

Aug. 14, 1928.

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I. G. THOMAS
TEMPERATURE CONTROL SYSTEM

Filed Nov. 7, 1927

Fig. 1.

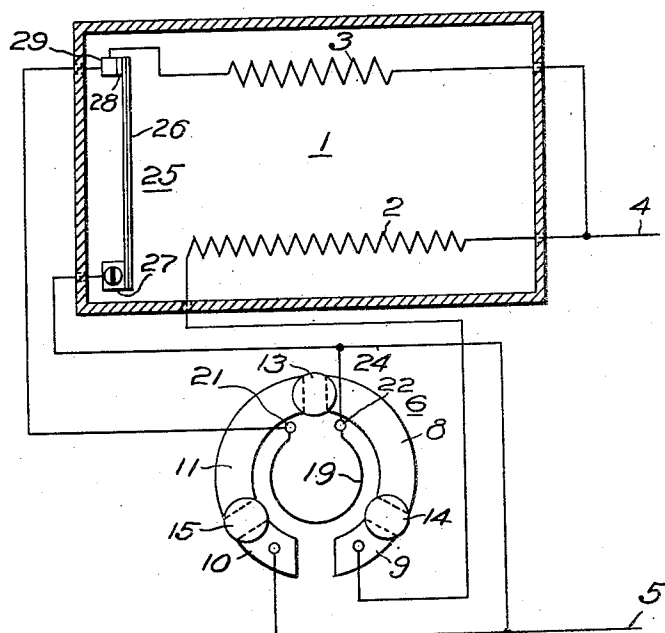
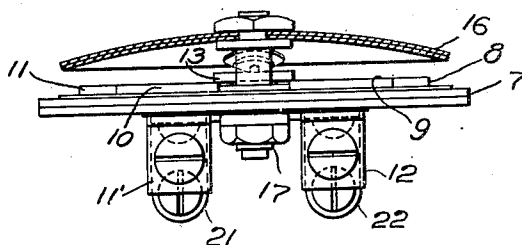


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TEMPERATURE-CONTROL SYSTEM.

Application filed November 7, 1927. Serial No. 231,535.

The invention relates to control systems and particularly to temperature control systems.

An object of the invention is to provide a temperature control system that shall be simple in construction, efficient in its operation and easily manufactured and installed.

Another object of the invention is to provide a temperature control system that shall be adapted to maintain the temperature of a body to be heated substantially constant.

For a fuller understanding of the invention, reference may be had to the following description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a schematic illustration of circuits and apparatus embodying the invention; and

Fig. 2 is a view, partially in section, of a circuit controlling device embodied in the circuits and apparatus of Fig. 1.

In the drawings an enclosed chamber 1 is provided with a main resistor element 2, and an auxiliary resistor element 3 which are connected to electric energy supply conductors 4 and 5.

The main resistor element 2 is connected in circuit with a switch or circuit interrupter 6 for effecting energization and de-energization thereof.

The switch or circuit interrupter in this embodiment of the invention is of the type disclosed in my copending application, Serial No. 211,054, filed August 6, 1927.

Briefly stated, the switch comprises a base 7 having a plurality of spaced stationary contact members 8 to 11, inclusive, secured to one face thereof and insulated therefrom. The contact members 9 and 10 are provided with terminals 11' and 12.

In order that a circuit may be controlled between the terminals 11' and 12, a plurality of contact bridging buttons 13 to 15, inclusive, are provided. The contact bridging buttons are carried by a thermostatic disc 16, which, in turn, is secured to the base 7 by a stud bolt 17, or other suitable means.

The disc 16 is preferably of the type disclosed in the patent to J. A. Spencer, No. 1,448,240. This disc has the characteristic that when the temperature thereof is below a predetermined value, the curvature thereof will be substantially that of Fig. 2 of the drawings, but if the disc is heated to a temperature of a higher predetermined value,

the curvature will reverse with a sudden snap motion thereby effecting disengagement of the contact bridging buttons 13 to 15, inclusive, from adjacent ends of the stationary contact members 8 to 11, inclusive.

Since the switch 6 is located outside of the chamber 1, it is not responsive to the temperature of the chamber. In order that the disc 16 may be heated to its operating temperature when a predetermined temperature obtains within the chamber, a switch actuating means, in the form of a resistance element 19, is provided. The element 19 is disposed between the disc 16 and the base 7 and is preferably secured to the base. The ends of the resistance elements 19 are connected to terminals 21 and 22 mounted on the base 7. The terminal 22 of the resistance element 19 is connected to the supply conductor 5 by a conductor 24, and the terminal 21 is connected to one terminal of the resistance element 3. Thus it is seen that the element 19 is permanently connected in series with the auxiliary resistance element 3 between the supply conductors 4 and 5.

In order that the resistance element 19 may be energized intermittently in accordance with the temperature to be maintained in the chamber 1, a thermostat 25 is provided for shunting the resistance element 19 when the temperature of the chamber 1 is below a predetermined value and for causing current, traversing the element 3, to traverse the element 19 when the temperature of the chamber is above a predetermined value.

The thermostat 25 may comprise a bimetallic strip 26 having one end thereof secured to a terminal 27 which is connected to the supply conductor 5 through the conductor 24. The other end of the strip 26 may be provided with a contact 28 for engaging the stationary contact 29 to which the resistance element 3 and a terminal 21 of the resistance element 19 are connected. When the strip 26 is in the position shown in Fig. 1 of the drawings, the resistance element 19 is shunted, or short-circuited, so that substantially no current flows therethrough. When the resistance element is so shunted, the current flows from the supply conductor 4 through the auxiliary resistance element 3, the strip 26 and the conductor 24 to the supply conductor 5.

If the temperature of the chamber reaches a predetermined value, the strip 26 causes

the contact member 28 to be disengaged from the contact 29, therefore the current traversing the resistance element 3 is caused to traverse, also, the resistance element 19. When the current traverses the element 19, radiant thermal energy is generated to heat the disc 16 to its operating temperature at which temperature the switch 6 is actuated and to thereby deenergize the main heating element 2.

The main heating element 2 will remain deenergized so long as the temperature within the body is above a predetermined value, but when the temperature has cooled to that value at which reengagement is effected between the contacts 28 and 29, the resistance element 19 will be shunted or short-circuited and substantially deenergized thereby permitting the switch 6 to be actuated to its circuit closing position automatically.

Since the resistance element 19 and the auxiliary element 3 are connected in series circuit with each other at all times, no arcing or burning of the contacts 28 and 29, of any consequence, will take place because the voltage tending to produce arcs therebetween will be absorbed by the resistance element 19.

It is desirable in the present embodiment of the invention that the auxiliary element 3 be of such heat generating capacity that only the radiation loss will be supplied thereby to the chamber 1, and that element 2 will have only that capacity necessary to supply the thermal energy required to perform any work desired within the chamber 1.

It is also to be understood that while a specific structure of switch has been shown for controlling the circuit of the resistance element 2, other circuit interrupting devices may be utilized.

The system illustrated in Fig. 1 of the drawings is operable to maintain the temperature of the chamber 1 at a very constant value because the thermostat 26 may be of the type which operates on a relatively small temperature differential. While the thermostat 25 has been shown as not being adjustable, it is to be understood that an adjustable thermostat may be utilized in practice, if so desired.

Various modifications may be made in the device embodying the invention without departing from the spirit and the scope thereof. It is desired, 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. In a temperature control system for a body being heated, in combination, a main heating element, a thermostatic circuit interrupter for controlling said heating element, a thermostat heating element for actuating said circuit interrupter, a continu-

ously current-traversed auxiliary heating element, and means responsive to the temperature of said body for diverting the current of the auxiliary heating element through the heating element of the circuit interrupter.

2. In a temperature control system for a body being heated, in combination, a main heating element for the body, a thermostatic switch for controlling the main heating element, a continuously current-traversed auxiliary heating element, switch actuating means in circuit with the auxiliary resistor element, a source of supply of electric energy for said heating elements, and means responsive to predetermined temperatures in said body for regulating the flow of current through the switch actuating means.

3. In a control system for a body to be heated, in combination, a main resistor element for the body, an auxiliary resistor element for the body, a switch for controlling the main resistor element, switch actuating means in circuit with the auxiliary resistor element and responsive to current traversing the same, and means responsive to the temperature of the body for rendering the switch actuating means responsive to the current traversing the auxiliary resistor element in accordance with said temperature.

4. In a control system, in combination, a body to be heated, a source of supply of electric energy, a main resistor heating element for the body connected for energization from said supply, and an auxiliary heating element continuously energized from the supply means in circuit with and responsive to current traversing the auxiliary heating element for controlling the circuit of the main heating element.

5. In a control system, in combination, a body to be heated, a source of supply of electric energy, a main resistor heating element for the body connected for energization from said supply, an auxiliary heating element continuously energized from the supply, means in circuit with and responsive to current traversing the auxiliary heating element for controlling the circuit of the main heating element, and means responsive to the temperature of the body for rendering the main resistance element controlling means either responsive or non-responsive to the current traversing the auxiliary heating element in accordance with predetermined temperatures to be maintained in the body.

6. In a temperature control system for a body to be heated, in combination, a source of supply of electric energy, a main resistor element in said body to be energized from said source, an auxiliary resistor element in said body and continuously energized from said source, a circuit interrupter for controlling the energization of the main resistor, means connected in circuit with and

responsive to current traversing the auxiliary heating element, and thermostatic means responsive to the temperature of said body for shunting said current responsive
5 means when the temperature of the body attains one predetermined value and for rendering said means responsive to said current when the temperature of the body reaches another value.
10 7. In a control system for a body to be heated, the combination with a main resistor element, a source of supply of electric energy therefor, and a circuit controlling device for the resistor element, of an auxiliary resistor element continuously energized

from said source, means for actuating the circuit controlling device connected in circuit with the auxiliary heating element, and means responsive to the temperature of the body for rendering the actuating means
20 non-responsive to the current traversing the auxiliary element when the temperature of the body is below a predetermined value and responsive thereto when the temperature is above a different predetermined
25 value.

In testimony whereof, I have hereunto subscribed my name this twenty-ninth day of October, 1927.

IRVIN G. THOMAS.