

Sept. 8, 1931.

A. A. THOMAS

1,822,069

THERMOSTAT

Filed May 31, 1928

Fig. 1

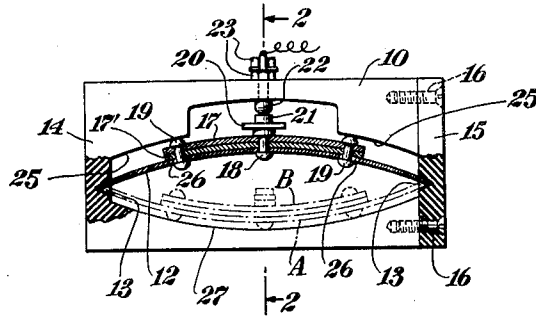
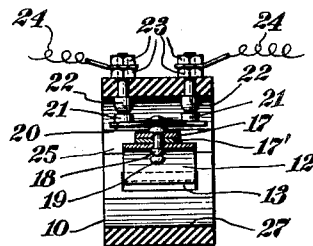


Fig. 2



INVENTOR

Adolph A. Thomas

UNITED STATES PATENT OFFICE

ADOLPH A. THOMAS, OF NEW YORK, N. Y.

THERMOSTAT

Application filed May 31, 1928. Serial No. 281,613.

This invention is for a new and improved thermostat adapted to operate with a snap action in opening and closing an electric circuit, or performing any other useful function. My device is exceedingly simple and compact, so that it can be housed in a very small space, as in electric flat irons and other heating appliances requiring temperature control.

10 The thermostat of my invention has only one moving part, which snaps back and forth at predetermined high and low temperature limits. In a preferred form of my invention, this operating part comprises a bowed spring
15 having a thermostat bar rigidly mounted thereon. The thermostatic movements or stresses of the bar force the spring abruptly into reverse curvature, these two members always moving as a unit from one position
20 to the other. If these movements are utilized to control an electric circuit, the contacts are not only opened and closed abruptly, but they are separated by a wide airgap which makes arcing impossible. This is an important
25 practical advantage.

A simple embodiment of my invention is illustrated in the accompanying drawings in which

30 Fig. 1 shows a face view, partly in section, of a thermostat constructed in accordance with my invention; and

Fig. 2 represents a transverse section on line 2—2 of Fig. 1.

35 A frame 10 of rectangular outline carries a buckling spring 12, the ends of which engage in recesses 13 formed in the opposite sides 14 and 15 of the frame. The spring 12 is here shown as a strip or blade, but it may be a cupped disk or any other curved
40 elastic member adapted to reverse its shape suddenly under pressure. To facilitate mounting of spring 12 in frame 10, the side 15 is made separate from the body of the frame and is attached thereto by screws 16.
45 The frame 10 may be cast of metal (such as brass, aluminum, etc.) or molded of strong insulating material (like condensation products, for instance) capable of withstanding high heat.

50 The elastic member 12 carries a thermo-

stat bar 17 rigidly mounted thereon by rivets 18 and 19, or in any other practical way. The central rivet 18 also supports a resilient plate 20 provided with contacts 21, which normally engage a pair of insulated contacts 22 on frame 10. The plate 20, which is of good conducting metal, normally closes the circuit through the two pairs of contacts 21—22 in series. The contacts 22 may be the heads of bolts secured to the frame by nuts 23, which also act as binding posts for conductors 24. If the frame 10 is of metal, at least one of the contacts 22 must be insulated from the frame.

When the parts are in normal position, as shown in Fig. 1, the contacts 21 are in firm pressure engagement with contacts 22. I have attempted to indicate this in Fig. 2 by showing the spring plate 20 slightly curved under tension. In an instrument of given design, the normal pressure between contacts 21 and 22 can be regulated by the screws 16. It is evident from Fig. 1 that, as the side 15 is screwed in, the curvature (and hence the normal tension) of spring 12 is increased. The rivet heads 19 normally touch (or almost touch) the stop shoulders 25 on frame 10.

The thermostat bar 17 is of usual bimetallic construction in which the inner strip 17' has the higher coefficient of expansion. The most common form of thermostat bar comprises strips of brass and iron welded together, or otherwise rigidly attached. As the temperature of the thermostat bar 17 rises, it is subjected to increasing stresses, until a point is reached when the bar snaps into reverse curvature, carrying the spring 12 along with it. The dotted lines A and B in Fig. 1 roughly indicate the reversed position of the buckling unit 12—17. The contacts 21 are abruptly separated from contacts 22 by wide airgaps, through which the circuit is broken in series, so that arcing is entirely eliminated. When the thermostat bar 17 cools to a predetermined temperature, it snaps back to normal position, bringing the contacts 21 with a jam against contacts 22.

Whatever slight preliminary movements of thermostat bar 17 may occur prior to its buckling, the resilient plate 20 automatically

compensates for such movements and holds the contacts 21 and 22 together until the bar actually snaps into reverse curvature. There is thus no fluttering of contacts 21 to cause arcing. In some instances it may be advisable to provide slots 26 in spring 12 for the bolts or rivets 19 to permit a slight relative movement between the spring and the ends of bar 17, so as to relieve the parts of undue strains or stresses during the buckling operation. The edge 27 of frame 10 acts as a stop for the buckling unit 12—17 in circuit-breaking position. The curved spring member 12 performs the double function of supporting the thermostat bar 17 and restraining its movement until certain high and low temperatures are reached. It is not necessary to make the part 12 of spring steel, for it can be made as a bowed strip or dished disk of any elastic metal or alloy having enough elasticity to restrain the bar 17 and snap with it into reverse curvature. For convenience I have shown the thermostat member 17 mounted in direct mechanical contact with spring 12, but it is evident that washers or other spacing elements can be interposed and held in place by the securing members 18 and 19.

It is clear from the preceding description that my new thermostat is characterized by utter simplicity of structure and certainty of operation without arcing. The device is not only compact, but cheap to manufacture and easy to calibrate. The parts are quickly assembled and there is nothing to get out of order. There is really only one moving part—namely, the thermostatic buckling unit 12—17. Thermostat bars of different dimensions or temperature characteristics can be mounted on springs of the same size to produce instruments in which the circuit is opened at different temperatures. Or, thermostat bars of identical size and characteristics may be mounted on spring members having different degrees of elasticity or resistance to a reversal of curvature. Either method is simple and reliable to produce thermostats adapted to operate at predetermined high and low temperatures.

Although I have shown and described a certain construction, my invention is not limited to the details set forth. Changes and modifications may be resorted to without departing from the scope of the invention as defined in the following claims. It is hardly necessary to add that the illustrations are not intended to be shop drawings on a mathematically accurate scale; on the contrary, the relative proportions of the parts have been purposely exaggerated for clearness. The actual device can be made smaller than the drawings.

I claim as my invention:

1. A thermostatic buckling member comprising a buckling spring carrying a curved

thermostat bar rigidly mounted thereon, so that these two parts always reverse their curvature as one member at predetermined high and low temperatures, and means for so connecting the ends of said bar to said spring as to prevent undue strains or stresses in these parts during the buckling operations.

2. A thermostat comprising a curved elastic member adapted to reverse its curvature under pressure, and a thermostat member rigidly mounted on said elastic member and curved to lie substantially in engagement therewith, said thermostat member being adapted to reverse its curvature suddenly at predetermined high and low temperatures, said elastic supporting member carrying said thermostat member bodily with a snap action from one position to the other when the thermostat member reverses its curvature.

3. A thermostat comprising a substantially rectangular support, a buckling spring mounted at its ends on said support, a curved thermostat bar rigidly mounted on said spring and secured thereto at its ends, said spring extending beyond the ends of said bar and carrying the latter bodily into positions of reverse curvature at predetermined high and low temperatures, said spring and bar snapping back and forth as one member under the thermostatic stresses in the bar, and stops on said support to limit the movements of said buckling member.

4. A thermostat comprising a buckling spring supported at its ends, a similarly curved thermostat bar rigidly connected over its entire length to said spring, which extends beyond the ends of said bar and constitutes the sole support therefor, said bar and spring being adapted to snap into reverse curvature as a unit at predetermined high and low temperatures, the connection between said spring and the ends of said bar being such as to relieve undue strains or stresses during the buckling operations.

5. A thermostat comprising a buckling spring supported at its ends, and a thermostat bar rigidly mounted on said spring and curved to lie in contact therewith, said spring extending beyond the ends of said bar and carrying the latter bodily into positions of reverse curvature at predetermined high and low temperatures, said spring and said bar snapping back and forth as one member under the thermostatic stresses in the bar, and means for regulating the normal curvature and tension of said spring.

6. A thermostat comprising a substantially rectangular support, a buckling spring mounted at its ends in the sides of said support, one of said sides being adjustable longitudinally of the spring to regulate the normal curvature and tension thereof, a curved thermostat bar rigidly mounted on said

spring, which extends beyond the ends of said bar and carries the latter bodily into positions of reverse curvature at predetermined high and low temperatures, said spring and said bar snapping back and forth as one member under the thermostatic stresses in the bar.

7. A thermostat comprising a buckling spring supported at its ends and adapted to snap into reverse curvature from either position to the other, said spring remaining stable in each position, a thermostat bar rigidly mounted on said spring and curved to lie in engagement therewith, whereby said spring and said bar snap back and forth as one member under the thermostatic stresses in the bar, said spring carrying the thermostat bar bodily into positions of reverse curvature at predetermined high and low temperatures, and stops on opposite sides of said buckling unit adapted to engage the same and thereby limit the movements of the unit in each direction.

8. A thermostat comprising a substantially rectangular support, a buckling spring mounted at its ends on said support and adapted to snap into reverse curvature from either position to the other, said spring remaining stable in each position, a curved thermostat bar mounted on said spring and rigidly connected thereto at its ends and center, said spring extending beyond the ends of said bar and carrying the latter bodily into positions of reverse curvature at predetermined high and low temperatures, said spring and said bar snapping back and forth as one member under the thermostatic stresses in the bar, and stops carried by said support to engage said buckling unit in each position.

9. A thermostat comprising the combination of a buckling spring supported at its ends and adapted to reverse its curvature with a snap action from either position to the other, said spring remaining stable in each position, and a bowed thermostat bar rigidly connected to and carried by said spring, whereby said spring and bar snap into reverse curvature as a unit at predetermined high and low temperature limits, said buckling spring in either position opposing the thermostatic movements of said bar until said high and low temperature limits are reached.

ADOLPH A. THOMAS.