Oct. 27, 1936. C. F. ALBAN ET AL 2,058,390

THERMOSTATIC SWITCH

Filed May 1, 1935

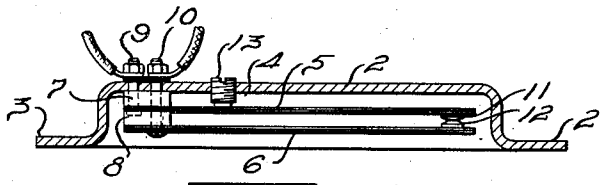


Fig. 1.

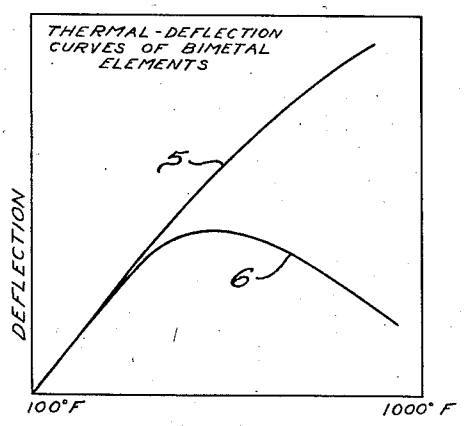


Fig. 2.

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Patented Oct. 27, 1936 2,058,390

UNITED STATES PATENT OFFICE

2,058,390

THERMOSTATIC SWITCH

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Application May 1, 1935, Serial No. 19,261

8 Claims. (Cl. 200—139)

This invention relates to thermostatic switches, the object being to provide a switch in which a pair of bimetallic blades are positioned in parallel relation and respectively form the terminals of an electric circuit, the respective blades being of dissimilar thermal deflection characteristics, the one being substantially uniform in its coefficient or deflection under increasing temperature and the other having substantially the same coefficient of deflection up to a certain temperature and at certain higher temperature reverses or decreases its rate of deflection causing the blades to separate and thus break a circuit.

Heretofore, it has been common to use a single bimetallic blade movable from a fixed contact to break an electric circuit or to use a single bimetallic blade in connection with a blade of spring steel which follows the deflection of the bimetal to a predetermined temperature, but such a switch is inefficient for many purposes in that, the internal stress in the bimetal in the cold position is necessarily high when the thermostat is adjusted to operate at high temperatures. These high temperatures also change the temper of the spring material which in turn changes the calibration of the thermostat.

With our improved switch having two bimetallic blades or elements of differing deflection curves at a certain temperature by applying pressure in varying degree to the blade whose deflection remains uniform the contacts thereof are held in pressure engagement until a certain predetermined temperature is attained at which the contacts will separate.

A feature and object of the invention therefore is to provide a thermostatic switch including a pair of bimetallic blades or elements, one of the blades being substantially constant in coefficient of deflection and the other abruptly variable in deflection curve at certain temperature to separate the contacts of an electric circuit associated with the blades and means restraining the blades from separation to thereby predetermine the temperature at which separation of the blades takes place.

The principal feature of the invention resides in the provision of two bimetallic elements lying preferably in parallel relation and of such respective compositions of high and low sides that the said blades within certain temperature range have approximately the same deflection coefficient and at certain higher temperature one of the blades practically ceases its deflection movement to thereby cause separation of the contacts carried by the blades at certain high temperature and thus break an electric circuit associated therewith.

These and other objects and novel features of our invention are hereinafter more fully described and claimed, and a structure embodying our invention is shown in the accompanying drawing in which—

Fig. 1 is a side elevation of our improved thermostatic switch, the bimetallic elements being shown in normal position.

Fig. 2 is a chart showing the deflection curves of the two bimetallic elements of certain respective compositions.

The invention particularly resides in the bimetallic elements having the required deflection curves. The casing or housing support for the blades is not material as it may be changed in various ways as may be required for any particular installation and the invention is usable with various types of instrumentalities such as electric hand irons or other devices to which heat is applied by electric current and which instrumentality is to be maintained at approximately a certain predeterminable temperature.

In the structure shown a simple bar or bracket 1 is shown bent at its ends 2 and 3 to provide supporting feet or other form of casing may be utilized having a recess 4 for the bimetallic blades 5 and 6. The blade 5 is supported at one end between blocks 7 and 8 which may be of insulating material or at least the blades should be insulated therefrom. The blade 6 is spaced from the blade 5 by the block 8 on the outer face of which an end of the blade 6 is secured.

The screw 9 is in metallic contact with the blade 5 and the screw 10 is in metallic contact with the blade 6. The block 8 may be conveniently recessed to receive the head of the screw 9. The blades respectively carry two contact points 11 and 12 at their free ends and these are normally in contact. A means for varying movement of the blade 5 under heat may be a screw for instance as shown at 13 extending through a portion 1 of the supporting member and this screw may cause engagement of the contacts 11 and 12 under different degrees of pressure whereby, as will be seen hereinafter, the degree of temperature at which the contacts will separate may be varied and cause separation of the contacts and breaking of the electric circuit at a predetermined temperature.

While there are various compositions of bimetallic elements suitable for the use herein described it is necessary to choose the element having the variable deflection curve that has sub-

stantially the same deflection curve as the other element within a certain temperature range and then abruptly changes at a temperature above said range. The purpose of this is to secure a bimetallic switch that will not break the circuit until a certain temperature is attained.

An example of the compositions suitable for the respective blades is as follows:

The blade **6** on the low expansion side is of the 36 per cent nickel-steel alloy and the high expansion side is 60 per cent nickel-steel alloy. The blade **5** has the low expansion side 50 per cent nickel-steel and the high expansion side 22 per cent nickel, 3 per cent chromium and the balance iron.

The chart, Fig. 2, shows the respective deflection curves of the two blades or elements wherein it will be seen that under temperature, the blade **5** is practically constant in its deflection curve while the blade **6** has practically the same deflection curve up to about 300 degrees F., at about 400 degrees F., practically ceases in deflection and at 600 degrees F. the bimetals are deflected in opposite directions relieving the contact pressure and breaking contact. Other bimetal compositions can be provided of such character that separation of the contacts of the blades will take place at a higher or a lower temperature but with any blades so arranged and of a composition to produce this character of variation in deflection of curve, it is preferable to use an adjustable stop **13**.

This stop, as heretofore stated, applies pressure to the blade **5** to hold the contacts **11** and **12** under pressure contact more or less limited by the flexibility of the blades and this will vary the time of separation of the contacts under influence of heat, the less pressure permitting separation of the blades at a lower temperature than will be secured through applying a higher pressure to the blade **5**. It will also be observed that the switch may be made without a stop or a non-adjustable stop could be utilized and under either condition the thermostat is not variable as to temperature at which the contacts will be separated.

It will be observed from the foregoing that by use of bimetallic blades having the thermal characteristic and deflection curves of the general character herein described can be utilized to maintain an electric circuit closed while under influence of heat until a certain temperature of the blades is attained whereupon a breaking of the circuit will result, that the device is simple and inexpensive in construction and the various objects and features of the invention are attained by the structure described.

Having thus fully described our invention, its utility and mode of operation, what we claim and desire to secure by Letters Patent of the United States is—

1. A thermostatic switch, a pair of bimetallic elements forming terminals of an electric circuit and normally in position closing the circuit, one of the said terminals having a substantially uniform deflection curve and the other of said elements having a like deflection curve within a certain temperature range and practically ceasing deflection at a higher temperature whereby at said higher temperature the elements so relatively deflect as to break the circuit.

2. In a thermostatic switch, a pair of bimetallic elements forming terminals of an electric circuit, each having a contact normally in engagement, said elements being supported at a point distant from the contact points thereby permitting the said elements to deflect under influence of heat, one of the said elements having a substantially constant deflection movement and the other of said elements having a like deflection movement within a certain temperature range and practically ceasing the deflection movement at a certain higher temperature whereby the contacts are separated at certain higher temperature and the circuit broken.

3. In a thermostatic switch, a pair of bimetallic elements forming terminals of an electric circuit, each having a contact normally in engagement, said elements being supported at a point distant from the contact points thereby permitting the said elements to deflect under influence of heat, one of the said elements having a substantially constant deflection movement and the other of said elements having a like deflection movement within a certain temperature range and practically ceasing the deflection movement at a certain higher temperature whereby the contacts are separated at certain higher temperature and the circuit broken, and adjustable means for varying the deflection movement of one of the elements thereby delaying the separation of the contacts and predetermining the temperature at which separation of the contacts may take place.

4. A thermostatic switch, comprising a support, a pair of bimetallic elements secured thereto, one of the said elements having practically a uniform deflection curve under increasing heat, said blades having contact points at a distance from the point of support normally in engagement and forming terminals of an electric circuit, the other element having a deflection curve closely approaching that of the first element within a certain temperature range and then practically ceasing deflection movement at certain higher temperature whereby at the said higher temperature the contacts are separated and the circuit broken.

5. In a thermostatic switch, a pair of bimetallic elements forming terminals of an electric circuit, said elements having contact points normally in engagement to close the circuit, the said elements being fixedly supported at a point distant from the contact points, said elements under influence of heat having like deflection curves within a certain temperature range thereby maintaining the contacts in engagement and at certain increased temperature, one of the said elements changing in its deflection movement to cause separation of the contacts to thereby break the circuit.

6. In a thermostatic switch, a support, a pair of bimetallic elements attached thereto at a fixed point, the said elements lying in parallel spaced relation, a contact carried by each element at a distance from its fixed point of support for engagement with the contact of the other, said bimetallic elements being of such respective character that under influence of heat the elements deflect alike within a certain temperature range and one of which practically ceases its deflection movement at a certain higher temperature while the other continues its deflection movement to thereby separate the contacts.

7. In a thermostatic switch, a pair of spaced bimetallic elements forming terminals of an electric circuit, means for fixedly supporting the elements at one point, a contact carried by each element at a point distant from the point of support, the contacts being normally in engagement and the major portion of the elements being free to deflect under influence of heat, the elements being of such respective compositions and dimensions as to respond substantially alike to influence of heat within a certain temperature

range and at a certain higher temperature differ in heat responsiveness, and means restraining deflection of the element whose deflection curve changes at a higher temperature than the first element to thereby prevent separation of the contacts until a predetermined temperature has been attained thereby causing separation of the contacts as said higher temperature.

8. A thermostatic switch, comprising a support, a pair of spaced bimetallic elements forming terminals of an electric circuit, means for fixedly supporting the elements at one point, a contact carried by each element at a distance from the point of support, the contacts being normally in engagement and the major portion of the elements being subject to deflection under influence of heat, means for applying pressure to one of the elements to normally hold the contacts in pressure engagement, the elements being of such respective compositions and dimensions as to respond substantially alike to influence of heat within a certain temperature range and at certain higher temperature differ in heat responsiveness thereby causing separation of the contacts at said higher temperature, said means for maintaining the pressure contact restraining the deflection movement tending to separate the contacts and to thereby practically determine the temperature at which the contacts may separate.

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