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2,629,797

MERCURY SWITCH

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Fig. 1

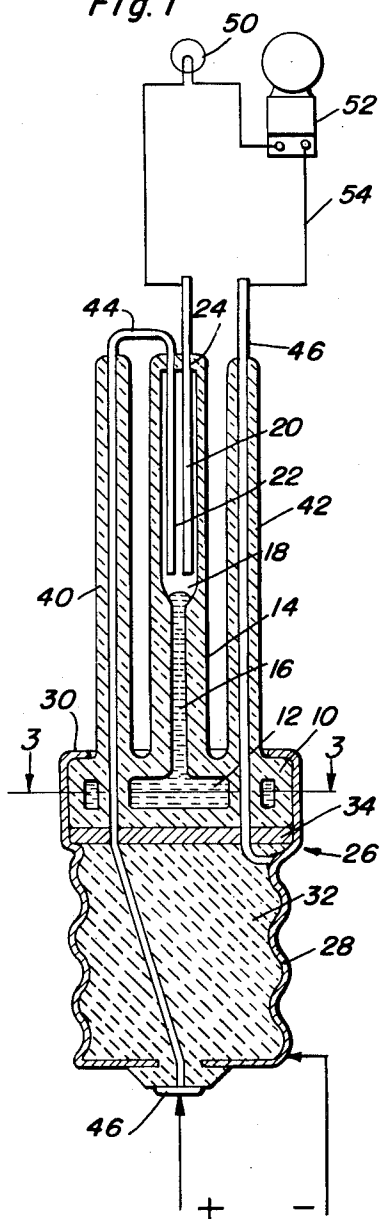


Fig. 2

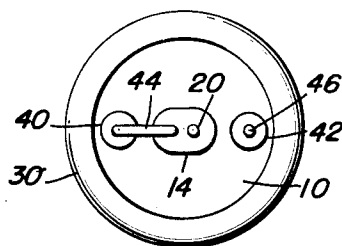
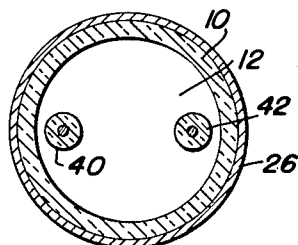


Fig. 3



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MERCURY SWITCH

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4 Claims. (Cl. 200-141)

1

This invention relates to a mercury switch and particularly to a thermo-responsive switch for use in an alarm circuit.

In the installation of fire alarm switches, it is desirable to have switches that are cheap enough and reliable enough to be placed wherever and however they may be needed to protect the premises from fire. Many switches have heretofore been designed for such purpose but they were either too expensive or their operation was too uncertain to warrant their utility. The present invention provides a cheap, reliable mercury switch having a base which will screw into a standard base socket so that the switches may be installed wherever they may be needed.

The present switch is constructed with a screw base having an insulating core and a reservoir of mercury contained within the shell. An expansion tube is connected to the reservoir and a plurality of contact wires extend into the expansion tube so that when the mercury expands it will short the contact wires and make the circuit. In order to make a self-contained device which may be easily screwed into a standard socket, the contact wires are brought out from the shell and from the usual contact terminal of the base and extend through the reservoir in insulated relation by such devices as insulating tubes such as glass.

It is an object of this invention to provide an improved mercury switch.

It is a further object of this invention to provide a mercury switch which is self-contained.

It is a primary object of this invention to provide a mercury switch which will screw into a standard socket base.

It is a further object of this invention to provide a mercury switch having contacts to fit a standard base and terminals extending in insulated relation through the reservoir of mercury.

Other objects and many of the attendant advantages of this invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a sectional elevation through the mercury switch showing the alarm circuit in diagrammatic form;

Figure 2 is a top plan view of the switch showing the method of connecting to the contact wires; and

Figure 3 is a cross-section through the mercury reservoir taken substantially on the plane indicated by the line 3-3 of Figure 1.

2

In the exemplary embodiment of the invention, a container 10 of glass or any other insulating material contains a reservoir 12 of thermal expansion conducting material such as mercury or gallium. An expansion tube 14 has a capillary tube 16 connected to the reservoir 12 so that on expansion the conducting liquid may extend up through the capillary tube 16. The expansion tube 14 is provided with a bulb-like top 13 which has a pair of contact wires 20 and 22 extending through the top of the expansion chamber and sealed therein so that the expansion chamber may be substantially evacuated or at least maintained at a relatively low pressure. The top 24 of the expansion tube may, if desired, be a standard press sealing the top to the contact wires 20 and 22. The reservoir 12 is assembled into a plug which fits a standard screw base by means of a shell 26 which has a threaded bottom section 28 and an inturned top section 30. The bottom section 28 is molded onto an insulating core 32 and a suitable cushioning device 34 is provided between the insulating core 32 and the container 10. Preferably the shell 28 is assembled on the core and the cushioning device 34 is inserted, after which the top edge of the shell 26 is spun over to provide an inturned lip 30 to retain the reservoir in position in the plug. A pair of hollow tubes 40 and 42, constructed of glass or other similar insulating material, extend through the reservoir 12 and extend upwardly a material distance above the container 10. A first conductor 44 is connected to the contact button 46 and extends upwardly through the insulating base or core 32 and upwardly through the hollow tube 40 to extend above the top thereof. The conductor 44 is then conducted to the contact wire 22 to provide one terminal of the switch. A conductor 46 is connected to the shell 26 and extends upwardly through the tube 42 to provide a terminal to the alarm circuit. The other contact wire 20 extends upwardly to provide the other terminal for the alarm circuit. Preferably the alarm circuit includes a visual and an audible device such as a lamp 50, 52. An alarm circuit 54 extends from the output terminal of the wire 20 through the signalling devices 50 and 52 to the outer terminal of the conductor 46.

If the signal circuit is of the direct current variety, preferably the terminal 46 is a positive terminal so that the positive terminal is in the make side of the switch while the negative terminal connects to the shell and to the conductor 46 centrally extending through the switch mech-

anism. As is usual in such circuits, the shell is preferably grounded.

In the utilization of the thermal expansion switch, the base 28 is screwed into a standard socket, not shown, which is connected to a standard electric source such as an ordinary light circuit or a special direct current circuit. If the latter is used, the terminal 46 is connected to the positive side of the circuit while the shell is grounded or connected to the negative side of the circuit. The negative conductor 46 or the grounded conductor is extended through the tube 42 in insulated relation to the reservoir of conducting material within the container 10. The positive side of the line is then connected in the make portion of the expansion chamber so that the expansion of the conducting liquid will bridge the contact wires and complete the circuit 54 to the alarm devices 50 and 52. Obviously, a plurality of switches may be connected in parallel to the same signal devices or each switch may have its own signal device or may be a plurality of signal devices either in series or in parallel so that signals may be given at various places by means of the system.

While, for purposes of exemplification, a particular embodiment of the invention has been shown and described according to the best present understanding thereof, it will be apparent that changes and modifications can be made therein without departing from the true spirit of the invention.

Having described the invention, what is claimed as new is:

1. An alarm switch comprising a screw base, an insulating core in said base, a conducting shell on said base, a reservoir mounted in said shell, a pair of insulating tubes extending through said reservoir, a conductor extending through each of said tubes, a contact button on said core, one of said conductors connected to said button, the other of said conductors connected to said shell, an expansion tube connected with said reservoir, a pair of contact wires extending into said expansion tube, one of said first-mentioned conductors being connected to one of said contact wires, the other of said first-mentioned conductors and the other of said contact wires forming the output terminals of said switch, a filling of expansible conducting liquid in said reservoir.

2. An alarm switch comprising a screw base, an insulating core in said base, a conducting shell on said base, a reservoir mounted in said shell, a pair of insulating tubes extending through said reservoir, a conductor extending through each of said tubes, a contact button on said core, one of said conductors connected to said button, the other of said conductors connected to said shell,

an expansion tube connected with said reservoir, a pair of contact wires extending into said expansion tube, one of said first-mentioned conductors being connected to one of said contact wires, the other of said first-mentioned conductors and the other of said contact wires forming the output terminals of said switch, a filling of mercury in said reservoir.

3. A thermally actuated switch comprising a circular glass container, a pair of glass tubes extending through said container, a screw base attached to said container, said base including an insulating core, a terminal on said core, a first conductor connected to said terminal, said first conductor extending through one of said glass tubes, a threaded conducting shell on said core and embracing said container, a second conductor attached to said shell and extending through the other of said glass tubes, a glass expansion tube connected with said container, a pair of contact wires extending into said expansion tube, a quantity of mercury in said container, said container and said expansion tube being otherwise substantially evacuated, said first conductor being connected to one of said contact wires, the other contact wire and said second conductor being the output terminals of said switch.

4. In an alarm system, a thermal switch comprising a reservoir of insulating material, a screw base attached to said reservoir, said base including an insulating core, a conducting terminal on said core, a screw-threaded conducting shell on said core, a pair of insulating tubes extending through said reservoir, a first conductor connected to said terminal and extending through one of said tubes, a second conductor connected to said shell and extending through the other of said tubes, an expansion tube communicating with said reservoir, a pair of contact wires extending into said expansion tube, said first conductor connected to one of said contact wires, said second conductor and the other contact wire being the output terminals of said switch, a filling of thermally expansive conducting liquid in said reservoir, said reservoir and said expansion tube being sealed to maintain a low pressure therein.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,113,126	Johnson	Oct. 6, 1914
1,990,659	Lindsey	Feb. 12, 1935