

March 15, 1927.

G. T. NEWELL, JR

1,621,023

THERMOSTAT

Filed Nov. 12, 1923

Fig. 1.

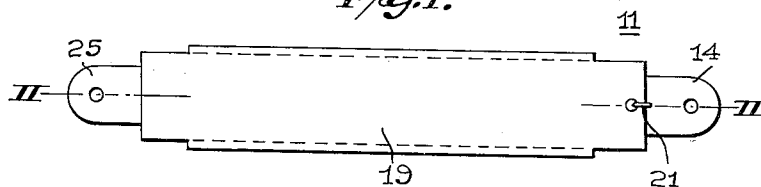


Fig. 2.

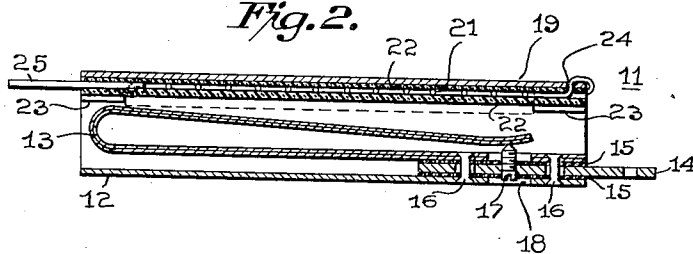


Fig. 3.

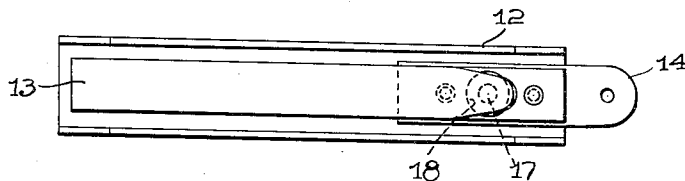


Fig. 5.

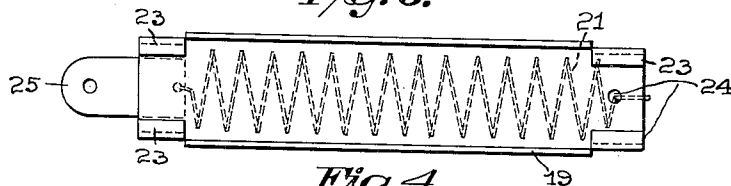


Fig. 4.

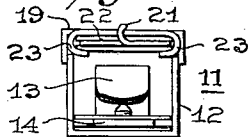
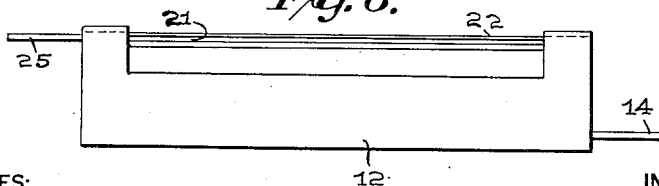


Fig. 6.



WITNESSES:

R. S. Harrison
H. M. Biebel

INVENTOR

George T. Newell, Jr.

BY

Herbert S. Carr
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE T. NEWELL, JR., OF BEVERLY, NEW JERSEY, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

THERMOSTAT.

Application filed November 12, 1923. Serial No. 674,137.

My invention relates to temperature-controlling means and particularly to thermostats.

The object of my invention is to provide a relatively simple and compact thermostat that shall embody means for compensating for the time-temperature lag thereof.

In using a metal-enclosed thermostat structure in an electrically heated warming pad, it is found that there is a time lag of the thermostat relatively to the pad. It has been found, for instance, in hospital shock pads, that this time lag is so pronounced that the temperature of the pad may go to 220° F. before the thermostat itself reaches a temperature of 185° F., for which it has been carefully adjusted. This is caused by the heat storage characteristic or heat-shielding effect of the metal casing, and is effective upon any change of temperature to cause the circuit to be interrupted at either a higher or at a lower temperature than desired.

In practicing my invention, I provide a metal casing having relatively thin walls and having a bi-metallic strip mounted therein. A heating element is insulatedly mounted on the casing and is connected in series circuit relation to the bi-metallic strip.

In the drawing,

Figure 1 is a top plan view of a thermostat structure embodying my invention,

Fig. 2 is a view, in longitudinal section therethrough, taken on the line II—II of Fig. 1,

Fig. 3 is a top plan view thereof with the cover member removed,

Fig. 4 is a view in end elevation thereof,

Fig. 5 is a top plan view of a modification of the device embodying my invention, and

Fig. 6 is a view, in side elevation, of the device illustrated in Fig. 5.

A thermostat 11 comprises a casing member 12 that is open at its ends and top, that is of formed and relatively thin sheet metal and that is also of relatively small dimensions. A return-bent thermostatic strip 13 is located within the casing member 12 and

has one end thereof secured against the inside of the casing 12, a terminal member 14 being located between the end of the strip 13 and the casing 12 and strips 15 of insulating material being interposed between the terminal member 14 and the casing and the thermostatic strip respectively.

A plurality of rivet members 16 are employed to secure the hereinbefore described members in proper operative positions relatively to each other, substantially as illustrated in Fig. 2 of the drawing. This construction provides an electrical connection between the casing 12 and the one end of the bi-metallic strip 13 through the rivet 16.

The terminal bar 14 is provided with an adjustable screw 17 extending therethrough and through an opening 18 in the casing 12, whereby it is insulated from the casing and normally constitutes a contact member for electrically connecting the terminal member 14 to the end of the strip 13 that moves toward or away from the member 17 in accordance with the temperature to which it is subjected.

A cover member 19, which is provided for the open top casing 12, is of relatively thin sheet metal, and is of substantially channel form, as illustrated more particularly in Fig. 4 of the drawing. A resistor member 21 is insulated by a layer of thin electric insulating material, such as mica, wound around the same. The heating unit, comprising the resistor member 21 and the insulating material 22 is located inside of the cover member 19, end portions of which are bent around the unit, as is illustrated more particularly in Fig. 4 of the drawing, in order to hold the heating unit in its proper operative position within the cover member.

While I have illustrated a particular method of securing the heating unit against the cover member, I do not wish to be limited thereto, although I have found the hereinbefore described method very simple, effective, and one that can be easily employed in the manufacture of the device.

One end of the resistor member 21 is elec-

trically connected to the cover member, an opening 24 being provided therethrough in order to permit of such connection. An insulated terminal member 25 is provided for the heating unit at the other end of the cover member, to which terminal member the other end of the resistor 21 is electrically connected. Both of these connections and the relative locations thereof are illustrated more particularly in Fig. 2 of the drawing.

When the cover member 19, together with the heating unit operatively associated therewith, is placed in its proper operative position on the casing 12, the circuit of a current traversing the thermostat that is connected in series with a heating resistor member (not shown) which it is to control, is as follows:

From the terminal member 14 through the screw 17, bi-metallic strip 13, rivets 16, casing 12, cover member 19, resistor 21 and out through the terminal member 25.

The heat storage capacity of the resistor member 21 is substantially equal to the heat storage capacity of the assembled device which, as hereinbefore stated is relatively small.

In the construction illustrated in Figs. 1 to 4, inclusive, any heat generated in the resistor 21 is radiated directly through the outer layer of insulation 22 against the thermostatic strip 13 and the result is that with the proper co-operation of all of the factors entering into the design of such a thermostatic structure, the temperature of the bimetallic strip 13 follows very closely to the changes of temperature of the device with which it is operatively associated, which, as stated above, is usually an electrically heated warming pad.

As the material of such a warming pad is of a relatively low storage capacity and follows the changes of temperature caused by an extended heating element operatively associated therewith very closely, the use of such a device as is embodied in my invention, is very necessary and when such a thermostat structure as herein disclosed is employed, the temperature of the warming pad at which the circuit is interrupted, will be substantially that for which it has been previously adjusted. That is, the temperature gradient of the thermostat 11 and its heater 21 correspond to the temperature gradient of the heating pad to be controlled, thus permitting the bimetallic strip 13 to respond directly to the temperature of the heating pad.

Figs. 5 and 6 illustrate a modified form of thermostat embodying my invention, the main difference being in the location of the heating unit relatively to the cover member. In this form of construction, the heating unit comprising the resistor 21 and the mica insulation 22 is located on the outside of the

cover member, the integral inturned portion 23 of the cover member 19 being turned outwardly of the cover member instead of inwardly.

The action of this form of device is the same as was hereinbefore described for the form of construction illustrated in Figs. 1 to 4, inclusive.

The device embodying my invention thus provides a relatively small and compact thermostat structure that may be operatively associated with a device such as an electrically heated warming pad, and will be effective to follow very closely the temperature changes of the pad itself.

The closeness of regulation of the device may be regulated by proper selections of the length of the resistor wire 21 and the resistance thereof. It is possible to so select the resistor member 21 that the temperature of the thermostat structure itself will follow exactly the temperature of the device with which it is operatively associated.

The metal casing may be said to act as a heat shield between the bimetallic strip and a warming pad or other device, thereby causing the hereinbefore described time lag and the effect of the heating unit on the present invention is to counteract this heat shielding action.

Various modifications and changes may be made without departing from the spirit and scope of the invention, and I desire therefore, that only such limitations shall be placed thereon as are imposed by the prior art or are set forth in the appended claims.

I claim as my invention:

1. A thermostat structure comprising a bi-metallic strip, a casing therefor, a cover member for said casing extending longitudinally thereof, and coextensive therewith, and a heating element operatively mounted on said cover member parallel to said strip and adapted to compensate for the heat-storage capacity of said casing and cover member.

2. A temperature-controlling structure comprising a thermostatic electric switch, a metal casing therefor, and means on said casing for causing the temperature of the thermostatic switch to be substantially the same as the temperature outside of the casing during its operative period, said means being parallel to said switch.

3. In a thermostat structure, in combination, a bi-metallic strip, a metal casing therefor, and means comprising a heating element mounted on said casing and connected in series-circuit relation to said bi-metallic strip, for causing the temperature of the strip to be substantially the same as the temperature at the outside surface of the casing.

4. In a thermostat structure, in combina-

tion, a metal casing, a bimetallic strip mounted in said casing, a plurality of terminal members insulatedly supported by said casing, and a heating element connected in series circuit relation to said terminal members, casing, and bimetallic strip, for decreasing the time-temperature lag of

said structure when subjected to a varying temperature.

In testimony whereof, I have hereunto subscribed my name this 3rd day of November, 1923.

GEORGE T. NEWELL, Jr.