Dec. 3, 1935. J. WORLEY 2,022,907

THERMOSTATIC SWITCH

Filed May 11, 1934

Fig. 1.

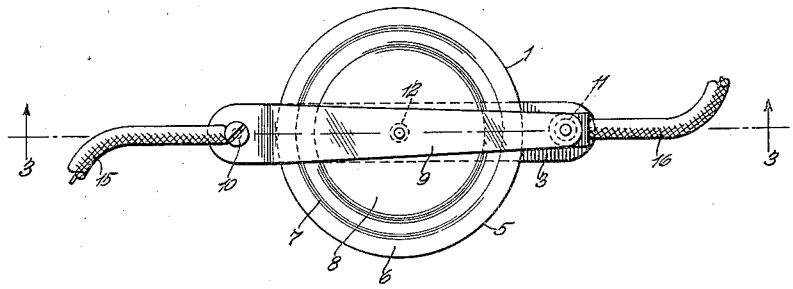


Fig. 2.

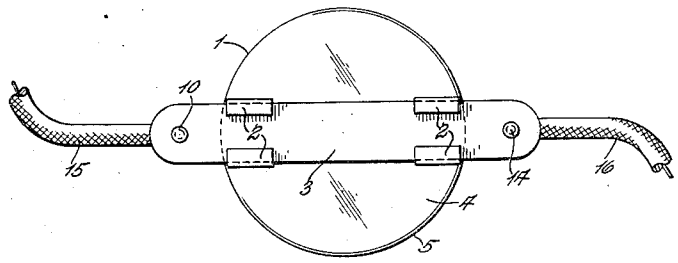


Fig. 3.

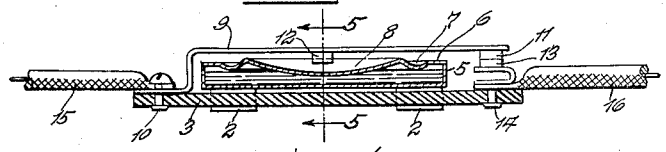


Fig. 4.

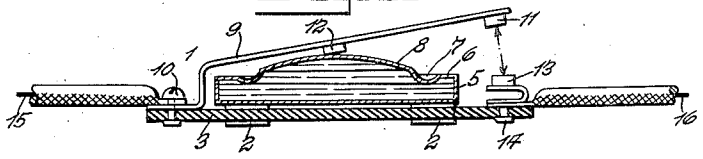
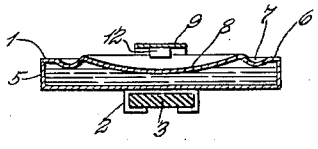


Fig. 5.



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2,022,907

THERMOSTATIC SWITCH

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Application May 11, 1934, Serial No. 725,147

1 Claim. (Cl. 200—140)

This invention relates to thermostatic electric switches.

An object of this invention is to provide an improved switch adapted to make or break a circuit upon a predetermined rise in temperature, which will resist change until a condition of instability occurs and will operate with a snap action.

Another object of the invention is to provide a device of this character which is adapted to be placed in a motor circuit and in the heat zone of the motor windings in order to function as a circuit breaker responsive to overload conditions in the motor. Thus, if the motor windings heat beyond a predetermined minimum, as they will do under overload conditions, the circuit will be broken.

These objects and others will be apparent from the following detail description, taken in connection with the accompanying drawing, in which—

Fig. 1 is a plan view of the device;

Fig. 2 is a bottom view;

Fig. 3 is a sectional view on line 3—3, Fig. 1;

Fig. 4 is a view similar to Fig. 3, showing the arrangement of the parts of the device upon action of the thermostatic element; and

Fig. 5 is a cross section on line 5—5, Fig. 3.

A thermostatic element 1 is secured by clips 2 to a base member 3.

The thermostatic element 1 comprises a hermetically sealed vessel, preferably cylindrical in form and shallow in depth, having a bottom wall 4, a side wall 5, and a top wall or diaphragm 6. The top wall 6 has a concentric concave corrugation 7 and a cupped central portion 8 normally concave, which may be substantially a section of a spherical surface. The vessel which comprises the thermostatic element 1 is filled, or partially filled, with an expansible substance which may be air, other gas, liquid or a partially solid agent. Preferably the agent is a liquid having a boiling point near the temperature at which it is desired the device should act. Such an agent which I have found satisfactory is carbon tetrachloride, but it will be obvious that other agents may be selected which are equally satisfactory and which may, of course, be better adapted because of a different boiling point. Solidified alcohol is an example of a partially solid agent which is satisfactory.

The top wall 6 of the member 1 is of resilient metal and the construction is such that the central portion 8 will normally retain a concave position, as shown in Fig. 3. Upon expansion of the agent in the member 1 pressure will be exerted and after a certain pressure is reached the member 8 will snap outwardly assuming a convex form, as indicated in Fig. 4.

The portion 8 will retain its form against internal pressure to a predetermined point at which a condition of instability it reached. Then under further pressure, this portion will pass abruptly to an opposite or convex curvature.

It is to be understood that the curvatures shown in Figs. 3, 4 and 5 are somewhat exaggerated in order to more clearly exemplify the action of the device. Upon cooling, pressure within the member 1 will be reduced and atmospheric pressure will cause the collapse of the central portion 8 to its normal position.

A resilient switch arm 9 is secured to the base member 3 by a pin or screw 10 and carries a contact 11 at its outer end. A fiber pin 12 is secured to the underside of the arm 9 for engagement with the portion 8 when that portion is expanded under heat. A fixed contact 13 is also secured to the base member 3 by a pin 14 in a position to cooperate with the contact 11. Circuit wires 15 and 16 are conductively attached to the switch arm 9 and the fixed contact 13 respectively, the wire 15 being preferably attached to or by the pin or screw 10 and the wire 16 being preferably attached to or by the pin 14.

It will be understood that when heat is applied to the device the agent expands in the chamber and exerts a fluid pressure upon the walls. When a liquid or semi-solid agent is used, this expansion is caused by a change in state to a gas, that is by vaporization. For a time the cupped portion 8 resists a change of condition but upon further pressure a state of instability is reached and the concave section abruptly passes to a convex form. Upon a sufficient diminution of internal pressure by cooling, the portion 8 will be forced by atmospheric pressure to its normal or concave form.

It will be obvious from the foregoing discussion that the device accomplishes its objects. Its

construction is such as to be positive in operation upon the occurrence of a predetermined rise in temperature. It has a snap action, thus preventing a slight opening of the contact points under a temperature less than that for which the device is desired and preventing arcing across the contacts, which occurs in a switch having a slow gradual opening. Its construction is such that it is compact and may be conveniently inserted in a small slot or recess provided for its reception in a motor frame.

It will be understood that various changes may be made in the details of construction, within the scope of the appended claim, without departing from the spirit of this invention.

I claim:

In a thermostatic switch, an operating element comprising a sealed chamber having a resilient wall with a circular corrugation therein and a cupped depression therein normally concave from the outer side and concentric with the corrugation, said cupped portion being adapted to maintain its form under a predetermined pressure in the chamber until a condition of instability is reached and then under further pressure within the chamber to pass abruptly to an opposite curvature, and an agent in the chamber adapted under heat to exert a fluid pressure against said wall of the chamber.

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