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THERMOSTATIC CONTROL FOR ELECTRIC CIRCUITS

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FIG. 1.

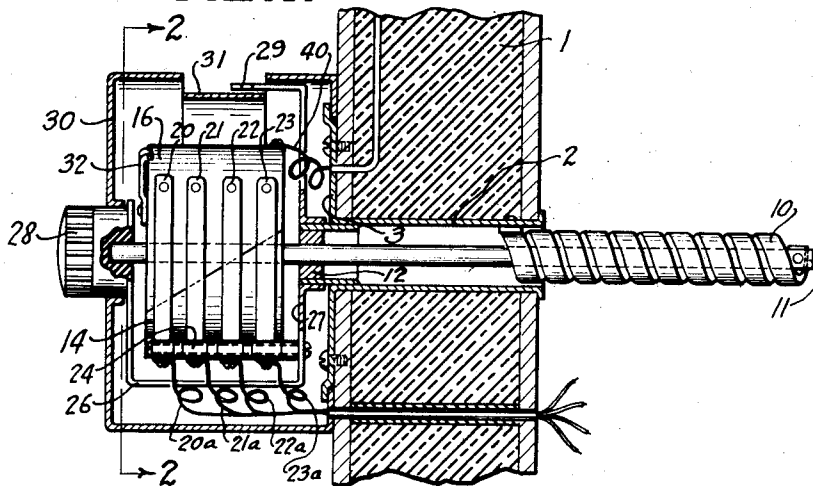


FIG. 2.

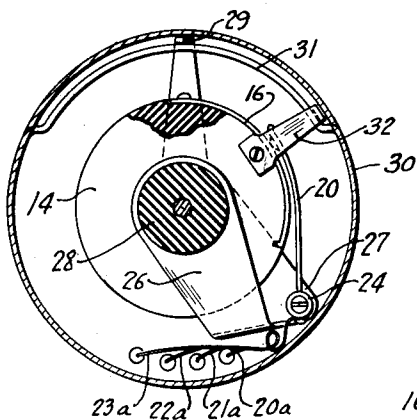


FIG. 3.

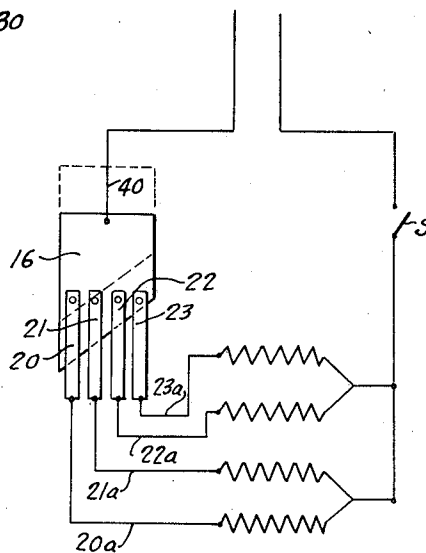
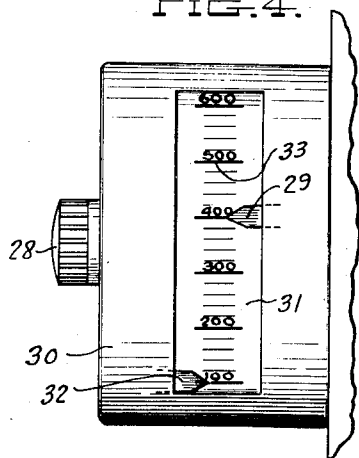


FIG. 4.



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THERMOSTATIC CONTROL FOR
ELECTRIC CIRCUITS

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4 Claims. (Cl. 200—138)

This invention relates to thermostatic control for electric ovens and is more particularly directed to a device which controls the power input to an oven to maintain a temperature selected by the user.

The primary object of the invention is the provision of a device which maintains an even oven temperature with a minimum current flow at any period.

Another object of the invention is to provide a thermostatic control which sub-divides the load produced by the oven so as to reduce the effects of making and breaking a circuit through which a large current is passing.

Another object of the invention is the provision of a thermostatic device which causes the energization of only sufficient heating elements in the oven to maintain the selected temperature and overcome heat losses from absorption and radiation.

Still another object of the invention is the provision of such a device which is inexpensive to manufacture, simple to install, and which is easy to use and efficient in operation.

Other objects and advantages of the invention will become apparent as the description proceeds, reference being had to the accompanying drawing which discloses a preferred embodiment of the invention and in which—

Figure 1 is a sectional side view of a device as installed on an oven, with parts in full; Fig. 2 is a section on line 2—2 of Figure 1, with a part broken away; Fig. 3 is a circuit diagram showing the several connections; and Fig. 4 is a top plan view of the assembled device.

Referring to the drawing, the device is disclosed in connection with an oven wall 1 of any suitable construction which is pierced by a sleeve 2 having an enlarged annular flange 3 formed at its outer end to be fixed to the outer side of the oven wall in a suitable manner.

The thermostatic control or switch mechanism is actuated by the conventional bi-metallic element 10, which is fixed at one end to the sleeve 2 and at its other, or inner, end to a shaft 11.

The shaft 11 extends through the sleeve 2 and is journaled at the outer end of the sleeve in a bushing 12 seated therein. A cylinder of insulating material 14 is mounted on the shaft 11 adjacent to its outer end without the wall 1 and is adapted to be rotated by the shaft in response to movement of the bi-metallic element 10. A segmental contact strip 16, the conformation of which is hereinafter described, is carried by the cylinder and has a portion which extends a dis-

tance around the periphery slightly greater than the degree of maximum rotation of the cylinder to bring about the operation which will subsequently be described.

A plurality of brushes 20, 21, 22 and 23 are carried by a brush holder 24, which is of insulating material so that the brushes are electrically and mechanically separated. The brush holder is carried in the bight portion of a U-shaped operating frame 26, one leg 27 of which is journaled on the outer surface of the bushing 12 and is free to rotate thereon. The outer end of the frame 26 carries a knob 28 by which the setting of the brushes is made and which, in the present instance, co-axially aligns with the shaft 11. A pointer 29 is carried at the inner end of the frame 26 and is adapted to indicate the position in which the brushes are set, in terms of oven temperature at which the device operates.

A casing 30 encloses the electrical contact 20 mechanism and at its inner edge detachably engages under the periphery of the annular flange 3 in a suitable connection to hold the casing in place. At one side of the casing, a depressed portion 31 is used as an indicating scale 33 and is graduated in terms of degrees of oven temperature. As shown in Fig. 4, a pointer 32, carried by the cylinder 14, overlies said scale at one side thereof while the pointer 29 carried by frame 26 is opposed thereto, said pointers entering from 30 the opposite sides of the slot formed by depressing the part 31.

Suitable connecting wires 20a, 21a, 22a and 23a are provided for the respective brushes and are led into the interior of the oven through suitable conduits and connected to the several heating elements in any suitable manner. A line connection 40 is made to the contact strip 16. It will be understood that all of these connections possess sufficient flexibility to allow unimpeded movement of the cylinder and brush holder throughout the entire operating range.

As seen in Figs. 1 and 3, one end of the contact strip 16 is cut at an angle so that, as the cylinder 14 rotates, the brushes run off progressively from right to left, thus disconnecting their respective circuits in order. The diagram shown in Fig. 3 indicates the four heating elements normally used in an oven, one end of each coil being connected to the source of power supply and the other end to one of the brushes through one of the leads 20a, 21a, 22a and 23a, thus forming a plurality of parallel circuits. The other side of the power supply source is shown as connected to the wire 40 and thence to the contact plate 16.

In operation, assuming the oven to be cold, and the selected temperature 400°, the user turns the knob 28 until the pointer 29 is on the "400°" mark of the scale 33, thus moving the brushes to the proper point. The oven is then turned on by the usual switch, diagrammatically indicated at S in Fig. 3. At this time all of the coils in the oven will be energized, since the brushes are all in contact with the contact strip 16. As the temperature rises, the bi-metallic element 10 expands and in so doing rotates the shaft 11 and hence, the cylinder 14. When the temperature approaches the desired point, the contact strip begins to run from under the brushes. As the first brush 23 runs off, the circuit through the coil connected therewith is broken, so that only three coils continue to heat the oven. Upon a further increase in temperature, the strip 16 is moved from contact with brushes 22 and 21 so that only one coil is left in circuit. It has been found that a single coil will maintain a selected oven temperature under most conditions. However, it will be seen that if the temperature continues to rise, this last coil will be cut off until the temperature falls so that contact strip 16 is again moved under the brush 20. Obviously, if the energy furnished by the single coil is insufficient to maintain the temperature for which the device is set, the bi-metallic element will rotate the cylinder to bring the contact strip under the next brush, 21, so that two coils are energized.

It will be appreciated that the present invention provides a device which reduces the line current to a minimum, since the full load is drawn only during the short period in which the oven is coming up to its selected heat. Thereafter, only a relatively small current is drawn, and this only periodically. In this manner surges of heavy current are avoided.

Obviously various modifications and changes may be made in the form and disposition of the structural elements disclosed without departing from the invention as defined in the appended claims.

What I claim is:—

1. A device of the class described adapted to control a plurality of electric heating elements having a source of electrical supply, including a switch means in circuit with said elements, and comprising an automatically movable contact

member and a plurality of adjustable brushes, one for each heating element, and temperature responsive means subjected to the heat generated by said elements and operable by an increase in temperature to move said contact member to progressively disengage said brushes and open the circuit through the respective heating elements.

2. A device of the class described adapted to control a plurality of electric heating elements having a source of electrical supply, including a switch means in circuit with said elements and comprising a contact member and a plurality of brushes, one for each of said heating elements, adapted to engage said contact means to close the circuit through the respective heating elements, and temperature responsive means subjected to the heat generated by said elements and operable to move one of said switch parts relative to the other to progressively open the circuits through the heating elements.

3. A device of the class described adapted to control a plurality of electric heating elements having a source of electrical supply, including a switch means in circuit with said heating elements comprising a contact member and a plurality of brushes, one for each of said heating elements, adapted to engage said contact means to close the circuits through the respective heating elements, temperature responsive means subjected to heat generated by said elements and operable to move said contact means relative to said brushes to progressively open the circuits through the heating elements, and manual means to initially adjust said brushes.

4. A device of the class described adapted to control a plurality of electric heating elements having a source of electrical supply, including a switch means in circuit with said elements, and comprising a cylinder carrying a contact strip having portions of unequal length, a pivoted frame, a plurality of brushes, one for each of said heating elements, carried by said frame and adapted to engage said cylinder, temperature responsive means subjected to the heat generated by said heating elements and operable to rotate said cylinder whereby to move said contact strip progressively from engagement with said brushes, and manual means to move said pivoted frame to initially adjust said brushes.

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