

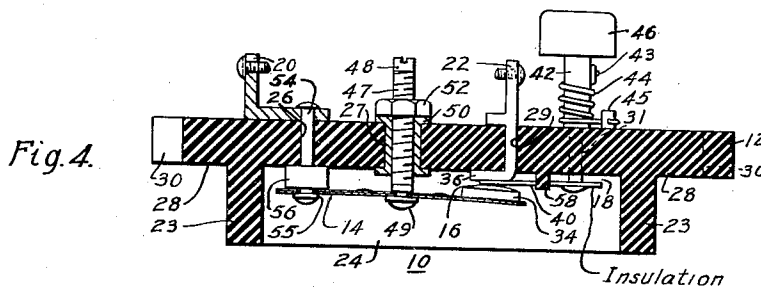
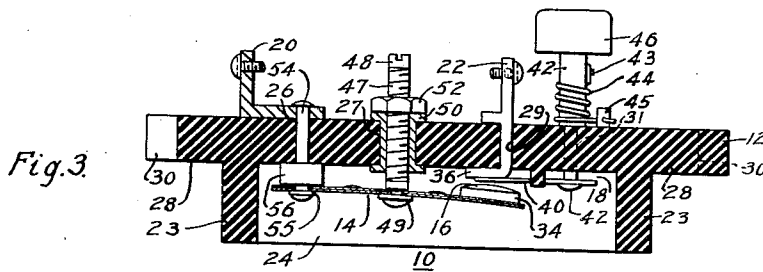
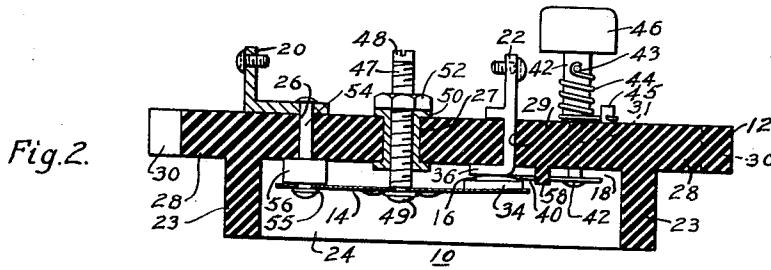
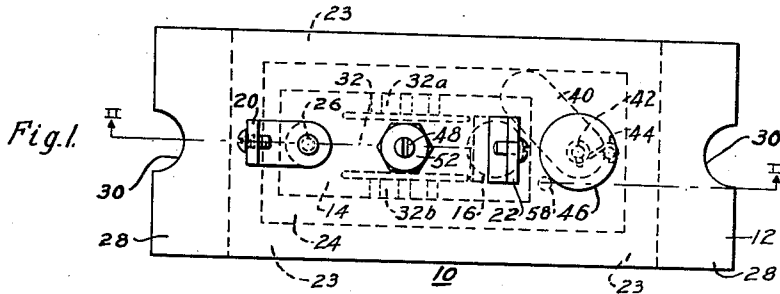
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2,210,677

MANUAL RESET THERMOSTAT

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WITNESSES:

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2,210,677

## MANUAL RESET THERMOSTAT

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2 Claims. (Cl. 200—138)

My invention relates to thermostatic devices and more particularly to a bimetallic, strip-type manual-reset thermostat.

An object of my invention is to provide an efficient, rugged, snap-acting, thermostatic device capable of carrying a large current, and which cannot be manually reset after disengagement until the bimetallic element thereof is in an operable position.

A further object of my invention is to provide a small inexpensive thermostatic device having a minimum number of cooperating parts which will readily fit into a small motor, or the like, and which is stable and dependable in operation, irrespective of the incidental jars, vibrations, etc., in such motor.

Another object of my invention is to provide a thermostat including a bimetallic member and cooperative contacts together with a contact separating mechanism for restricting the mating of the contacts after such contacts have been disengaged, and means for bodily moving such contact separating mechanism from between the contacts for permitting the mating of such contacts when the bimetallic member is in its operable position.

Other objects of my invention will either be pointed out specifically in the course of the following description of a device embodying my invention, or will be apparent from such description.

In the accompanying drawing:

Figure 1 is a top view of a device embodying my invention; and

Figs. 2, 3 and 4 are sectional views illustrating the thermostatic device in its various operable positions taken along the line II—II of Figure 1.

Referring to the accompanying drawing in which like reference characters indicate like parts in the several figures, I show a thermostatic device or circuit regulator 10 having a base or supporting structure 12, a bimetallic heat responsive member 14, a circuit-maker and breaker 16, a contact separating mechanism 18 and a plurality of terminals 20 and 22 for connecting the device 10 to a circuit.

The base 12 is, in this instance, formed from any suitable phenolic resin or other suitable insulating material. An open faced hollow central portion or recess 24 is formed by means of a continuous depending side wall 26 of substantially rectangular shape. A plurality of apertures 26, 27, 29 and 31 are formed within the main portion of the base 12 to afford means for attaching the various operating parts, such as the terminals

20 and 22, contacts separating mechanism 18, and adjusting screw 48 as hereinafter described. Outwardly extending ledges 28 are located one at each end of the base 12. The ledges 28 have a semicircular notch 30 positioned in the outer edge at substantially the midpoint thereof. The ledges 28 and semicircular notches 30 thus provide suitable supporting means for rigidly attaching the base or supporting structure 12 to any desired motor or the like. It is to be understood, however, that the particular base or supporting structure hereinabove described is merely a preferred form, and that any other suitable supporting structure may be used in lieu thereof.

The bimetallic member 14 is preferably a unitary elongated bimetallic member having three substantially parallel leg portions 32, 32a and 32b (see Fig. 1). The outside legs 32a and 32b have waves formed therein intermediate the ends thereof. This deformation produces an inherent snap-acting action in the bimetallic member 14 as it snaps from one operating position to another. This preferred structure and method of formation thereof is described in my copending application Serial No. 250,538, filed January 12, 1939. However, it is to be understood that any other suitable bimetallic member may be used in lieu thereof. The bimetallic member 14 thus constitutes an elongated strip-type member which is rigidly attached at one end to the supporting structure 12 and may have a suitable adjusting means 47 rigidly attached to the central leg thereof for adjusting its operation. However, it is to be understood that the bimetallic member 14 may be adjusted in any other suitable manner.

The circuit-maker and breaker 16 comprises a movable contact 34 and a stationary contact 36. The contact 34 is attached directly to the movable or free end of bimetallic member 14. The contact 36 is attached to, or, as in this instance, is integral with the terminal 22. However, the contact 36 may be attached to the supporting structure or base 12 in any other desired manner. The contacts 34 and 36 are so located with respect to each other as to properly cooperate as the bimetallic member 14 moves from an operable to an inoperable position and vice versa.

The contact separating mechanism 18 comprises, in this instance, an insulating movable member 40, a shaft 42, resilient member 44 and a control knob or handle 46. The insulating member 40 is merely an insulating finger which is adapted to be positioned between the contactors 34 and 36. The insulating member 40 is located in substantially a horizontal position or substan-

tially parallel to the main portion of the base or supporting structure 12 and is rotatively mounted with respect to the cooperating contacts and base 12 by means of shaft 42. The member 40 and shaft 42 are biased in a counterclockwise direction by means of the resilient member 44, the possible limit of such rotative movement being determined by a suitable stop or boss 58.

The shaft 42 extends through aperture 31 in base 12 and has the insulating member 40 attached to the lower end thereof. The shaft 42 has an upper relatively large portion and a lower relatively small portion with an abrupt shoulder therebetween. The relatively small portion of the shaft 42 extends through the aperture 31 in the base 12 into the hollow central portion 24, while the shoulder between the small and large portion thereof, rests upon the upper surface of the base 12. The insulating member 40 is then rigidly stationed at the lower end of the relatively small portion of the shaft 42 so as to move simultaneously with such shaft.

The resilient member 44 is, in this instance, a loosely wound helically coiled spring rigidly attached at one end by a pin 45 to the base 12. The resilient member 44 after being wound around the relatively large portion of the shaft 42 has its upper end attached to the upper portion of such shaft by means of a suitable pin 43. The resilient member 44 thus biases the shaft 42 and insulating member 40 in a counterclockwise direction.

The knob 46 is rigidly attached to the upper free end of the shaft 42 so that an operator may rotate the shaft 42 by merely rotating the knob 46. Such knob is preferably formed from a phenolic resin. However, it may be formed from any other suitable material.

The terminals 20 and 22 are rigidly attached to the supporting structure or base 12 in any desired manner or in a preferred manner, as hereinafter described. The terminal 20 is, in this instance, merely a small portion of an angle member. This member is rigidly attached to the base 12 by means of an elongated rivet 54 which extends through the horizontally positioned portion of the angle, through the aperture 26 in the base 12, supporting block 56, the end of the bimetallic member 14 and washer 55. The ends of the rivet 54 are then spun or riveted over against the angle iron at the upper end and washer 55 at the lower end. It is preferred that the supporting block 56 be an integral part of the rivet 54. The terminal 20 and bimetallic member 14 are thus rigidly attached to the base or supporting structure 12 by means of the rivet 54.

The terminal 22 is, in this case, integral with the stationary bent-under contact 36 and extends through the aperture 29 in the base 12. However, it is to be understood that the terminal 22 may be a separate member rigidly attached to the stationary contact 36 in any well known manner.

A suitable adjusting mechanism 47 is attached to the base or supporting structure 12 and operatively associated with the bimetallic member 14 to adjust the operation thereof. The adjusting mechanism 47 includes, in this instance, an elongated screw 48, a sleeve member 50, and a nut 52. The sleeve member 50 extends through aperture 27 in the base and has outwardly extending flange portions at either end thereof to rigidly attach it to the base. It is preferred that the sleeve member 50 be cast integral with the phenolic resin material of base 12 so that the flange portions thereof need not

be formed thereon after the base 12 is formed. The inner surface of the sleeve 50 is threaded to cooperate with the screw 48. The screw 48 may thus be rotatively positioned within the sleeve 50 so as to cooperate with the bimetallic member 14. The lower end of the screw 48 has a suitable cap 49 which is used to attach such screw to the central leg 32 of the bimetallic member 14. The screw 48 may thus be rotated within the sleeve 50 and due to such movement be bodily moved in a vertical direction so as to adjust the relative position of the central leg of bimetallic member 14. After adjusting the screw 48 to the desired position, a suitable nut 52 may be run down upon the screw 48 tightly against the sleeve 50 to lock the screw 48 in its selected position.

When assembling the circuit regulator 10, the bimetallic member 14 is first rigidly attached to the rivet 54 against the shoulder or block 56. This unit is then assembled to base 12 and terminal 20, and rigidly attached to the base 12, as hereinabove described. With the bimetallic member 14 located within the hollow central portion 24, the adjusting screw 48 of adjusting mechanism 47 is then positioned within the sleeve 50 and attached to the bimetallic member 14. The contact separating mechanism 18 is likewise positioned in the supporting structure 12 as described above, the insulating member 40 being positioned on the lower end thereof, with the resilient member 44 and the adjusting knob 46 located at the upper portion thereof. The insulating member 40 is thus biased toward the stationary and movable contacts 36 and 34 by means of the resilient member 44 through the cooperative shaft 42. However, when the thermostatic device is in a closed or engaged position with the contact means 16 engaged or mated, such contacts restrict the angular movement of insulating member 40 (see Fig. 2), and it has no effect thereon.

When operating the thermostat or circuit regulator 10 with the bimetallic member 14 thereof in a closed or engaged position and with such thermostat operatively associated with a circuit (not shown), the bimetallic member 14 will carry the full current of such circuit. With a continued passage of electrical current through the thermostat and bimetallic member 14, such bimetallic member will, due to its high resistance, increase in temperature. With a suitable predetermined increase in temperature thereof such bimetallic member will, because of its inherent characteristics, snap to its open or disengaged position, (see Fig. 3). It is understood that the bimetallic member receives heat from both the energy translating device upon which the thermostat is attached, and the current passing through such bimetallic member.

As the bimetallic member increases in temperature and snaps to its open position, the movable contact 34 will be moved downwardly (see Fig. 3) and become disengaged from the stationary contact 36. The insulating member 40 which is biased in a counterclockwise direction by means of resilient member 44, is thus free to rotate between contacts 34 and 36. That is, as the cooperating contacts 34 and 36 become disengaged, the insulating member 40 suddenly moves from its preliminary fixed position touching the sides of the contacts to a secondary fixed position between such contacts, it being understood that the angular movement of the insulating member 40 is limited by means of stop or boss 58.

With the bimetallic member 14 in an open or

disengaged position, the flow of current through the thermostat or circuit regulator 10 will cease. Likewise, the flow of current to and through the associated energy-translating device to be protected (not shown) will stop. Then when the temperature of bimetallic member 14 decreases to a predetermined value by reason of the cooling-off of said device, such member will attempt to return to its original engaged position.

10 The reengagement of the movable contact 34 with the stationary contact 36, as the bimetallic member 14 snaps from an inoperative to an operative position, is prevented due to the insulating member 40 being already positioned between such contacts 34 and 36 as previously described, (see Fig. 4). The insulating member 40 thus prevents the reengagement of the cooperating contacts 34 and 36 even though the bimetallic member 14 is in an operable position.

20 To reengage the cooperative contacts 34 and 36, it is merely necessary for an operator to rotate the knob or handle 46 in a clockwise direction. The insulating member 40 will thus be moved in a clockwise direction against the biasing action of the resilient member 44, to remove it from between the contacts 34 and 36, permitting such contacts to reengage or mate. Then upon releasing the knob 46, the resilient member 44 will bias and rotate the insulating member 40 in a counterclockwise direction, to a point where the member 40 will touch the reengaged contacts 34 and 36, as hereinabove described.

It is, therefore, obvious that I have provided a thermostat or circuit regulator having means for preventing the automatic reengagement of the cooperating contacts after the bimetallic member thereof has snapped from its operative to its inoperative position and attempts to return to operative position. Further, the cooperating contacts of such regulator may be reengaged upon the proper movement of the control knob 46.

It is obvious that the thermostat or circuit regulator cannot be reset unless the bimetallic member has returned to its operative position that is, the "cold" position, wherein the contacts tend to engage, inasmuch as when it is not in its operative position, the insulating member 40 of contact separating mechanism 18 will again function to position itself between the contacts even though prematurely operated by an operator in an attempt to reset the motor. Accordingly, it follows that such thermostat or regulator can only be actually reset when the bimetallic member is in an operative position.

In addition, it is obvious that any premature attempt to reset the thermostat will not affect the operation of the bimetallic member, inas-

much as there is no connection between the resetting mechanism and the bimetallic member.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and the appended claims.

I claim as my invention:

1. A circuit regulator comprising, in combination, a supporting structure, a heat-responsive member, a circuit-maker and breaker comprising a stationary contact member and a cooperating movable contact member mounted directly upon the heat-responsive member, and an insulating member, said members all disposed on one side of the supporting structure, a resilient member operatively associated with such insulating member for biasing and moving the member between the contacts when the contacts have become disengaged for preventing reengagement of such contacts, and means including a handle operatively associated with the insulating member and resilient member for rotating the insulating member from between the contacts against the action of the resilient member to permit engagement of the contacts when the heat-responsive member is in its operating position, said resilient member and said means being disposed on the opposite side of the supporting structure.

2. A circuit regulator comprising, in combination, an insulating supporting structure, a bimetallic heat-responsive current-carrying member, a pair of cooperating contact members, one of such contact members attached to the free end of the bimetallic member, and a contact separating mechanism for preventing the automatic reengagement of the contact members after they have been disengaged, said mechanism including an insulating member, all of said members being disposed on one side of the supporting structure, a shaft extending through said structure for supporting the insulating member in close relation to the contacts, a resilient member for rotatively biasing the insulating member and shaft about the shaft axis and moving such insulating member between such contacts after they are disengaged, and an operating knob attached to the free end of the shaft for rotating the shaft and insulating member against the action of the resilient member to permit reengagement of the contacts when the bimetallic member is in its operating position, said resilient member and said knob being disposed on the opposite side of the supporting structure.

PAUL R. LEE.