Oct. 21, 1930. A. J. BRESSAN 1,778,884

ELECTRIC HEATING UNIT

Filed May 17, 1927

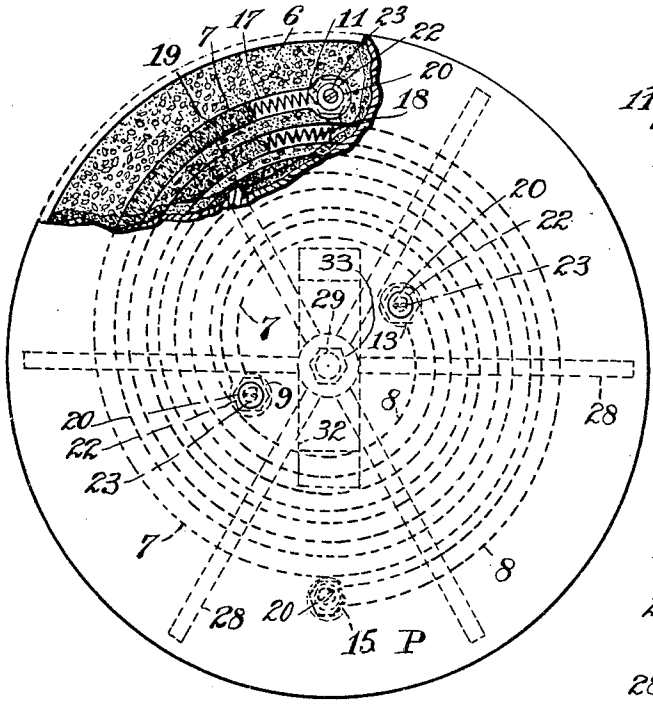


Fig.1.

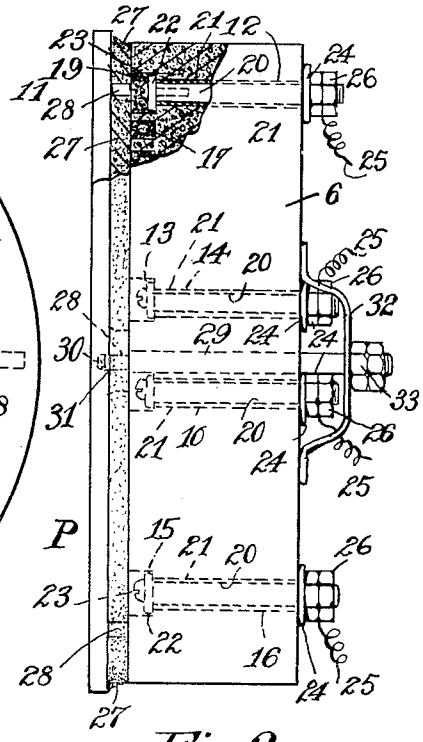


Fig.2.

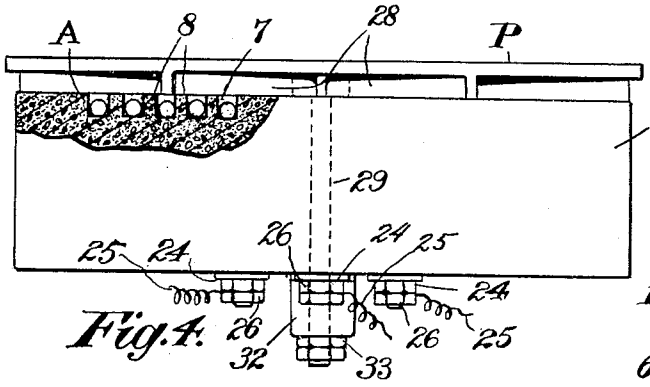


Fig.4.

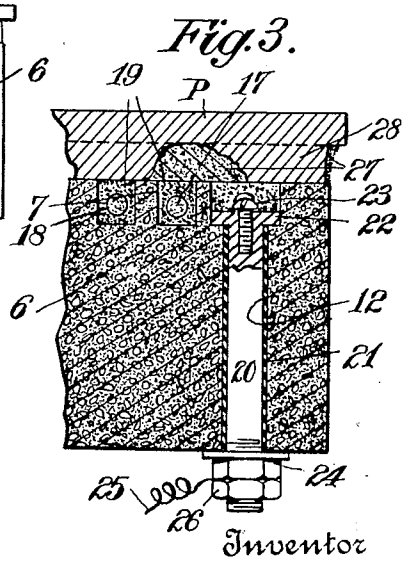


Fig.3.



Fig.5.

Inventor

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By his Attorney John O. Seifert

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UNITED STATES PATENT OFFICE

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ELECTRIC HEATING UNIT

Application filed May 17, 1927. Serial No. 191,987.

This invention relates to electric heating units of the "radiant" type wherein the resistance or heating element is rendered incandescent by the passage of an electric current therethrough, and it is the object of the invention to provide an improved heating unit of this character which is particularly adapted for cooking devices, which is simple in structure and efficient in use.

Another object of the invention relates to an improved electric resistance element for use in electrical heating devices and to the method of making the same.

In the drawing accompanying and forming a part of this specification Figure 1 is a top view of an electric heating unit showing one embodiment of the invention, the same being partly broken away to show the arrangement of the heating element in a carrier therefor.

Figure 2 is a side elevation looking at the right of Figure 1, partly broken away, to show the connection of the terminals with the heating element for connecting the same with a source of current supply.

Figure 3 is a sectional view, on an enlarged scale, of a portion of the heating unit shown in Figures 1 and 2.

Figure 4 is a side elevation, partly broken away, of a heating unit showing a modified arrangement thereof; and

Figure 5 is a perspective view of a portion of the wire constituting the electric heating or resistance element and showing the same arranged with insulation to insulate the wire against the atmosphere when cold, and which insulation is adapted to be rendered incandescent when an electric current is passed through the wire.

In carrying out the invention illustrated in Figures 1 to 3, there is provided a carrier in the form of a brick or plate of refractory material 6 having the properties of being an electric insulator as well as a heat insulator, said brick having a porosity of not less than fifty per cent in the cubical contents thereof; that is, the brick has a series of cells interspersed therethrough, which cells are formed therein in the process of manufacture of the brick. This brick is preferably of circular form although it may have any other desired conformation to suit requirements, and recessed in one face, in the present instance comprising a pair of spiral grooves 7, 8 one within the other. The inner terminal 9 of the groove 7 communicates with an opening 10 through the brick (Figure 2) and the outer terminal 11 of said groove communicates with an opening 12 through the brick. The inner terminal 13 of groove 8 communicates with an opening 14 through the brick, while the outer terminal 15 thereof communicates with an opening 16 through the brick.

Heating elements comprising coils of wire of electrical resistance material 17 and 18 are engaged in said grooves in embedded relation with a body of material having relatively high thermal conductivity and being a good electric insulator, the said body also being adapted to be rendered incandescent by the passage of the current through the resistance elements and a heat retainer. This body may be of suitable material, alundum grains mixed with a binder in a plastic state having been found efficient. To mount the resistance wires in the grooves embedded in said material a portion of the groove is filled with said material in a plastic state when the resistance wires are engaged therein and the grooves completely filled with the material and the resistance elements embedded therein. Prior to filling the grooves with the body 19 the terminals of the resistance wires 17 and 18 are electrically connected with contact terminal means including posts 20 engaged in insulator sleeves 21 in the openings 10, 12, 14 and 16, the posts being entered into said openings through the grooved face of the brick with a head 22 on the posts engaging in an enlargement of said openings at the groove end and for engagement with the shoulder formed by said enlargement. The terminals of the resistance wires are secured below heads of screws 23 threaded into the posts. The opposite end of the posts are threaded and project beyond the opposite face of the brick and are secured in position by nuts on the projecting threaded ends with an interposed washer, as at 24,

and adapted for connection of electric conductors 25 to said posts leading from a source of current supply by binding nuts 26 threaded onto the posts. Suitable electric switch mechanism (not shown) is provided for connecting one of the resistance coils, or both the resistance coils either in series or in multiple, in electric circuit to thereby regulate the heat generated by the coils.

The structure as described will function as a heating unit adapted for cooking devices, but more particularly for radiant heating devices as the body or bodies 19, which are in the nature of veins, are rendered incandescent and the cellular structure of the carrier or the brick 6 therefor will function to prevent and resist the transmission of the heat through the carrier in a direction toward the back and serve to reflect the heat toward the front or face of the carrier having the vein 19 with the embedded resistance elements recessed therein. To adapt the device as a stove for cooking purposes the heating element carrying face of the brick is arranged with a heat retaining element in the form of a metal plate P united to said face of the brick in intimate contact with the bodies or veins 19 by a metallic cementitious compound 27, such as that commercially known as "smooth-on". The plate is arranged with a series of radial ribs 28 to reinforce the plate to prevent warping thereof through the successive heating and cooling of the plate, and also to maintain the plate in spaced relation to the face of the insulator carrier 6 and provide an additional surface for the uniting of the cementitious compound 27. As a further means for uniting the hot plate P with the insulator carrier 6 mechanical means are provided, comprising a stud 29 having a reduced end 30 threaded into a central boss from which the ribs 28 radiate, as at 31, said stud extending through an opening centrally in the insulator carrier with the free end extended beyond the same and through a perforation centrally in a bow shaped resilient member 32 the extremities of which are extended laterally for engagement with the insulator body and secured thereon by nuts 33 threaded onto the stud at the outer side of said bowed member. By the provision of the bowed resilient member 32 the hot plate and resilient body will be firmly though yieldingly united and compensate for variations in the parts due to expansion and contraction by the heating and cooling of the same.

In Figure 4 I have shown a modified arrangement of my improved electric heating unit. The construction and arrangement is substantially the same as that described in connection with Figures 1 to 3, with the exception that the cementitious compound 27 is not interposed between the hot plate P and the recessed face of the insulator carrier or brick 6, the ribs serving to maintain the hot plate in spaced relation to the insulator carrier and thus providing an air space between the two. The heating elements 17, 18 are not embedded in an alundum body but are free in the recesses 7 and 8 below the surface of the insulator carrier. In order to prevent deterioration of the resistance elements, as by oxidization due to exposure to the atmosphere, they are provided with a coating, as shown at 34 in Figure 5, to insulate the same from the atmosphere when cold and adapted to be rendered incandescent to generate radiant heat when an electric current is passed through the resistance elements, which coating is a nonconductor of electricity and has high thermal conductivity. This insulator for the resistance elements is a cementitious compound comprising a mixture of fine alundum grains and a twenty-five per cent boracic acid applied to the resistance elements in a plastic state. The method of applying this insulator to the resistance elements consists in heating said elements preferably to incandescency, which may be effected by passing an electric current through the resistance elements, and then dipping the elements in the heated state into said compound, or by spreading, as by pushing the compound on the heated elements.

While I have illustrated and described the preferred embodiment of my invention, it will be obvious that various modifications may be made in the construction and arrangement of parts, and that portions of the invention may be used without others and come within the scope of the invention.

Having thus described my invention I claim:

1. In an electric heating unit, a brick of refractory material, a heating element, a body recessed into a face of the brick in which the resistance element is embedded, said body consisting of a material having high thermal conductivity and low electric conductivity, a heat retaining plate juxtaposed to the recessed face of the brick, and means to yieldingly secure the plate to the brick.

2. An electric heating unit as claimed in claim 1, wherein the means to yieldingly secure the plate to the brick comprises a stud fixed at one end centrally in the plate and adapted to be extended through an opening in the brick, and resilient means engaged upon the end of the stud projecting beyond the brick to engage the brick.

3. An electric heating unit as claimed in claim 1, wherein the means to yieldingly secure the plate to the brick comprises a stud fixed at one end centrally in the plate and adapted to be extended through an opening in the brick, a bowed leaf spring member having a central opening whereby it is en-

gaged upon the end of the stud projecting beyond the brick, and a nut threaded onto the projecting stud outside of said spring member.

Signed at New York city, in the county of New York and State of New York, this 10th day of May, 1927.

ANTHONY J. BRESSAN.