July 25, 1933. B. E. GETCHELL 1,919,327

THERMOSTATIC SWITCH

Filed June 6, 1932

Fig. 4.

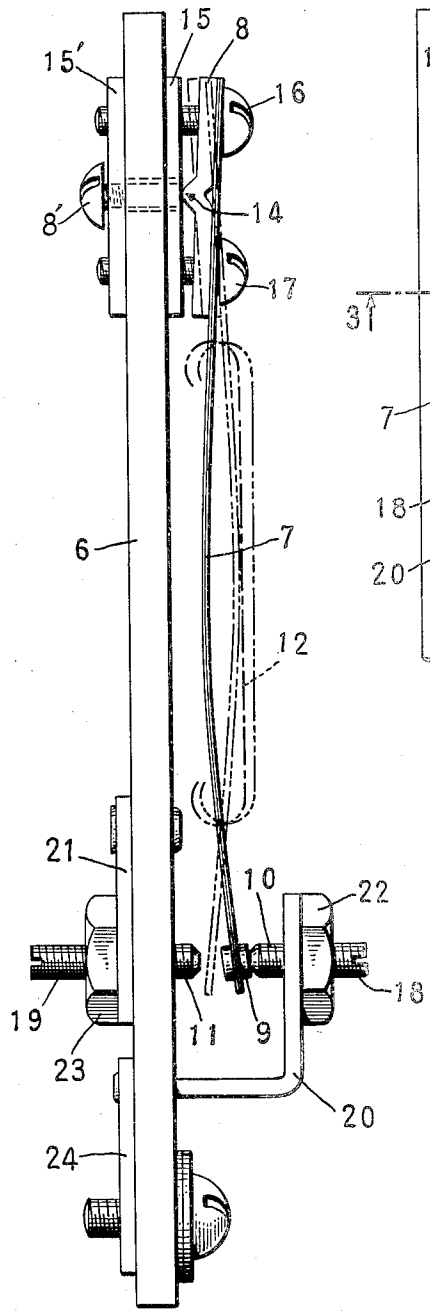


Fig. 2.

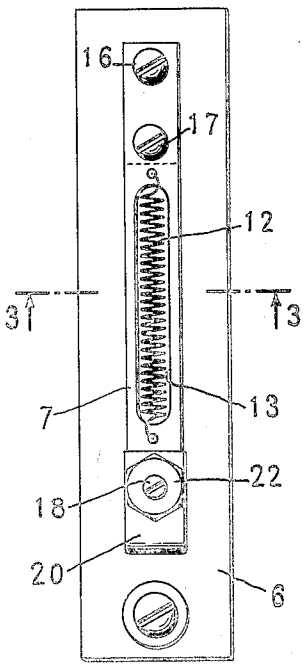


Fig. 1.

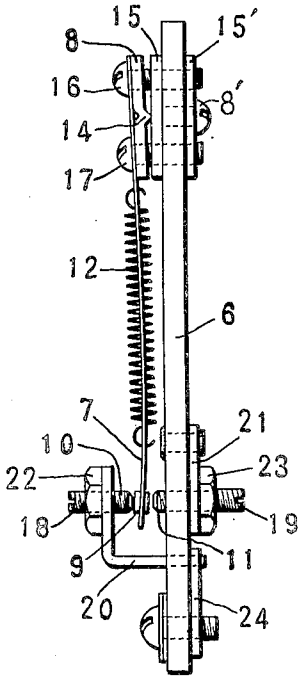
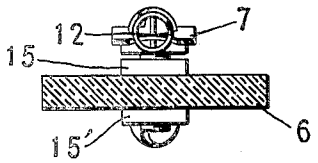


Fig. 3.



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THERMOSTATIC SWITCH

Application filed June 6, 1932. Serial No. 615,524.

My invention relates to automatic switches for opening and closing electric circuits.

One object is to provide a simple but extremely sensitive and inexpensive form of construction which will quickly respond to changes of temperature.

Another object is to provide a thermostatic switch which will positively operate with a snap action to either one of two positions upon a predetermined change in temperature.

Another object is to provide a thermostatic switch which will open and/or close the circuit with a snap action.

Another object is to provide a thermostatic switch which may be adjusted to vary the temperature at which the switch will operate to either open or close the circuit or to change the direction of the flow of the circuit.

In carrying out the invention I provide a bi-metallic blade or arm of suitable construction, which arm is anchored at one end and carries a contact at the other end. A tension spring connects the movable and stationary ends of the arm in such a way that the movable end is moved to and held in either one of two positions by the tension of the spring as well as by the normal bias of the arm.

The arm and spring are so designed and arranged that upon a predetermined change of temperature the contact carrying end of the arm will start to move from a normally bowed position and as soon as it passes the medial line or straight position the spring will add its force to the warping tendency of the arm and snap the movable end of the arm to another position at the opposite side of the center. The relatively stationary end of the arm is supported in such a manner that it may be tilted for regulating or adjusting the action of the switch.

Fig. 1 is a side view of a switch embodying my invention.

Fig. 2 is a front or plan view of the same.

Fig. 3 is a cross section on the plane of the line 3—3 of Fig. 2 but on a larger scale.

Fig. 4 is a side view of the switch on the same scale as Fig. 3 and showing the thermostatic arm in solid lines in one position and in dotted lines in another position.

The parts of the switch are mounted on a support 6 which may be of insulating material and which will not warp or become distorted with ordinary changes of temperature.

A thermostatic arm 7 is formed of any suitable bi-metallic strip and has one end secured to a plate 8 which is normally stationary. The movable end of the arm carries a contact or contacts 9 adapted to engage the stops 10 and 11, either or both of which may be considered as stationary electrical contacts.

A helical spring 12 connects two points of the arm, one point being at or near the stationary end of the arm and the other point being near the movable contact carrying end of the arm.

Preferably the arm 7 is slotted at 13 to provide a mounting space having ample clearance for the spring. The arm normally has a bias which slightly flexes or warps the arm and the spring 12 is so designed and arranged with respect to the arm that the spring tends to add ample additional flexure to the arm which is itself resilient. The tension spring, therefore, adds its pressure to the normal flexing bias of the thermostatic spring arm.

In order to adjust the switch so that it will operate at the desired temperature the relatively stationary end of the arm is made adjustable, for instance, by mounting it upon a tilting plate 8. This plate is provided with an offset pivot or knife edge 14 which rests upon a plate or platform 15. This plate 8 with the attached thermostatic arm may be rocked upon the projecting edge 14 and thus adjusted by tightening and/or loosening the screws 16 and 17 which may have threaded engagement in the platform 15 or in the backplate 15′. The plate 8 may be locked in the desired position by means of the set screw 8′ which has a threaded engagement either in plate 15 or 15′.

The two stops or contact members 10 and 11 are also preferably made adjustable, for instance, by forming them as threaded screws

18 and 19, adjustable in the bracket 20 and the plate 21, respectively. Set nuts 22 and 23 may also be provided. The plate 21 may constitute a circuit terminal and the plate 24 may constitute another circuit terminal.

The thermostatic arm may be considered to be normally in the position shown in full lines in Fig. 4 where the bias of the arm and the tension of the spring 12 both tend to hold the contact end 9 bowed or warped against the stationary stop or contact 10. Upon a predetermined change of temperature the arm 7 will warp sufficiently with respect to the medial line so as to just pass the center line and reverse its central curve so that the spring 12 instead of tending to bow the arm 7, as shown in full lines in Fig. 4, will be pulling on the other side of the center line of the arm and tend to bow the arm into the position shown in dot and dash lines.

Obviously, after the active warping movement has once started, the pressure of the contact carried by the thermostatic arm against whichever stationary contact it may be engaged with, will be increased until the thermostatic arm assumes a straight line form thus avoiding the usual vibrating or chattering movement of the contact.

The result of this action is that the contact end of the arm is snapped from one position to the other, thus breaking the circuit through the contact 10 and establishing a new circuit through contact 11. The opposite change of temperature will, of course, result in snapping the thermostatic arm back to its original position. Obviously, the contact and terminals may be arranged to control other forms of wiring circuits.

With such a construction it is possible to provide a quick-make and break switch which may be actuated automatically and thermostatically by means of change in temperature or by means of any other auxiliary means of heating or cooling. By this construction it is possible to avoid the disadvantages frequently found in thermostatic switches of slow and vibrating motion.

Obviously different forms of springs and different ways of securing the springs to the respective ends of the thermostatic strip may be used without departing from the spirit of my invention so long as the tendency of the spring is to assist the warping movement to either one or both sides of a relatively straight line.

I claim:

1. A thermostatic switch including a one-piece bi-metallic strip having an elongated closed ended slot therein intermediate its ends and a tension spring in said slot, said spring being secured to said strip at the respective ends of said slot and the axial center of said spring being in alignment with the edge center of said strip when said strip is in a straight line position.

2. A thermostatic switch including a unitary bi-metallic strip having an elongated slot therein intermediate its ends and a tension spring in said slot, said spring being secured to said strip at the respective ends of said slot and the axial center of said spring being in alignment with the edge center of said strip when said strip is in a straight line position, said spring tending to assist the warping movement of said strip.

3. A thermostatic switch including a one-piece bi-metallic strip having an elongated slot therein intermediate its ends and a tension spring in said slot, said spring being secured to said strip at the respective ends of said slot and the axial center of said spring being in alignment with the edge center of said strip when said strip is in a straight line position, said spring tending to assist the warping movement of the strip as soon as said strip has warped beyond a relatively straight line position.

4. A thermostatic switch including a unitary bi-metallic strip having an elongated slot therein intermediate its ends and a tension spring in said slot, said spring being secured to said strip at the respective ends of said slot and the axial center of said springs being in alignment with the edge center of said strip when said strip is in a straight line position, said spring tending to assist the warping movement of said strip on both sides of the center line with respect to the warping movement of said strip.

5. A thermostatic switch including a single bi-metallic strip having an elongated slot therein intermediate its ends said slot being closed at both ends and a tension spring in said slot, said spring being secured to said strip at the respective ends of said slot and the axial center of said spring being in alignment with the edge center of said strip when said strip is in a straight line position, said strip being secured to a relatively fixed mounting at one of said ends and having its other end free to warp to make or break an electrical contact.

6. A thermostatic switch including an adjustable tilting member having a knife edge support, a bi-metallic strip having one end carried thereby, stops for the opposite end of said strip, a tension spring connecting two portions of the strip and tending to bend the strip and an adjustable abutment for said tilting member consisting of two screws one on each side of the knife edge support for adjusting the tilting member and maintaining it in its adjusted position.

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