby firmly hold said member in said position.

6. In a waterproof switch, a wall having an opening therethrough, a nonconductive elastomeric member secured to said wall and sealing said opening, a portion of said distortable member on one side of said wall having a conductive member mounted thereon, a pair of fixed spaced contacts in engagement with said conductive member when said switch is closed, said distortable member being manipulatable from the other side of said wall to move said portion to disengage said conducting member from at least one of said contacts whereby to open said switch, said conductive member and contacts being provided with cooperating cam-like portions arranged to elastically distort said portion of said distortable member to selectively hold said switch in opened or closed position.

7. A waterproof switch as defined in claim 5 wherein said distortable member is provided with a recess open to the other side of said wall, aligned with said opening, and extending inwardly thereof to a position short of but adjacent said conductive member.

8. A switch as defined in claim 7 including a fixed rigid annular member at the open end of said recess, concentric thereto and adapted to serve as a fixed fulcrum for an actuating implement insertable in said recess.

9. A waterproof switch as defined in claim 5 wherein said portion of said ditsortable member is tubular in form and has a closed end adjacent said contacts, said conductive member comprising a metallic cap fitted over the closed end of said tubular member.

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