Sept. 13, 1966 R. E. LARKIN 3,272,461

SWITCH MOUNTING STRUCTURE

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Fig. 1

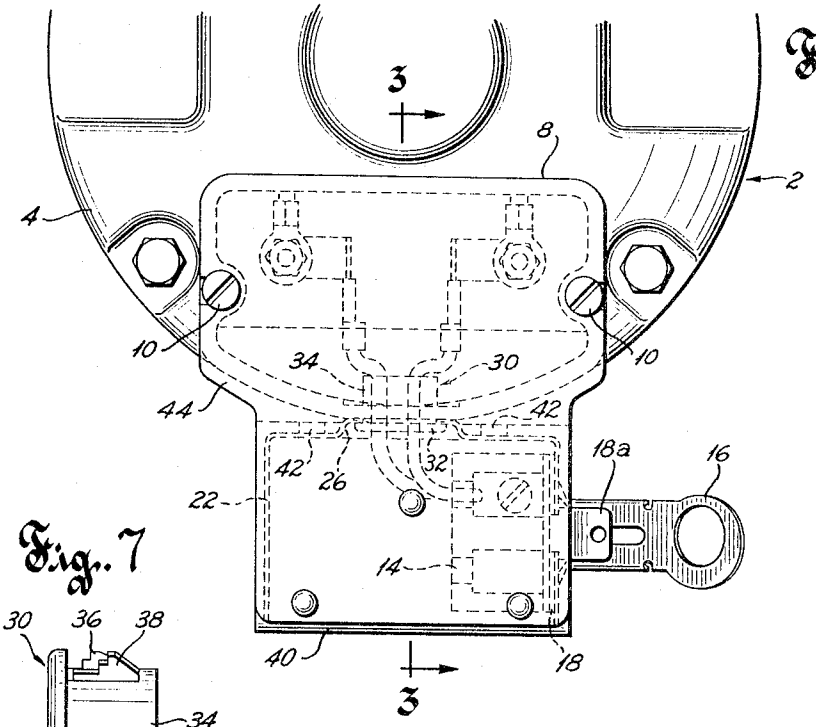


Fig. 7

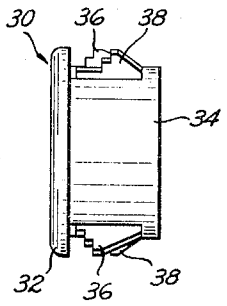


Fig. 2

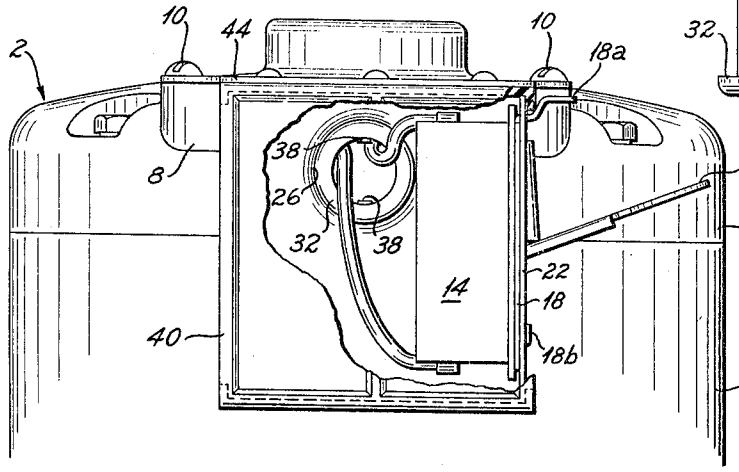
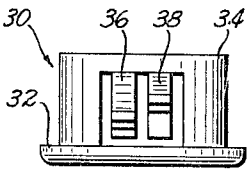


Fig. 6



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Fig. 3

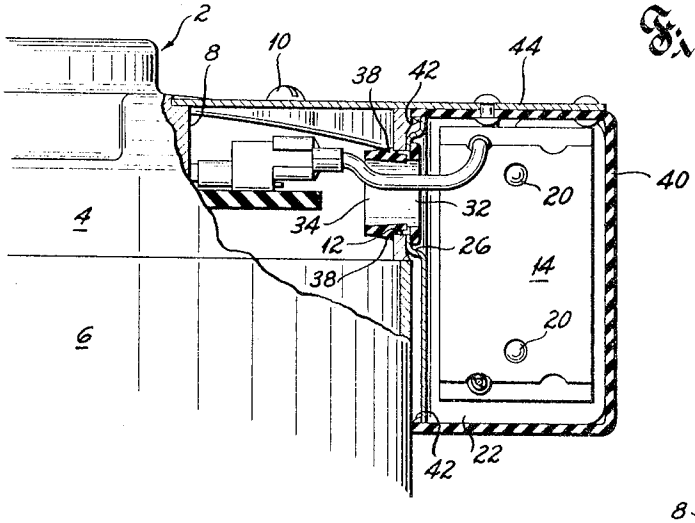


Fig. 4

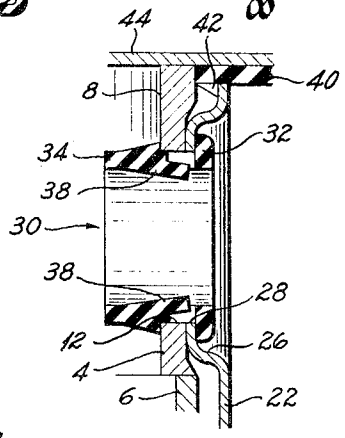
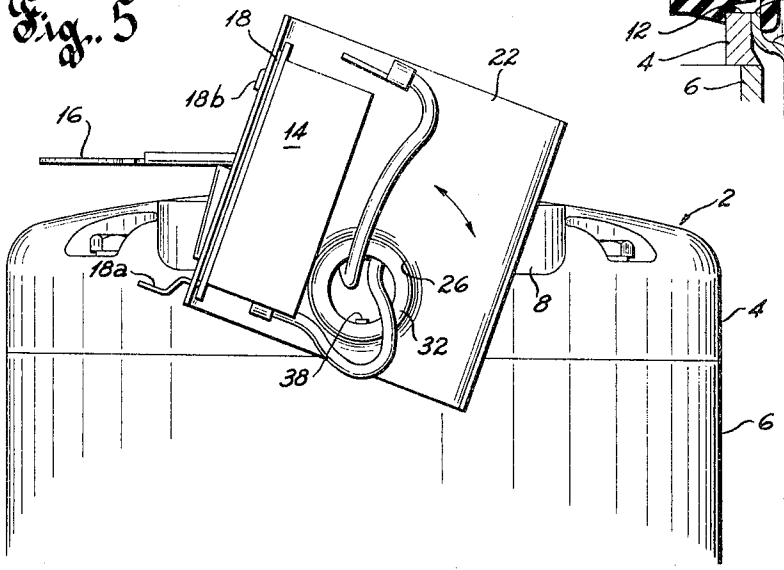


Fig. 5



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Fig. 8

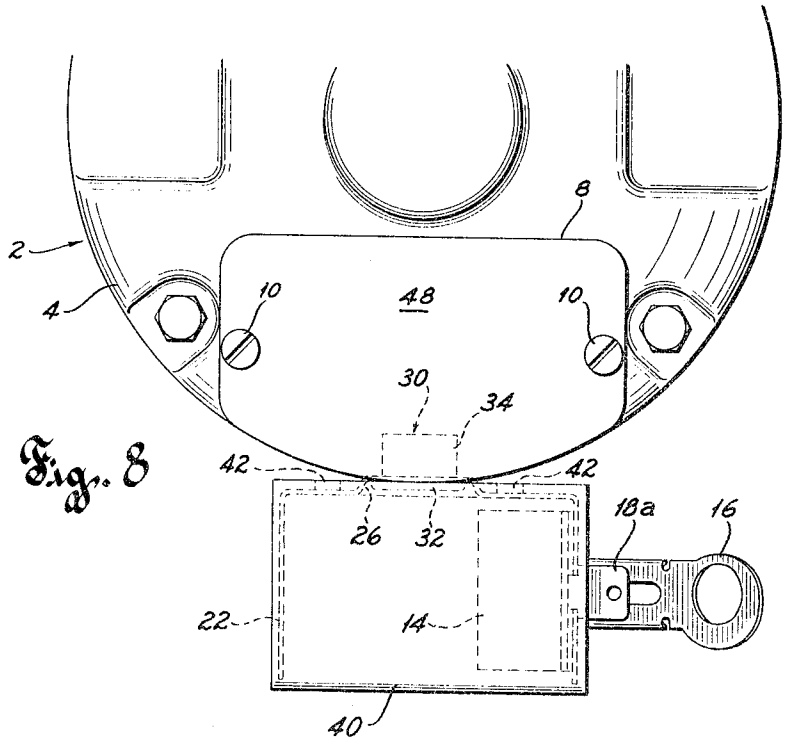
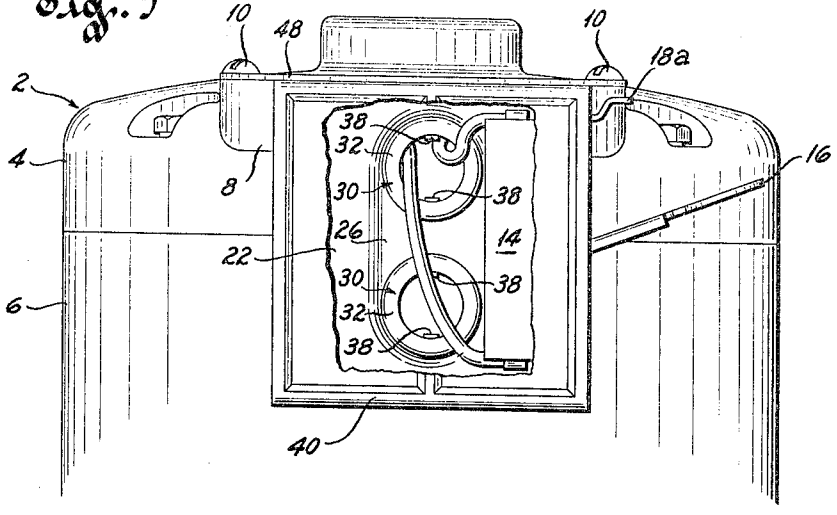


Fig. 9



United States Patent Office 3,272,461
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3,272,461

SWITCH MOUNTING STRUCTURE

Robert E. Larkin, Waukesha, Wis., assignor to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

Filed Mar. 9, 1965, Ser. No. 438,345
5 Claims. (Cl. 248—27)

This invention relates to an improved mounting means for switches.

More particularly the invention relates to an improved means for mounting float responsive switches to a sump pump motor.

Heretofore sump pump switches have commonly been mounted to the motor by a threaded bushing which extends from the switch frame through an aperture in the motor housing and have been held in place by a nut threaded onto the exposed end of the bushing. In many instances the bushing length has been limited and the thread engagement small, thus hindering a tight and long lasting connection. A loose connection would allow the switch to rotate about the bushing, thus disturbing the preset tripping points of the switch to cause faulty pumping action.

It is therefore an object of this invention to provide an improved switch mounting means which is inexpensive to manufacture.

It is a further object of this invention to provide a rigid mounting means for a switch which utilizes portions of the switch housing and the member to which it is to be mounted to achieve its rigidity.

These and other objects will become apparent in the following specification and claims when taken in conjunction with the drawings, wherein:

FIGURE 1 is a top plan view of a switch mounted to a device;

FIG. 2 is a front elevational view of the switch and device of FIG. 1 with a portion of the switch housing broken away;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged view of a portion of FIG. 3;

FIG. 5 is a view like FIG. 2 with the switch cover removed and showing a feature of the invention;

FIGS. 6 and 7 are plan and side elevational views, respectively, of a mounting member incorporated in the invention;

FIG. 8 is a top plan view of a modified version of the invention; and

FIG. 9 is a front elevational view of the device of FIG. 8.

In the drawings there is shown in FIGS. 1–5, portions of a motor **2** having a cover **4** and a casing **6**. The cover **4** has a terminal housing **8** open to the top to provide for electrical connection to the motor. Housing **8** is normally provided with holes for receiving screws **10** which fasten a cover member to the housing. A hole **12** is also provided in the cover **4**.

A switch **14**, which has an operator **16**, is secured to a mounting plate **18** by a pair of rivets **20** (FIG. 3). The mounting plate **18** has a leg **18***a* at its upper end and a pair of tabs **18***b* near its lower end, all of which extend at approximately right angles to the mounting plate and in the same direction.

Mounting plate **18**, with the switch **14** attached, is mounted to one leg of a U-shaped frame member **22** by sliding the leg **18***a* downward in a slot open to the top of that leg of the frame **22**. The portion of the leg **18***a* which lies beyond the frame is wider than the slot and traps the upper end of mounting plate **18** to the frame against horizontal movement. The tabs **18***b* extend through corresponding slots in the frame and are subsequently clinched over to hold the lower end of mounting plate **18** against the frame. An opening is also provided in that leg to allow the switch operator **16** to extend therethrough. The bight portion of U-shaped frame **22** is also provided with an offset portion **26** which has an opening **28** therein.

A commercially available molded snap grommet **30** (shown specifically in FIGS. 4, 6 and 7) of nylon or the like has a flanged end, or collar **32** and a barrel portion **34** extending outwardly therefrom. The barrel portion **34** is provided with a pair of diametrically opposed openings in its surface and each opening contains a pair of spring fingers **36** and **38** formed integral to the grommet at the outer end of the opening. Each finger has an inclined surface extending from its connected end toward the flanged end of the grommet and projects beyond the surface of the barrel. Each finger has at its free end a plurality of equally spaced steps which project upwardly to meet the top of its inclined surface. The steps of fingers **36** are closer to the flanged end **32** of grommet **30** than are those of fingers **38** and the distance between the last step of fingers **36** and the first step of fingers **38** is equal to the length of each step.

The design of grommet **30** is such that the barrel of the grommet may be pushed into a hole of slightly larger diameter than the barrel itself, such as opening **28** of frame **22** and hole **12** of motor **2**. Upon pushing the grommet **30** through opening **28** and into hole **12** the forward edge of the wall of hole **12** cams the fingers **36** and **38** inwardly of the barrel due to the inclined surfaces. The fingers spring outwardly once the stepped portion of the fingers clear the rear edge of the hole **12** and the grommet is seated. The plurality of steps are provided on the fingers to facilitate various thicknesses of material in which the opening may be formed, or in this instance, a plurality of thicknesses of material. Once the fingers **36** and **38** have sprung outwardly behind the rear edge of the hole **12** the grommet **30**, and therefore frame **22**, is locked against linear movement relative to the motor **2**, as shown in FIG. 5. While the grommet **30** has been hereindescribed as being inserted from the "frame" side, it is also contemplated in this invention that where clearance and other reasons dictate, the grommet may be inserted from the "device" side.

Rotation of the frame **22** about the grommet **30** when mounted upon the motor greatly facilitates the wiring of the switch **14**. Lead wires from the motor extend to a terminal block mounted in the terminal housing **8**. The wires which connect the switch **14** to the terminals of the motor are passed through the grommet **30** and up into the terminal housing **8** as shown in FIG. 3. The switch **14** may be either a single or a double pole switch and each pole has a terminal at each end of the switch. In the particular application shown in the drawings only one pole of a double pole switch is used and therefore only two connecting wires are shown, a wire being connected at each end of switch **14**. While the sequence of wiring the switch is immaterial, FIG. 5 shows the frame **22** rotated after the top terminal has been wired so that the terminal that was on the bottom is now at the top and may be easily wired. Upon wiring this terminal the frame is rotated back to its desired position and a cover member **40** is snapped in place over the frame **22**.

Cover member **40** is a U-shaped member molded of a resilient material such as nylon or the like having a peripheral flange along each side. The bight of the cover forms the front wall of the switch enclosure and the legs of the cover form the top and bottom walls of the enclosure. The cover is slid onto the frame **22** from the front so that the flanges overlie the outer edges of the legs of the frame to position the cover. A pair of cam lugs **42** are formed on the inside outer ends of each of the legs of the cover **40** and snap over the top and bottom

edges of the bight portion of the frame to hold the cover to the frame.

Cover member **40** is also provided with a cover plate **44** which is riveted to one leg of the cover, the leg being the top of the cover in this instance. Cover plate **44** extends rearwardly of the switch enclosure and is formed to comply with the top plan of the terminal housing **8**. Clerance apertures are provided in the cover plate for screws **10** which secure the cover plate **44** over the terminal housing. With the cover **40** and its cover plate **44** in place, the frame **22** and switch **14** are held to the motor against rotation.

FIGS. 8 and 9 show a modified version of the invention wherein the motor **2** and switch frame **22** are provided with a second hole to receive a second grommet **30**. In this version the motor may or may not have a terminal housing, but in either instance, the cover plate **44** is not utilized. If the motor has a terminal housing, the terminal housing cover **48** provided with the motor is used to cover the housing. The frame **22** and switch **14** are assembled to the motor **2** as described before and the switch is wired in the same manner. However, to prevent the switch from rotating after it has been wired, a second grommet **30** is then pushed into the second hole. The cover **40** without the cover plate **44** is then snapped over the switch frame **22** and is held in place by the lugs **42**.

While the invention has been described in connection with a switch mounted to a sump pump motor in the foregoing, it is apparent that the invention is susceptible of various modifications to be utilized in other situations without departing from the scope of the appended claims.

I claim:

1. For mounting an enclosed electric switch unit on a device having an aperture extending through a wall thereof, the combination with a switch enclosure having a frame and cover member, said frame having an aperture arranged to be in corresponding alinement to that in the device, of attaching and securing means comprising a grommet for penetrating and seating in the alined apertures of the frame and the device, said grommet having a collar seating against a wall adjacent the periphery of one of said apertures and having resilient portions which overlie and grip a wall adjacent the periphery of the other of said apertures which is opposed to the wall first mentioned when said grommet is seated, and further comprising means in engagement with said enclosure and said device to prevent rotational movement of the switch unit about said grommet.

2. For mounting an enclosed electric switch unit on a device having an aperture extending through a wall thereof, the combination with a switch enclosure having a frame and cover member, said frame having an aperture arranged to be in corresponding alinement to that in the device, of attaching and securing means comprising a grommet for penetrating and seating in the alined apertures of the frame and the device, said grommet having a collar seating against a wall adjacent the periphery of one

of said apertures and having resilient portions which overlie and grip a wall adjacent the periphery of the other of said apertures which is opposed to the wall first mentioned when said grommet is seated, and further comprising means extending from said cover and in engagement with said device to prevent rotational movement of the switch unit about said grommet.

3. The combination according to claim **2** wherein said cover is removable and the frame is free to rotate about said grommet seated in the alined apertures of the frame and the device when the cover is removed.

4. For mounting an electric switch unit on a device having a first and second aperture extending through a wall thereof, the combination with a switch mounting frame having a first and second aperture arranged to be in corresponding alinement with those in the device, of attaching and securing means comprising a grommet for penetrating and seating in the alined apertures of the frame and the device, said grommet having a collar seating against a wall adjacent the periphery of one of said apertures and having resilient portions which overlie and grip a wall adjacent the periphery of the other of said apertures which is opposed to the wall first mentioned when said grommet is seated, and further comprising a second grommet like the first mentioned grommet seated in said second alined apertures of the frame and the device to prevent rotational movement of the switch unit about the first mentioned grommet.

5. For mounting an electric switch unit on a device having at least one aperture extending through a wall thereof, the combination with a switch mounting frame having at least one aperture arranged to be in corresponding alinement with that in the device, of attaching and securing means comprising a grommet for penetrating and seating in the alined apertures of the frame and the device, said grommet having a collar seating against a wall adjacent the periphery of one of said apertures and having resilient portions which overlie and grip a wall adjacent the periphery of the other of said apertures which is opposed to the wall first mentioned when said grommet is seated, said resilient portions being cammed inwardly when said grommet is pushed through the alined apertures and springing outwardly when said grommet is seated to allow the frame to be secured to the device by pressing said grommet through said apertures.

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