Oct. 21, 1941. E. N. CALHOUN 2,260,165

HEATING MEANS

Filed June 6, 1940

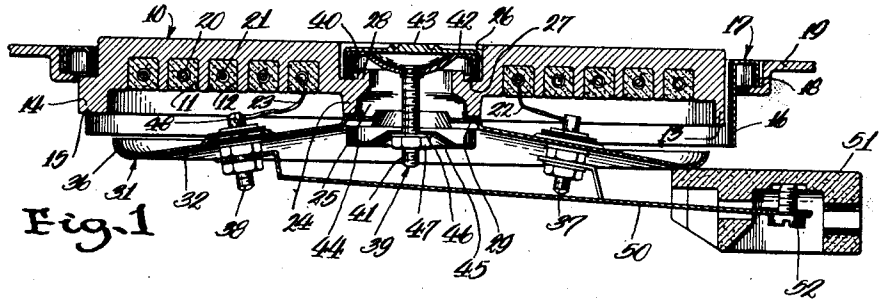


Fig. 1

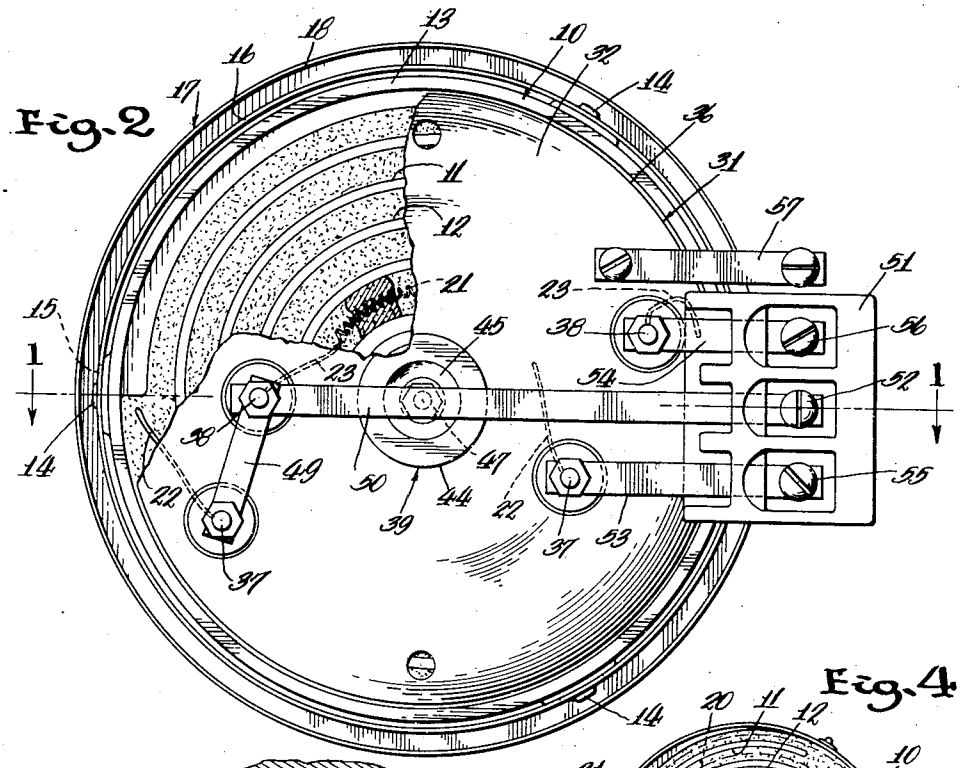


Fig. 2

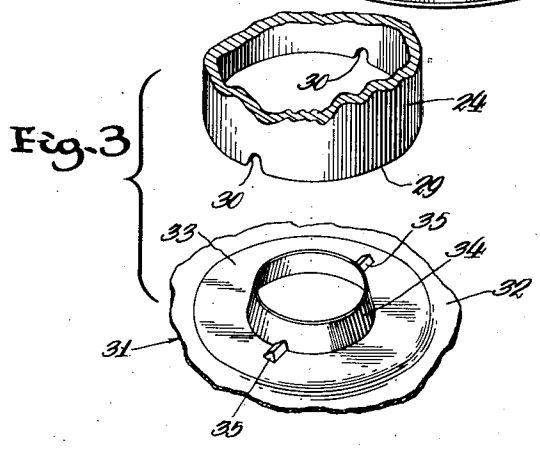


Fig. 3

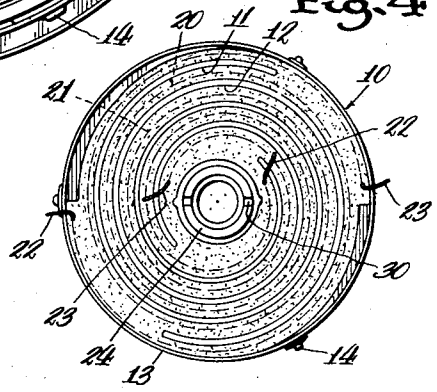


Fig. 4

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Patented Oct. 21, 1941

2,260,165

UNITED STATES PATENT OFFICE

2,260,165

HEATING MEANS

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Application June 6, 1940, Serial No. 339,119

9 Claims. (Cl. 219—37)

This invention relates to heating means, more particularly to electrical heating means adapted generally for use with appliances which are to be electrically heated, illustrative examples of which are ranges or stoves, hot plates, and the like. The principal object of this invention is to provide new and improved heating means of the character described.

In the drawing accompanying this specification, and forming a part of this application, I have shown an embodiment which my invention may assume, and in this drawing:

Figure 1 is a vertical sectional view of the embodiment of the invention herein illustrated, the line of section being generally shown by the section line 1—1 in Figure 2,

Figure 2 is a bottom plan view of the embodiment, parts being broken away to more clearly show the construction,

Figure 3 is a fragmentary separated perspective view of certain parts of the embodiment, and

Figure 4 is a bottom plan view of the heating unit.

The embodiment of the invention herein shown is particularly adapted for use as a range unit, and as shown in Figure 1, comprises a support, which in the particular embodiment is in the form of a disk-like metallic plate 10, preferably formed by a casting operation, and constituting part of the heating unit. The top side, referring to the position of parts in Figure 1, is preferably flat and provides a heating surface on which articles, such as pots, pans, kettles, or the like, are supported. The lower side of the plate 10 is formed with channel means, as by grooves 11 and 12, which are here formed as spirals and are intercalated with respect to each other, as best seen in Figure 4.

The marginal edge of the plate 10 is formed with annular downwardly extending peripheral flange means 13, and extending radially from the flange means 13 are a plurality of projections 14, here shown to be three in number, these projections being engageable within corresponding apertures 15 formed in a rim 16 of an adapter ring 17. The rim 16 is connected to a larger diameter rim 18, and this latter rim is so constructed that its terminating margin may rest on the bottom surface of a recess formed in the stove or range portion 19, preferably in such manner that the top side of the plate 10 extends above the adjacent surfaces of the adapter ring 17 and the stove portion 19, so that direct contact between the heating surface and the article to be heated is provided for.

Electrical resistor means, and heat-conducting electric-insulating means are disposed in the grooves formed in the lower side surface of the plate 10. As herein illustrated, a single length of electrical resistance wire of the helically wound type, either round in transverse section, as shown, or triangular or otherwise shaped, is disposed in each of the grooves 11 and 12, these lengths being respectively designated by numerals 20 and 21. The insulating material is preferably in the form of suitable granular, comminuted, or powdered refractory material, desirably compacted to a dense hard condition. In this particular case, the refractory material is compacted in the grooves 11 and 12 in such manner that the resistors 20 and 21 are embedded therein, and are thus held spaced from those surfaces defining the respective groove, as best seen in Figure 1. Each of the resistors 20 and 21 has a pair of connection leads 22 and 23 respectively, extending outwardly from the insulating material, as best seen in Figures 2 and 4.

A preferred method of properly positioning the resistors and the refractory material in the grooves of the plate comprises disposing the plate 10 groove side up on a suitable support, and loosely filling the grooves 11 and 12 with the refractory material, such material preferably being mixed with a certain amount of bonding clay, and moistened so that it may be worked somewhat like founders' clay. The excess material from the upper side of the plate 10 (remembering that the plate is groove side up) is then scraped off, the insulating material is compacted a certain amount, and the resistors 20 and 21 are properly positioned in respective grooves 11 and 12. Such compacting of the material and positioning of the resistors may be carried out substantially simultaneously, as for instance by providing a suitable die having projections shaped to closely fit the grooves 11 and 12, such projections carrying the resistors 20 and 21, the latter preferably being wound in predetermined formation on pegs extending from the projections of the die. The die and plate 10 are then brought together, so that the projections extend into respective grooves 11 and 12 and compact the refractory material and simultaneously position the resistors in respective grooves. Just before the die and plate are separated, the resistors may be stripped from the pegs, so that when the die and plate are separated, the resistors are properly held positioned in the refractory material in respective grooves. The grooves may then again be filled with loose refractory material, and the

excess material wiped from the plate, as before, and a die, somewhat like the die before described, but without resistors, is brought together with the plate 10, to compact the refractory material. The heating unit may then be dried or baked, if desired.

The lower side surface of the plate 10 is formed with laterally extending centrally disposed circular flange means 24, circumscribing an opening 25 extending through the upper side of the plate 10, and at such upper side the opening is formed with an enlargement 26, forming a shoulder 27. The marginal surface defining the opening 25 has such contour as to provide an annular lip 28 so constructed that the shoulder 27 forms the bottom of an annular recess, as best seen in Figure 1. The terminating margin 29 of the flange means 24 is formed with spaced-apart recesses or notches 30, here shown to be two in number and diametrically opposed.

Reflector means 31 is provided for assembly with the heating unit, and in this embodiment comprises a metallic shallow cone-shaped wall 32 having a central, generally flat portion 33 which is formed with a central aperture defined by an upstanding annular lip 34. Projections 35, corresponding in position and number to the recesses or notches 30, are struck-out from the flat portion 33 and are constructed to engage within respective recesses 30. The edge margins of the wall 32 are curved upwardly, as shown at 36, and adjacent this edge margin, the reflector may be formed with a pair of diametrically opposed apertures.

The reflector means 31 carries a plurality of means for receiving the connection leads 22 and 23 of the resistors 20 and 21, and these means may take the form of the binding posts 37 and 38, as herein shown, which are respectively connected to the leads 22 and 23. The binding posts, it will be appreciated, are electrically insulated from the reflector means 31, as for instance in the manner shown in the drawing.

Means 39 is provided for holding the reflector means 31 assembled with the heating unit. The holding means 39 extends from the heating unit, through the opening 25, and is constructed and arranged to press the reflector against the heating unit. In the particular embodiment of the invention, the holding means 39 comprises an upper headed portion formed by a generally inverted cup-shaped member 40, the end wall of which is curved to facilitate connection thereto of a screw-threaded stud 41, and comprises also an outer inverted cup-shaped member 42, arranged to receive the member 40 substantially in nesting relation. The members 40 and 42 are held together in any suitable manner, preferably by a force fit. The outer member 42 may be of an ornamental nature, and may carry indicia, such as that suggested at 43, on its end wall. The flange wall of the outer member 42 is of a greater extent than the flange wall of the member 40, so that the terminating margin of the flange wall of the member 42 bears against the shoulder 27. The screw stud 41 is of such length that it passes through the opening 25, and through the aperture in the reflector means 31.

A lower headed portion, for pressing the reflector means against the heating unit, comprises a cup-shaped member 44, having its closure wall dished inwardly, as shown at 45, to form a recess for receiving a washer 46 and nut 47. The end wall of the member 44 is apertured to pass the stud 41, and the flange wall of the member 44 is of such diameter that its terminating margin bears against the adjacent surface of flat portion 33 of the reflector means 31. When the nut 47 is drawn up, the member 44 causes the reflector means to bear against the terminating margin of the flange means 24. Thus, the projections 35 are held in the recesses or notches 30 and prevent relative rotation of the reflector means with respect to the heating unit about the holding means.

The parts of the heating means hereinbefore described may be assembled in any desirable manner. By way of example, the binding posts 37 and 38 may first be properly assembled on the reflector means 31, and then the conductor leads 22 and 23 may be secured to respective binding posts. As best seen in Figure 1, the upper end of each binding post is bifurcated, as shown at 48, and the respective conductor lead is placed between the furcations, and the furcations are then squeezed tightly about the conductor lead. If desired, the conductor leads additionally may be soldered to their respective binding posts.

The reflector means 31 may then be positioned with respect to the heating unit, in such manner that the flat central portion 33 bears against the terminating margin of the flange means 24, and the projections 35 are positioned within respective recesses or notches 30. The assembled cup-shaped members 40 and 42, carrying the screw stud 41 may then be disposed so that the terminal margin of the flange of the member 42 bears against the shoulder 27 and the stud 41 extends through the opening 25 and the aperture in the reflector means 31. As clearly seen in Figure 1, the outer member 42 is so constructed that its flange fits within the enlargement 26 of the opening 25, and its top wall does not extend beyond the plane of the upper flat surface of the heating unit 10.

The cup-shaped member 44 may then be placed in position on the stud 41, and the washer 46 and nut 47 assembled with the stud 41, the nut being drawn up sufficiently so that the member 44 presses the flat central portion 33 of the reflector means 31 against the terminating margin of the flange means 24. It will be clear that the interfitting recesses 30 and projections 35 prevent relative shifting of the reflector means and the heating unit during and after assembly thereof, and therefore certain parts, like the conductor leads, binding posts, and insulating material, are not subjected to strains which might be set up if relative shifting were not prevented. Also, the recesses 30 and projections 35 provide for a predetermined assembly of the heating unit and reflector means.

As shown in this embodiment, referring particularly to Figure 2, two of the binding posts 37 and 38 are connected together by a jumper strap 49, the binding post 38 of this connection also having attached thereto a conductor strap 50 leading to a terminal block 51. The strap 50, at the terminal block 51, is provided with a screw connection 52, for the purpose of receiving and holding a conductor leading from a source of energy.

The other binding posts 37 and 38 have conductor straps 53 and 54 respectively connected thereto, these straps also leading to the terminal block 51, and having screw-connections 55 and 56 respectively, for receiving and holding conductors leading from a source of energy. A

ground conductor, such as the conductor strap 57, may be connected to the reflector means, this strap having a connection screw for receiving and holding a conductor leading to a suitable ground.

It will be appreciated that the terminals 52, 55, and 56 may be connected in electrical circuit in such manner that one, or the other, or both, of the resistors 20 and 21 may be selectively energized. The particular construction of the heating unit makes it non-susceptible to warping, apparently because of the provision of the centrally disposed flange means 24, or the peripheral flange means 13, or the combination of the two.

From the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention, and it also will be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. Heating means, comprising: cast-metal plate means, having opposite sides, one side providing a heating surface, and the opposite side being provided with channel means; electric-insulating heat-conducting material within said channel means; electric resistor means supported by said material, said resistor means having a plurality of connection leads; reflector means spaced from said opposite side, and having a portion bearing against said plate means; a plurality of connection posts carried by but insulated from said reflector means, said posts being electrically connected to respective connection leads; holding means, constructed and arranged to press said reflector means portion against said plate means; and means, in part carried by said plate means and in part carried by said reflector means, constructed and arranged to prevent relative shifting of said reflector means and said plate means about said holding means.

2. Heating means, comprising: a cast-metal plate, having opposite sides, one side providing a heating surface, and the opposite side being provided with channel means, and having central laterally extending flange means; granular refractory insulating material retained within said channel means; electric resistor means, embedded in said insulating material, in such manner that said resistor is held spaced from those surfaces defining said channel means, said resistor means having a plurality of connection leads extending outwardly from said material; reflector means, positioned adjacent to said opposite side, and having a central apertured portion bearing against the terminating surface of said flange means, said reflector means having also a plurality of binding posts to which said connection leads are respectively electrically connected; holding means, comprising a screw stud extending from said plate and through said reflector means aperture, and nut means threaded on said stud and pressing said reflector means portion against the terminating surface of said flange means; said flange means being formed with a plurality of recesses and said reflector being formed with corresponding projections fitting in respective recesses and so constructed and arranged as to prevent relative rotation of said reflector means and said plate about said stud.

3. Heating means, comprising: a support, having opposite sides, and having a tubular flange extending laterally from one of said sides; reflector means, spaced from said one side, and having a portion bearing against the terminating margin of said tubular flange; holding means extending from said support through said tubular flange and to said reflector means, constructed and arranged to press said reflector means portion against said terminating margin; and means, in part carried by said reflector means and in part carried by said tubular flange, constructed and arranged to prevent relative shifting of said reflector means and said support about said holding means.

4. Heating means, comprising: a heating unit, having opposite sides, and having also an aperture extending therethrough, said aperture having an enlarged portion entering from one side and forming a shoulder with the remaining portion of said aperture; reflector means, positioned adjacent the opposite side of said heating unit, and having a portion bearing against said heating unit, said portion being apertured; and holding means, comprising inverted cup-shaped means disposed within the enlarged portion of said heating unit aperture and having its terminating margin bearing against said shoulder, said inverted cup-shaped means having a screw-threaded stud extending through the apertures in said heating unit and in said reflector means, and said holding means comprising also cup-shaped means having an aperture passing said stud, and nut means threaded on said stud and pressing the terminating margin of said cup-shaped means against said reflector means portion.

5. Heating means, comprising: a support, carrying heat producing means; reflector means, positioned adjacent to said support, and having a portion bearing against said support; holding means, holding said reflector means in assembled relation with said support; and means, comprising interfitting projection means and recess means, in part carried by said support and in part carried by said reflector means, constructed and arranged to prevent relative shifting of said reflector means and said support about said holding means.

6. Heating means, comprising: a support, having flange means extending from a surface thereof, said flange means having recess means in its terminating surface; reflector means, having a portion bearing against said terminating surface, said portion having projection means fitting into said recess means; holding means, holding said reflector means in position with respect to said support, and comprising means constructed and arranged to exert pressure against said reflector means portion.

7. Heating means, comprising: a heating unit, having opposite sides, and having also an aperture extending therethrough, said aperture having an enlarged portion entering from one side and forming a shoulder with the remaining portion of said aperture, and said heating unit having a tubular flange adjacent said aperture and extending from the opposite side, said flange having recess means in its terminating margin; reflector means, positioned adjacent said opposite side of said heating unit, and having a portion bearing against the terminating margin of said tubular flange, said portion being apertured, and

having projection means fitting into said recess means; and holding means, comprising inverted cup-shaped means disposed within the enlarged portion of said heating unit aperture and having its terminating margin bearing against said shoulder, said inverted cup-shaped means having a screw-threaded stud extending through the apertures in said heating unit and in said reflector, and said holding means comprising also cup-shaped means having an aperture passing said stud, and nut means threaded on said stud and pressing the terminating margin of said cup-shaped means against said reflector means portion.

8. Heating means, comprising: a support; electrical insulating material carried by said support; electrical resistance means, carried by said insulating material, and having extending terminal means; reflector means, having connection means to which said terminal means are connected; holding means, constructed and arranged to hold said reflector means assembled with said support; and means, separate from said terminal means, constructed and arranged to prevent relative shifting of said reflector means and said support about said holding means, so that said terminal means are relieved of the strain of opposing such relative shifting.

9. Heating means, comprising: a support, having recess means in a surface thereof; granular refractory insulating material disposed within said recess means; electrical resistance means embedded within said insulating material, and having terminal means extending from said insulating material; reflector means, having connection means to which said terminal means are connected; holding means, constructed and arranged to hold said reflector means assembled with said support; and means, separate from said terminal means constructed and arranged to prevent relative shifting of said reflector means and said support about said holding means, so that said terminal means are relieved of the strain of opposing such relative shifting.

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