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O. A. KNOPP

HEATER CONTROLLER

Filed April 13, 1927

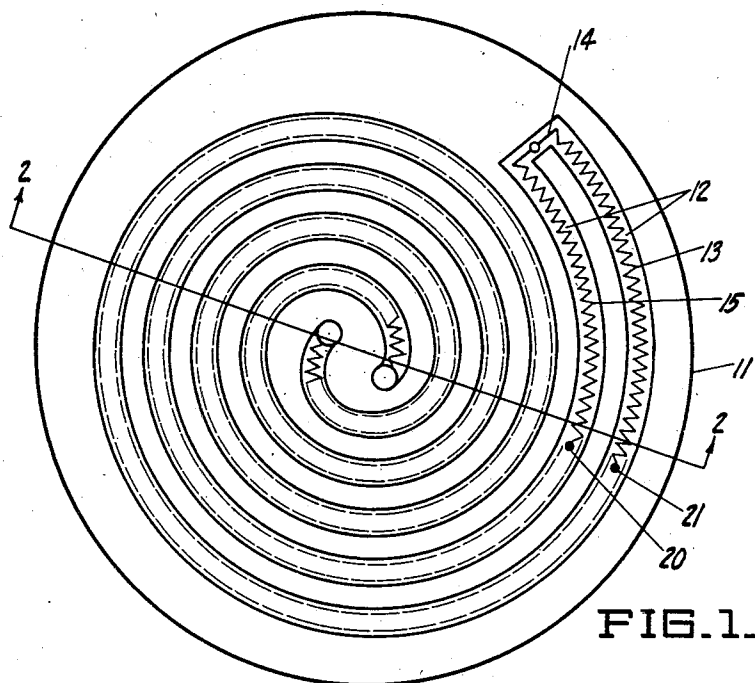


FIG. 1.

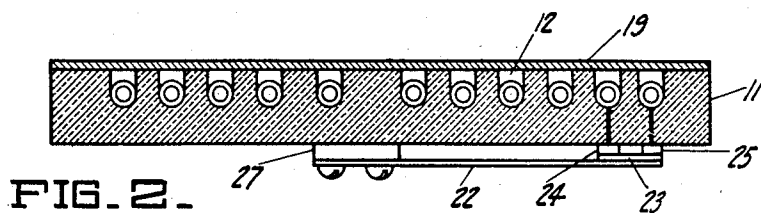


FIG. 2.

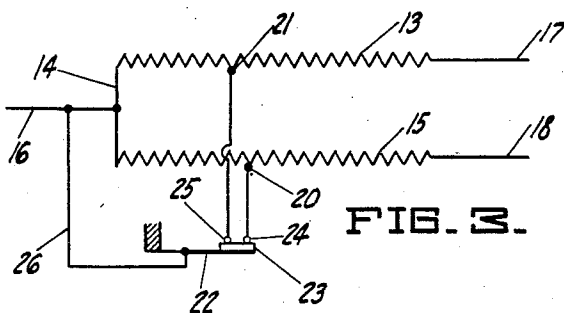


FIG. 3.

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HEATER CONTROLLER.

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This invention relates to electric heating and especially to electric hot plates.

Such hot plates usually include a mass of material, to which heat is transferred from a unit that is closely adjacent the material. This material is usually either metallic or ceramic; but under each circumstance, it has considerable mass and takes a substantial period before its temperature is brought to a satisfactory operating point that is useful for the emission of heat. It is one of the objects of my invention to accelerate this initial heating period.

It is another object of my invention to provide this function by the use of a thermostat that responds to the temperature attained by the hot plate body, and that ensures a rapid heating rate, much higher than the normal, until the operating temperature is reached, at which the hot plate emits heat at the desired rate to cooking utensils or the like, irrespectively of the temperature of the object heated.

The thermostat is arranged preferably to reduce the resistance of the unit by short circuiting a portion of it, whereby more current is permitted to flow, and consequently, more power is expended in heating the plate. It is another object of my invention to arrange the two parts of the unit in such a way that substantially uniform heating of the hot plate is secured independently of the condition of the temperature controlling means.

My invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of my invention. For this purpose I have shown a form in the drawings accompanying and forming part of the present specification. I shall now proceed to describe this form in detail, which illustrates the general principles of my invention, but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of my invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a plan view mainly diagrammatic, of a typical hot plate in which my invention can be embodied;

Fig. 2 is a sectional view taken along plane 2—2 of Fig. 1; and

Fig. 3 is a schematic wiring diagram of the hot plate unit shown in Figs. 1 and 2.

In the present instance, I show a hot plate having a body 11 of ceramic material, in the face of which there is a double spiral groove 12. Over this groove can extend, if desired, a cover plate such as indicated at 19 in Fig. 2. In the groove 12 is located the coiled heating unit 13 and 15, the two ends being arranged at approximately the center of the plate, and being doubled at 14, adjacent the outer edge of the plate.

In Fig. 3 I show the wiring of the unit. It is possible to pass current through the two portions 13 and 15 either in parallel or series, so as to produce either a high or a low degree of energization of the source of heat. This can be accomplished by well-known switching means. For parallel operation, current is fed in at the common junction 14 through lead 16, and both the free terminals 17 and 18 connect to the other side of the circuit. For series operation, current enters through one of the terminals 17 or 18, passes through both portions 13 and 15, and out through the other of the terminals 17 or 18.

When the current is first turned on, it takes a substantial period for the body 11 to attain its operating temperature, because heat transferred to it from element 13—15 can but slowly affect a body of the mass of plate 11. In order to quicken or accelerate this initial period necessary to cause the unit to produce heat emission at the proper rate, I arrange to reduce the resistance of unit 13—15, as by short circuiting a portion of it between common point 14 and the points 20 and 21, located respectively on portions 15 and 13. This short circuit is effected by strip 22 that carries a contact 23, bridging contacts 24 and 25 that are connected to points 20 and 21 and located on the lower side of plate 11. To complete the short circuit, strip 22 is connected to a common point 14 by lead 26.

The bridging contact 23 is arranged to be automatically opened upon the unit attaining the desired rate of emission. For this purpose, strip 22 is bimetallic, and is in good thermal contact with plate 11 and by the aid of boss 27 depending from the lower surface thereof. When the desired rate of emission is reached, strip 22 flexes downwardly, opening the short circuit by pulling contact 23 away from contacts 24 and 25.

During the initial heating period, current is thus caused to flow only through the inner

portions of coils 13 and 15, the outer portions being short-circuited. In this way, it is assured that the heat emission of the unit will be uniform even during the initial heating period. During this initial heating period, the unit 13-15 is operating at abnormal watt consumption; but this does not harm the unit, because heat is transferred from it to the plate 11; and when no further heat transfer is desirable, and the heat emission attains the desired rate, the thermostatic arrangement reduces its energization to the normal value.

I am aware that thermostats have been used and proposed for preventing undue temperature rise; but my system differs therefrom in that an abnormally high energization is purposely permitted initially to inaugurate the desired rate of heat emission from a device that serves as a source of heat.

I claim:

1. In an electrical heating device, an electrical heating unit, and means for temporarily increasing the energization of the unit beyond its normal operating point during the initial heating up period of the unit comprising a thermostat operated in response to the attainment of the desired rate of heat emission of the unit to decrease its energization.

2. In an electrical heating device, a heating unit, a body of considerable mass supporting said unit, and means causing abnormal energization of the unit during the heating up of the body to bring it to the desired rate of heat emission, comprising a

thermostat operated in response to the attainment of the desired rate of heat emission of the unit, to decrease its energization.

3. In an electric hot plate, a heating unit, a thermostat in thermal contact with the unit and contacts for short circuiting a part of the unit and operated by the thermostat, said thermostat being arranged to open the contacts upon the unit reaching normal heat emission.

4. In an electric heating device, a supporting body, a heating unit coiled on said body to form a flat spiral, and contacts for short circuiting one end of the spiral.

5. In an electric heating device, a supporting body, a heating unit coiled on said body to form a spiral, contacts for short circuiting one end of the spiral, and means for opening the contacts, responsive to the attainment of the desired heat emission.

6. In an electric heating device, a supporting body, a heating unit in heat exchange relation therewith, said unit being coiled to form two flat spirals, joined at one end, and contacts for short circuiting a portion of each of the spirals adjacent the joined ends.

7. In an electric heating device, a supporting body, a heating unit in heat exchange relation therewith, said unit being coiled to form two spirals, joined at one end, contacts for short circuiting a portion of each of the spirals adjacent the joined ends, and means for opening the contacts, responsive to the attainment of the desired heat emission.

In witness whereof I have hereunto set my hand.

OTTO A. KNOPP.