Jan. 13, 1959 M. COLETTE 2,868,918

ELECTRIC SWITCH

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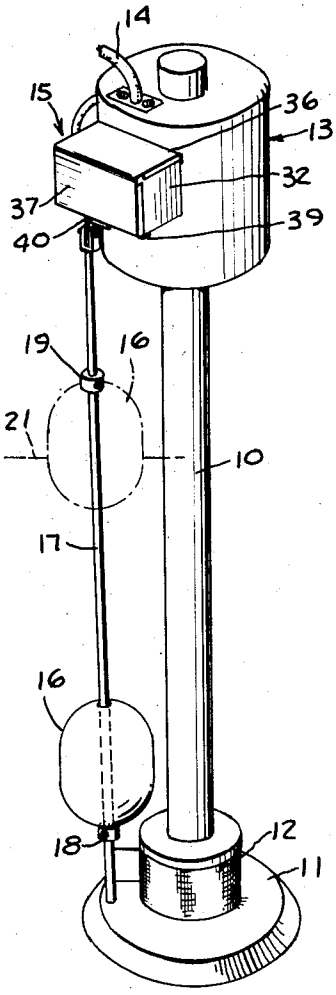


Fig. 1

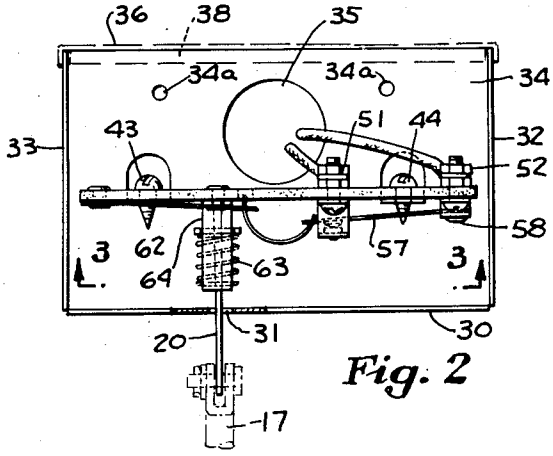


Fig. 2

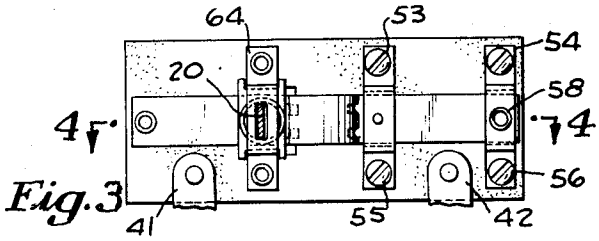


Fig. 3

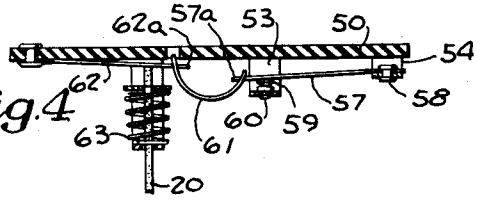


Fig. 4

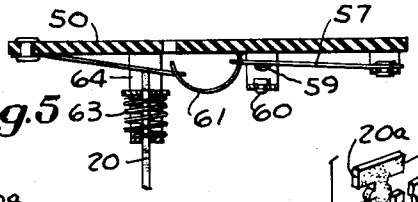


Fig. 5

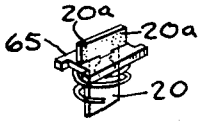


Fig. 7

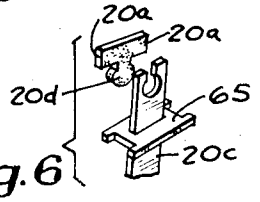


Fig. 6

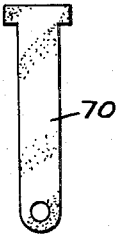


Fig. 8

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ELECTRIC SWITCH

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3 Claims. (Cl. 200—84)

This invention relates to sump pumps and to an improved electric switch, particularly, but not exclusively, advantageous in use with such pumps.

Considerable difficulties have been experienced with the use of electric switches for sump pumps. Such pumps are usually installed in damp places for removing seepage water. With the air around the sump being very damp and with moisture precipitating within the switch, difficulties have been experienced in producing a switch properly insulated for use under such conditions and with its insulating material not subject to deterioration under condition of dampness. With such switches often going out of order, their frequent inspection and replacement is necessary. Very frequently such work has to be done in dark places with little or no illumination, such as in a dark corner of a basement, using a flashlight which has to be held in one hand, making it difficult to do the work requiring the use of both hands. In spite of such a situation, such difficulties and disadvantages have been considered by those skilled in the art as being unavoidable and resulting from the nature of the use of such switches rather than from their construction. In addition, considerable difficulties have been experienced in calibration of such switches to ensure their proper actuation by sump pump floats.

One of the objects of the present invention is to provide an improved electric switch device whereby the above difficulties and disadvantages are overcome and largely eliminated and a simple, reliable electric switch particularly advantageous in use on sump pumps and in similar installations is produced.

Another object of the present invention is to provide an improved electric switch device which is exceedingly simple and compact and can be easily opened for inspection with its electrical part being easily replaceable as a unit without the necessity of removing the entire switch.

A further object of the present invention is to provide an electric switch of the foregoing nature possessing superior insulation characteristics and which need not be calibrated for its application in a sump pump.

An added object of the present invention is to provide an improved electric switch of the nature specified above, which is simple in construction, dependable in operation, is relatively inexpensive to manufacture and easy to repair.

Further objects and advantages of this invention will be apparent from the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification, wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is a perspective view of a sump pump with an electric switch embodying the present invention.

Fig. 2 is a view of the switch on a larger scale and with its cover being removed.

Fig. 3 is a bottom view of the switch assembly shown separately, said view being partly in section and taken

in the direction of the arrows from the section plane 3—3 of Fig. 2.

Fig. 4 is a sectional view taken in the direction of the arrows on the section plane passing through the line 4—4 of Fig. 3, the operative parts of the switch being shown in their closed position.

Fig. 5 is a view similar in part to Fig. 4 but showing the parts of the switch in their open position.

Fig. 6 is an exploded view showing the switch-actuating piece.

Fig. 7 is a perspective view showing the top portion of the switch-actuating piece sub-assembly.

Fig. 8 is a view showing the switch-actuating piece made of insulating nylon material and of one piece or integral construction.

It is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and not of limitation.

In accordance with the invention, I provide an improved electric switch of superior insulating characteristics, with said switch including a snap action mechanism and having its electrical part removable from its casing as a unit for replacement or repair.

Referring specifically to the drawing, Fig. 1 illustrates a sump pump including a tubular column **10** mounted on a base **11** and having an intake and with a screen **12**. At the top of the column **10** there is provided an electric motor-and-pump aggregate generally designated with the numeral **13**. An electric cord **14** is electrically connected to the electric motor. In such connection there is operatively interposed an electric switch generally designated by the numeral **15**. A float **16** actuated by the level of the water at the lower portion of the column **10** is adapted to slide on the rod **17** between the adjustable collars **18** and **19** fixed in desired places on the rod **17**. The upper end of the rod **17** is hingedly connected to the switch actuating piece **20**.

The upper collar **19** is adjustable to a desired height to determine the level at which the pump begins operating. The weight of the rod **17** and of the float is sufficient to pull the piece **20** and open the switch as shown in Fig. 5. Therefore, normally the switch remains open. However, should the level of the water around the lower part of column **10** rise to the level **21**, the float **16** will press on the collar **19** and will push the rod **17** up together with the piece **20**, thus bringing the operative parts of the switch into the relative positions shown in Fig. 4 and thus closing the switch. Thereupon, the pump will begin operating to pump the water out. As the water level drops, the float **16** reaches the collar **18**, whereupon the weight of the rod **17** and of the float **16** acting on the collar **18** and pulling on the piece **20** through the rod **17** again opens the switch to stop the motor and the pump.

The switch **15** comprises a two-piece casing, including the lower portion having a bottom **30** provided with an opening **31** for passage of the switch actuating piece **20**, side walls **32** and **33** and a back wall **34** provided with aperture **35** for passage of the electric wires and holes **34***a* for passage of screws or similar connectors for securing the switch in place on the motor-and-pump aggregate. Thus, the top and the front of the lower portion of the casing are open as can be best appreciated by examination of Fig. 1. The upper portion or the cover of the casing comprises a top **36** and a front wall **37** provided with flanges going over side walls **32** and **33**, see Fig. 1. A

rear flange 38 is adapted to go over the upper edge of the back wall 34, while the front wall 37 is also provided with a lower flange 39 going over the front edge of the bottom 30. An extension 40 is provided to enable easy removal of the cover.

Lugs 41 and 42 are stamped out from the material of the back wall 34 and are adapted to support the entire switch assembly connected to said lugs with the aid of screws 43 and 44.

The switch assembly comprises a shelf 50 made of an insulating material and having terminals 51 and 52 provided on its top, for receiving electric wires. Brackets 53 and 54 are provided on the underside of the shelf 50 and are electrically connected through the terminal screws 55 and 56 with the terminals 51 and 52, respectively.

It will now be understood that if brackets 53 and 54 are electrically connected together, the terminals 51 and 52 will also be connected and electric current will flow through the switch. Means are provided to connect and disconnect electrically said terminals 51 and 52. Said means are exemplified by a copper spring 57 having one of its ends riveted or otherwise secured to the bracket 54 as at 58, and its other end carrying a contact point 59 adapted to contact and to be separated from the point 60 provided on the bracket 53. It will now be understood that when points 59 and 60 are in contact as shown in Fig. 4, the switch is closed. If points 59 and 60 are separated as shown in Fig. 5, the switch is open.

A snap action mechanism is provided to move the switch spring 57 into its circuit breaking and circuit closing positions. Said mechanism comprises a leaf spring bow 61 having holes through its end through which prongs 57*a* of the spring 57 and prongs 62*a* of the spring 62 pass.

The spring 62 is shaped to exert constant pressure on the top of the switch actuating piece 20 and to be in constant mechanical contact therewith.

A compression coil spring 63 is provided on the piece 20, which spring is compressed between the lower portion of the bracket 64 and the cross head 65 carried by the piece 20. The piece 20 is provided with shoulders 20*a* bearing on said cross head 65. The piece 20 may be of articulated construction as shown in Fig. 6 and comprises a metal piece 20*c* and an insulating piece 20*d*, thus preventing the possibility of flow of current through the piece 20 to the ground.

It will now be seen with reference to Figs. 4 and 5 that as the piece 20 moves downward from its position shown in Fig. 4, the bow piece 61 will be deflected to bring its ends closer together. This condition will continue for a short distance of movement of the end of the spring 62, whereupon the resiliency of the piece 61 will cause it to snap into the position shown in Fig. 5, moving the piece 57 to separate the contact points 59 and 60. Movement of the piece 20 upward will reverse this movement but also with a snap action. By the provision of the snap action mechanism described above, a greater distance of separation between points 59 and 60 and speedier separation thereof preventing sparking is attained.

The piece 20 as can be understood from the above, must possess both electric insulation properties and mechanical strength. It is for this reason that it may be made partly of metal and partly of insulating material. I also found it very advantageous to make such piece out of nylon material which possesses both electric insulation properties and greater mechanical strength. Such piece is made of integral or one-piece construction as shown in Fig. 8 wherein said piece is designated by the numeral 70.

By using a stronger spring instead of spring 63, the switch may be used as a "displacement weight type switch," such as in cases where instead of a rod such as 17, a wire with two weights are used.

By virtue of the construction disclosed above, the objects of the present invention and numerous additional advantages are attained.

I claim:

1. In a sump pump including a pump, an electric motor for driving said pump, and a float actuated by the liquid to be pumped; an electric switch device controlling current to said motor and actuated by said float, said switch device comprising a steel casing adapted to be mounted on said pump to enclose fully the entire switch device, and having a removable cover, a switch assembly removably mounted within said casing, said assembly comprising a single one-piece shelf made of insulating material and removably mounted within said casing at a distance from the walls thereof, two terminals provided on said shelf and adapted to receive ends of electric wires carrying current to said motor, a spring element normally connecting said terminals, a snap action mechanism adapted, when actuated, to bend said spring element and to disconnect said terminals, and a spring-pressed piece adapted to actuate said mechanism, said piece being connected to the float and being made, at least in part, of insulating material.

2. The invention defined in claim 1, said piece being adapted to operate in tension as well as in compression.

3. The invention defined in claim 1, with a plurality of lugs being stamped from the body of the casing and said shelf being connected to said lugs with the aid of threaded connectors.

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