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REFRACTORY HEATER PLATE

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Fig. 1

Fig. 2

Fig. 3

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REFRACTORY HEATER PLATE.

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To all whom it may concern:

Be it known that I, CLARENCE W. WILLIAMS, a citizen of the United States, residing at East Palestine, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Refractory Heater Plates, of which the following is a specification.

My invention relates to electric heating devices and particularly to refractory resistor-supporting means.

One object of my invention is to provide a refractory heater plate embodying means for permitting of easily and quickly inserting a resistor member in and removing it from operative engagement therewith.

Another object of my invention is to provide a heater plate of refractory material embodying means for permitting of inserting a resistor member into a groove in one face thereof by a movement of the resistor at substantially right angles to the surface of the plate.

In practicing my invention I provide a flat plate of refractory material having an open groove in one face thereof. A plurality of spaced lugs, integral with the inner wall of the groove, partially overhang it, the clearance between the outer end of the respective lugs and the opposite wall of the groove being sufficient to permit of passing therebetween a resistor member to be located in the groove. A plurality of pairs of spaced ribs, integral with the opposite wall of the groove, serve to hold the resistor member under the respective lugs.

In the single sheet of drawings,

Figure 1 is a top plan view of a heating unit comprising the device embodying my invention.

Fig. 2 is a view, in section therethrough, taken on the line II—II of Fig. 1, and.

Fig. 3 is a fragmentary top plan view of a modified form of heating unit embodying my invention.

A refractory plate, designated by the numeral 11, is shown as of substantially circular form and has, in one face thereof, a spiral groove 12 that is substantially open and is wider at the top thereof than at the bottom. The groove 12 has, at its outer end, a laterally-extending opening 13 through which a suitable machine screw (not illustrated) may extend to constitute a terminal member for one end of a resistor. A similar opening 14 is provided at substantially the center of the plate 11, through which a suitable machine screw (not illustrated) may extend to constitute a terminal member for the other end of a resistor.

A resistor member 15, operatively associated with the plate 11 and adapted to be located in the groove 12, comprises a suitable metallic resistor wire that is wound to substantially helical form. The outer end of the resistor extends through a small opening 16 located closely adjacent to the opening 13, and is suitably secured to the under or depending end of the hereinbefore mentioned terminal member. A similar opening 17 is provided closely adjacent to the central opening 14, and the other end of the resistor member extends therethrough and is connected to the lower end of a terminal bolt that is located in and extends through the opening 14.

A plurality of spaced lugs 18, integral with the inner side wall of the groove 12, are provided and extend substantially parallel to the face of the plate 11 and partially overhang the open groove 12. The distance between the outer end of the respective lugs 18 and the opposing surface of the outer wall of the groove is just sufficient to permit of moving the helically-wound resistor member 15 therebetween when the resistor member is to be inserted in, or removed from, its proper operative position in the groove 12. I have not deemed it necessary to designate each of the overlapping lug illustrated in Fig. 1 of the drawings with a number, for the reason that their construction is identical and any desired number thereof may be employed and they may be spaced as may be thought necessary.

The rectangular openings 19 illustrated as located below each of the overlapping lugs are made by rods provided in the mold, which extend through the body of the granular material comprising the refractory plate in order to properly form the overlapping lugs hereinbefore described.

Means for holding spaced portions of the helically-wound resistor member 15 under the respective lugs 18 comprise pairs of spaced ribs 21 and 22 integral with the outer side wall of the groove and extending at substantially right angles to the face of the plate 11. These ribs are located one on each side of the adjacent overlapping lugs and do
not extend to the top surface of the plate. The overhanging lugs are also depressed below the top surface of the plate in order that they may not be injured and broken off in case a relatively heavy cooking utensil is placed upon the plate 11.

In Fig. 3 of the drawings I have illustrated the overhanging lugs and the pairs of spaced ribs as applied to a refractory heater plate of substantially rectangular form and having substantially straight open grooves.

A plate 23, of refractory material, is provided with a plurality of substantially parallel-extending open grooves 24, 25, 26, and 27, of substantially the same shape as the groove 12, it being understood that these grooves as shown constitute a part only of the total number. The grooves are so located and connected that a helically-wound resistor member 28 may be located therein and extend from one to the other over substantially the entire surface of the plate.

A plurality of lugs 29, spaced at suitable intervals, integral with the inner surface of the side wall of the respective grooves and extending substantially parallel to the face of the plate are provided and overhang the grooves. The space between the outer end of the lugs 29 and the opposing surface of the other side wall is just sufficient to permit of moving the resistor member 28 therebetween when the same is being placed in or removed from its proper operative position in the respective grooves. A plurality of pairs of spaced lugs 30 and 31, integral with the opposing surface of the outer wall of the groove and extending substantially at right angles to the face of the plate, are located one on each side of the respective lugs 29. Openings 32, located respectively under the overhanging lugs 29 are caused by rods provided in the dies of the mold forming the plate 23 and particularly the overhanging lugs 29.

One end of the resistor member 28 may be connected to a terminal member constituted by a suitable machine screw terminal (not shown) that is located in and extends through an opening 33 located adjacent to one edge of the plate 23.

When it is desired to insert the resistor member 15 into the groove 12 of the substantially circular plate 11, the straightened end of the resistor member 15 may be pushed through the opening 16, after which the resistor member may be laid over the groove and pushed into the same by temporarily changing its shape relatively to the groove in one direction until it has been moved past the overhanging lugs 18. In order to move the helically-wound resistor member downwardly until it is resting upon the bottom surface of the groove, it is necessary to locally bend the resistor to permit it to pass by the pairs of spaced ribs 21 and 22, that is, its shape is changed in the other direction relatively to said groove. I have illustrated this final deformed position of the resistor member in Fig. 1 of the drawing, where it is shown somewhat exaggerated in order to bring out the action more clearly.

It is, of course, obvious that the helically-wound resistor member is resilient to a certain degree, this resiliency depending upon the size of wire employed and upon the diameter of the turns of the helix. It is, therefore, easy to bend the helically-wound resistor member slightly at spaced points in order to permit of first moving it past the lugs and then past the opposing ribs until it is resting in the bottom of the groove.

It is further evident that the overhanging lugs may be made longer if the upper portion of the groove is made wider, or if the outer diameter of the turns of the resistor member is made smaller.

Substantially the same method may be employed to place the resistor member 28 in the grooves of the rectangular plate 23 illustrated in Fig. 3 of the drawing, and I have not illustrated the resistor member as being deformed, although this will happen if the resistor is very resilient and if the ribs 30 and 31 are relatively thick.

If it is necessary to remove the resistor member substantially the reverse process may be employed to that hereinbefore described for placing the resistor member in the groove.

I am aware that a number of different means have been provided to hold a helically-wound resistor member in a groove provided in one face of such a refractory plate. One means comprises a plurality of spaced bridges extending from one wall of the groove across to the other wall. In this construction it is necessary that a greater portion of the length of the resistor member be threaded through under these bridges, a proceeding which requires a relatively large amount of time, is relatively expensive, and therefore increases the cost of the complete heating unit. Another method is to provide a plurality of zigzag grooves having overhanging salient corners, the helically-wound resistor member being initially pulled under these overhanging corners while being placed in the grooves. As such a resistor member may become red hot in actual operation, it may expand sufficiently to permit portions thereof to move out from under the overhanging corners.

The device embodying my invention provides relatively simple means for holding a resistor member in a substantially open groove, which means permit of moving the resistor member into its proper operative position in the groove by a movement substantially at right angles to the face of the plate. The integral ribs located opposite
to the overhanging lugs ensure that the resistor member will remain under the overhanging lugs no matter what temperature it may reach, and irrespective of whether it loses its original resiliency.

While I have illustrated a particular number of overhanging lugs, I do not wish to be limited thereto as any desired number may be employed and they may be located in regularly or in irregularly spaced positions relatively to each other.

Various modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and all such modifications are intended to be covered by the appended claims.

I claim as my invention:

1. A refractory heater plate having a groove in one face thereof for receiving a resistor member, and embodying means for retaining the resistor member in said groove, said means permitting the free movement of said resistor into said groove in a direction substantially at right angles to the face of said plate, and embodying other means for holding the resistor member in its proper operative position in said groove.

2. A refractory heater plate having a groove in one face thereof for receiving a resistor member, and comprising an integral lug partially overhanging the groove, and means opposite to said lug for holding a resistor member under the lug.

3. A refractory heater plate having a groove in one face thereof for receiving a resistor member, and comprising an integral lug partially overhanging the groove and integral with one of the side walls of said groove, and means opposite to said lug for holding a resistor member under the lug.

4. A refractory heater plate having a groove in one face thereof for receiving a resistor member, and comprising an integral lug partially overhanging the groove and integral with one of the side walls of said groove, and a pair of spaced ribs, located one on each side of and opposite to said lug, integral with the other side wall of said groove for holding the resistor member under said lug.

5. In a refractory heater plate, the combination with an open groove located in one face thereof, and a resilient resistor member located in said groove, of a resistor-retaining lug integral with one of the side walls of said groove and extending substantially radially outwardly therefrom, the distance between the end of said lug and the opening surface of the other wall of said groove being sufficient to permit the resistor member to be placed in the groove by a movement in a direction substantially at right angles to the surface of said plate, and means located in said groove and integral with the other wall thereof for holding the resistor member under the lug.

6. In a refractory heater plate, the combination with an open groove located in one face thereof, and a helically-wound resistor member located in said groove, of means integral with said plate for permitting the insertion of said resistor into said groove by temporarily changing its shape relatively to said groove and moving it in a direction substantially at right angles to the surface of said plate, said means serving to hold said resistor member in the groove after being placed therein.

7. A refractory heater plate having an open groove in one face thereof for receiving a resistor member, and comprising a plurality of spaced lugs partially overhanging the groove and integral with one of the side walls thereof, and spaced pairs of ribs located one on each side of said lugs and integral with the other side wall of said groove for holding spaced portions of a resistor member under the respective lugs in said groove.

8. A refractory heater plate having an open groove in one face thereof for receiving a resistor member, and comprising a plurality of spaced, integral, resistor-retaining lugs extending substantially parallel to the face of the plate, and a plurality of spaced, integral, resistor-positioning ribs extending substantially at right angles to the face of said plate.

9. A refractory heater plate having an open groove in one face thereof for receiving a resistor member, and comprising a plurality of spaced, resistor-retaining lugs extending substantially parallel to the face of said plate and integral with one of the side walls of the groove, and a plurality of pairs of spaced, resistor-positioning ribs extending substantially at right angles to the face of said plate and integral with the other side wall of said groove.

10. A refractory heater plate having a groove in one face thereof for receiving a resistor member, means for retaining said resistor in said groove, said means permitting the resistor to be placed in said groove by a movement substantially at right angles to the surface of said plate, and means for positioning said resistor under said retaining means, said positioning means causing said resistor member to be deformed relatively to said groove.

11. In a refractory heater plate having a substantially open groove in one face thereof for receiving a resiliently-wound resistor member, and comprising a plurality of integral lugs extending partially over said groove in a direction substantially parallel to the face of said plate and permitting the insertion of said resistor into said groove.
groove by temporarily changing its shape in one direction relatively to said groove and moving it in a direction substantially at right angles to the surface of said plate, and resistor-positioning means causing a change of shape of said resistor in the other direction relatively to said groove and holding spaced portions of the resistor member under said lugs.

12. A refractory heater plate having an open groove in one face thereof for receiving a substantially resilient resistor member placeable in said groove by a movement thereof in a direction substantially at right angles to the surface of the plate, and comprising a plurality of spaced resistor-retaining means partially overhanging said groove, and a plurality of resistor-positioning means for holding spaced portions of said resistor under the resistor-retaining means, said resistor-positioning means causing said resistor to be deformed relatively to said groove.

In testimony whereof I affix my signature.

CLARENCE W. WILLIAMS.