

Oct. 2, 1934.

R. B. MARSHALL

1,975,658

HEATING ELEMENT ASSEMBLY

Filed April 23, 1932

2 Sheets-Sheet 1

FIG. 1.

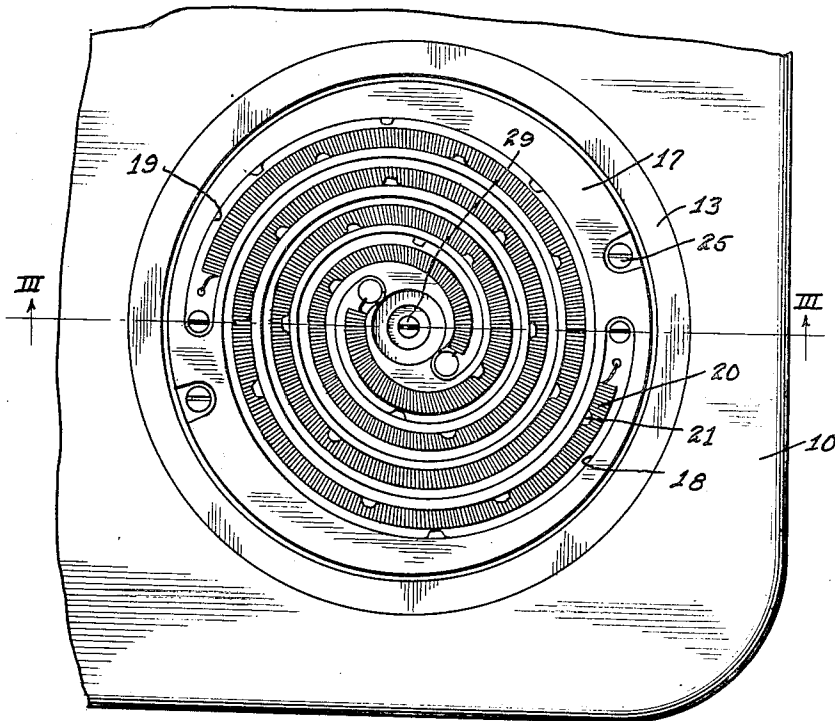
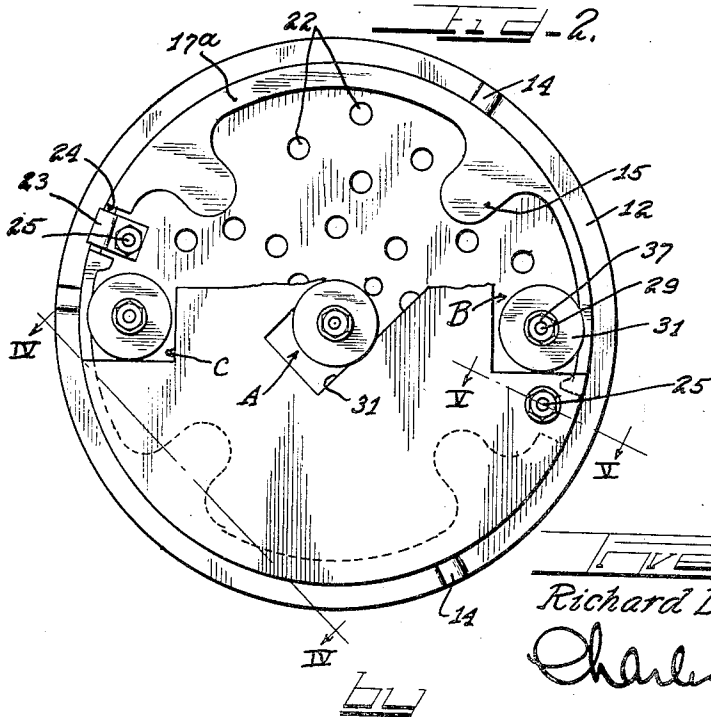


FIG. 2.



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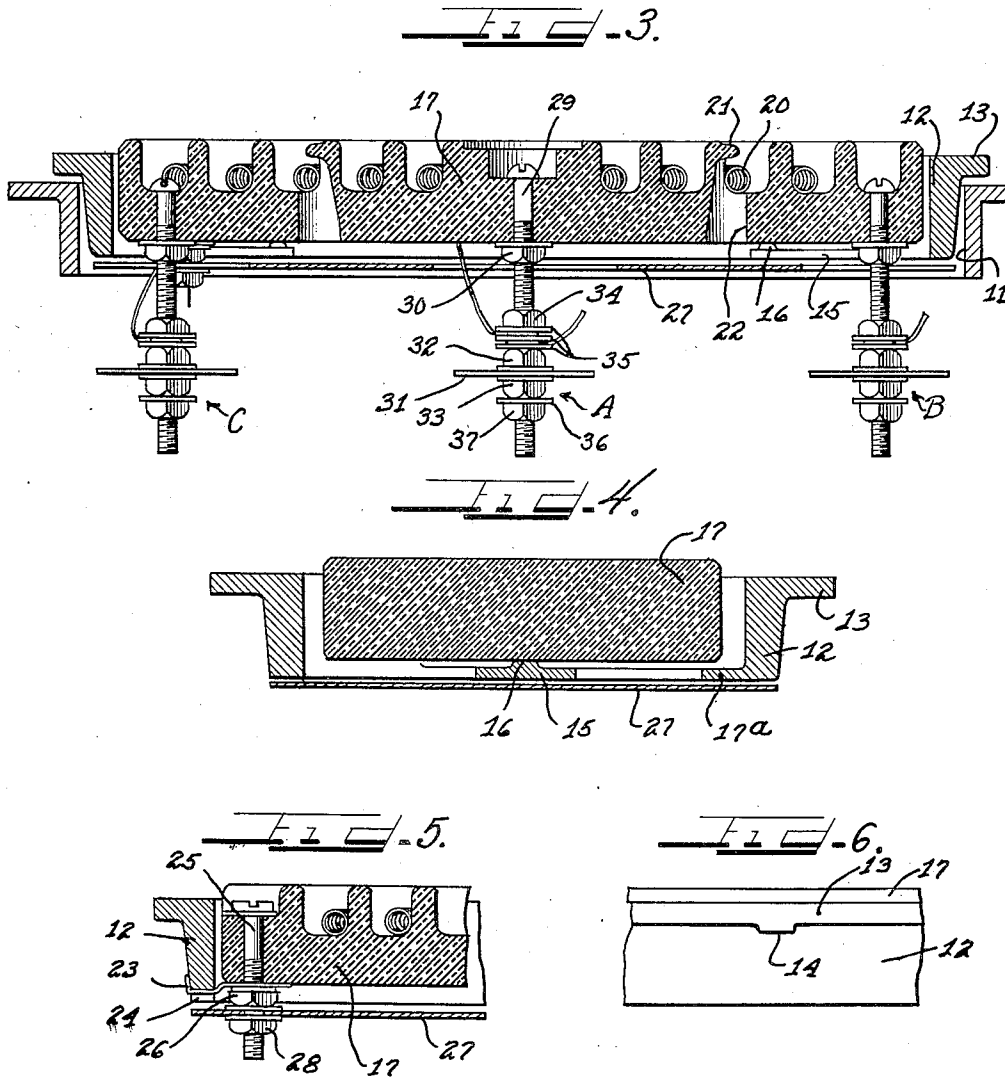
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2 Sheets-Sheet 2



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1,975,658

HEATING ELEMENT ASSEMBLY

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4 Claims. (Cl. 219—37)

This invention relates in general to improvements in heating element assemblies such as are used in electric stoves and the like, and has for its primary object the provision of a heating element assembly in which the various elements are so constructed and relatively disposed as to result in increased efficiency of operation, whereby the heating element heats up more rapidly and less heat energy is wasted through conduction between the parts comprising the entire assembly.

The invention has for a further object the provision of a heating element assembly wherein the heat energy will be concentrated at the point where it is desired to use the same for cooking purposes, and not lost through conduction and radiation into undesirable channels where it will not be available for the purpose desired.

Another object of the invention is to provide improved terminals for the heating element, these terminals being so arranged that they are removed from the heating zone, and so constructed that they will not heat up at the points where electrical connections are made thereto.

In accordance with the general features of this invention, it is proposed to provide a refractory member for supporting the heating element, this member being supported within a ring member and held out of contact with the ring member by means of a minimum number of pads on the ring member, in this instance four pads have been used although a less number may be used if desired. The ring member is likewise supported out of contact with the cooking table by similar pads on the ring member, in this instance, three in number. A radiating plate is disposed below the refractory and ring members, this plate being held in position by a two-point suspension from the refractory member. Further, the terminals for the heating element are disposed below the reflector plate and are provided with radiators to eliminate heating of the terminals at the points where electrical connections are made. The above arrangement is advantageous in that the various elements composing the complete assembly are so arranged as to present minimum contact surfaces, thereby materially lessening the conduction of heat energy into channels where it will serve no useful purpose. The entire organization effects a heating element assembly which is more efficient than those heretofore used.

Other objects and features of this invention will more fully appear from the following detail description taken in connection with the accompanying drawings which illustrate a single embodiment thereof, and in which

Figure 1 is a plan view of the top of a cooking table embracing a heating element assembly embodying the features of this invention;

Figure 2 is a plan view looking at the heating element assembly from below, certain portions being cut away to more clearly disclose the relationship between the various elements thereof;

Figure 3 is an enlarged fragmentary vertical section through the cooking table top and the heating element assembly the terminals for the heating element being shown in elevation, taken substantially on line III—III of Figure 1;

Figure 4 is an enlarged vertical section through the heating element assembly to show the manner of supporting the refractory member, taken substantially on line IV—IV of Figure 2;

Figure 5 is an enlarged vertical fragmentary section showing the manner in which the refractory member is secured against removal from the associated supporting ring, taken substantially on line V—V of Figure 2; and

Figure 6 is an enlarged fragmentary view in elevation of the supporting ring member showing the pads for holding the ring member spaced relative to the top of the cooking table.

As shown on the drawings:

In the illustrated embodiment of my invention, there is shown in Figure 1 a top 10 of a cooking table which is of the usual construction and which forms a part of an electric stove, range, or other cooking appliance. The cooking table is provided with the usual openings as shown at 11 for receiving the heating element assembly.

Disposed within the opening 11 in the top of the cooking table is a ring member 12 which may be constructed of any suitable material, although I have found that cast iron is particularly adapted for this purpose. The upper end of this ring member is deflected outwardly so as to form an annular flange 13. The ring member 12 is supported in position with the flange 13 spaced above the top of the cooking table by means of a plurality of pads 14 which are integrally formed with and project from the lower surface of the flange. It is contemplated that the ring 12 may be supported at any desired number of points around the flange 13, but in order to reduce the contact area between the ring 12 and the top of the cooking table to a minimum, it is preferable that there should be not more than three points of supports. By providing three points of support the ring 12 is effectively retained against tilting movement

and at the same time there is a minimum surface in contact with the top of the cooking table.

The lower edge of the ring 12 is provided with a plurality of inwardly extending arms 15 which are uniformly spaced around the ring. The upper surface of each arm is provided with an integrally formed pad 16. The arms 15 are preferably interconnected by a web 17^a which is integrally formed with the arms and lower edge of the ring 12, thereby strengthening this portion of the ring.

A refractory insulating member 17 composed of any suitable highly refractory material is disposed within the ring 12 and supported upon the pads 16 so that it is spaced from the arms 15 of the ring. It will be noted that the refractory member 17 is of less diameter than the internal diameter of the ring 12 so that the only surface contact with any portion of the ring is at the pads 16, a relatively small contact surface thereby being provided through which heat may be conducted from the refractory member to the ring.

The upper surface of the refractory member 17, as shown in Figure 1, is provided with a pair of spirally arranged parallel grooves 18 and 19, the convolutions of one groove being alternately disposed relative to the other groove. Each groove begins at a point adjacent the central portion of the refractory element 17 and is spiraled outwardly, the outer ends of the grooves being terminated at opposite sides of the refractory element. Each of the grooves 18 and 19 contains a coil of suitable resistance wire 20 which is held within the grooves by means of spaced lips 21 formed on the groove walls and overhanging the heating elements disposed in the grooves. Directly beneath each of the lips 21 is an opening 22 which extends through the body of the refractory member 17 and forms a passageway extending from the lower surface of the refractory member into one of the grooves. These passageways enable a circulation of air from below the refractory member in an upward direction through the refractory member and toward the upper surface thereof, thereby keeping the refractory member cool and carrying the heat energy toward the cooking utensil which would be disposed over the refractory member during the cooking operation.

The refractory member 17 is retained against removal from the ring 12 and in contact with the pads 16 of the arm 15 by means of outwardly disposed clips 23, one of which is shown in Figure 5. The clips 23 extend at one end through a cut-out portion 24 in the ring 12. The inner end of the clip 23 is secured against the under-surface of the refractory member 17 by means of a bolt 25 and nut 26.

The bolt 25 also serves as a support for a reflector plate 27, this plate being apertured to receive the screw 25 and held against the nuts 26 by means of a second set of nuts 28. It will be observed that with this arrangement, the reflector plate is spaced below the refractory member and is of such size as to extend outwardly over the lower edge of the ring 12. Here again, it will be observed, the reflector plate 27 is suspended from the refractory member at two points, thereby providing a minimum surface contact between the refractory member and the plate, with the result that direct conduction of heat is materially lessened.

The inner ends of the spiraled heating element are brought out to a central terminal A and the outer ends of the heating element are

respectively connected to terminals B and C. Since each of the terminals A, B and C is similarly constructed, only one will be described.

Referring to Figure 3, a bolt 29 extends through the refractory member 17 and is securely held against removal therefrom by means of a nut 30 which is securely tightened against the under-surface of the refractory member. The bolt 29 extends through a suitable aperture 31 which is provided in the reflector plate 27. Spaced below the reflector plate 27 so as to be removed from the heating zone, a metallic disc 31 surrounds the bolt 29 and is securely held against axial movement by means of nuts 32 and 33 which are disposed on either side of the disc and tightened thereagainst. Between the spaced nuts 30 and 32 is a nut 34 which may be actuated to clamp the terminal connections from the inner ends of the heating elements between a plurality of washers 35 when the nut 34 is actuated so as to move toward the nut 32. Line connection to the terminals may be made by inserting a line wire between a washer 36 and the nut 33, the connection being securely fastened by tightening a nut 37 which is also on the bolt 29.

It will be observed that, with the foregoing terminal arrangement, the electrical connections on each terminal are disposed on each side of the disc 31. This disc substantially increases the radiating surface of the terminal and serves to keep the terminal cool, thereby obviating the possibility of its becoming hot by virtue of the electrical connections thereto.

From the foregoing, it will be apparent that this invention provides a novel heating element assembly in which the available heat energy is concentrated at the point where it is most desirable to use the same; that the relative arrangement of the various elements of the assembly is such as to obviate the conduction and radiation of heat energy into undesirable channels, where it will not be available for useful purpose; terminals which are disposed outside of the heat zone and are provided with radiators for keeping them cool at all times; and in the main a heating element assembly which heats up more quickly and is more efficient than arrangements heretofore used.

Now, it is of course to be understood that although I have described in detail the preferred embodiment of my invention, the invention is not to be thus limited but only insofar as defined by the scope and spirit of the appended claims.

I claim as my invention:

1. In combination with a cooking table having an opening therein, a heating element assembly comprising a refractory insulating member supported within said opening, a heating element carried by said refractory member, terminals for said heating element supported on said refractory member and extending below the heating element, a reflector plate disposed between said terminals and refractory member, and means supporting said plate from said refractory member at not more than two points.

2. The combination with a cooking table having an opening therein of a heating element assembly comprising a ring member disposed in said opening, a flange at the upper end of said member extending outwardly over the cooking table, pads on said flange to maintain the flange spaced above the table, radially disposed arms on the lower end of said ring member extending toward the ring axis, pads on the upper surface of said arms, a refractory member within said

ring member supported on said arm pads, the periphery of the refractory member being spaced from the ring member, and a heating element carried by the refractory member.

- 5 3. The combination with a cooking table having an opening therein, of a heating element assembly comprising a ring member disposed in said opening, a flange at the upper end of said member extending outwardly over the cooking
- 10 table, pads on said flange to maintain the flange spaced from said table, radially disposed arms on the lower end of said member extending toward the ring axis, pads on the upper surface of said arms, a refractory member within said
- 15 ring member supported on said arm pads, the periphery of the refractory member being spaced from the ring member, the heating element carried by the refractory member, and a clip secured to the refractory member in engagement
- 20 with said ring member, whereby removal of the refractory member from the ring member is prevented.

4. The combination with a cooking table having an opening therein of a heating element assembly comprising a ring member disposed in said opening, a flange at the upper end of said member extending outwardly over the cooking table, pads on said flange to maintain the flange spaced above said table, radially disposed arms on the lower end of said member extending toward the ring axis, pads on the upper surface of said arms, a refractory member within said ring member supported on said arm pads, the periphery of the refractory member being spaced from the ring member, a heating element carried by the refractory member, heating element terminals supported on said refractory member and disposed below the same, and a reflector shield spaced below the refractory member and ring member, said shield extending over the lower surface of the refractory member and lower edge of the ring member.

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