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ELECTRIC HEATING DEVICE

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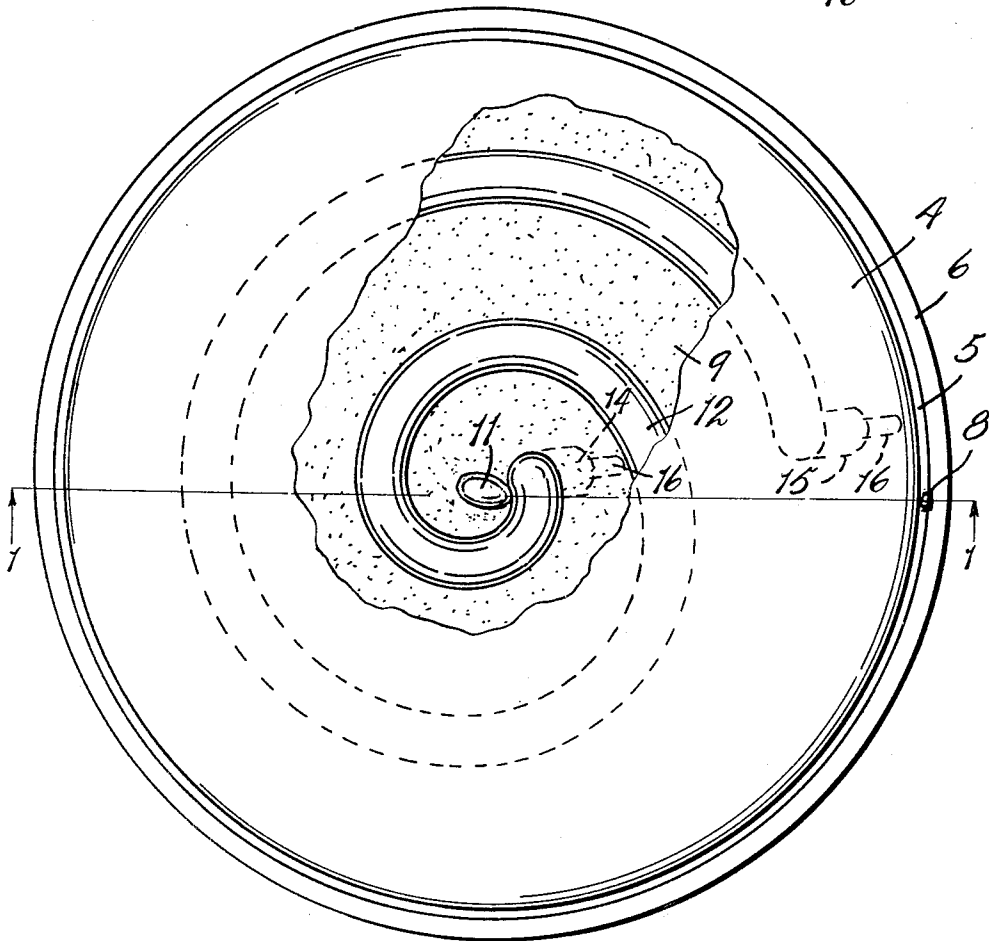
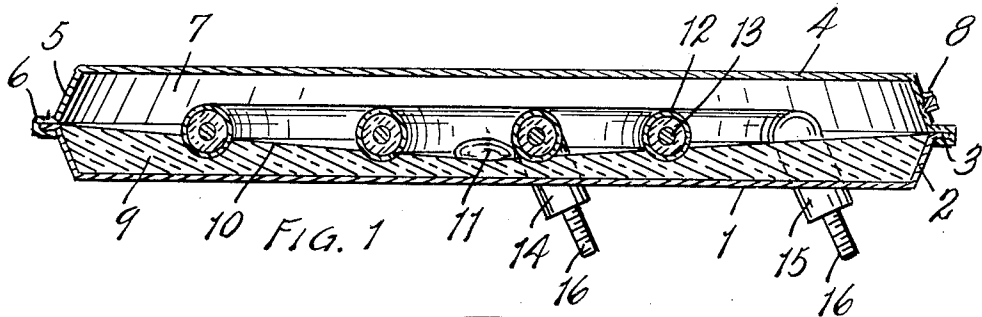


FIG. 2

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ELECTRIC HEATING DEVICE

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10 Claims. (Cl. 219—37)

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This application relates to improvements in electric heating devices well adapted for use as burners for electric stoves, ovens, and in various other relations.

The main objects of this invention are:

First, to provide an electric heating device which is highly efficient and includes a top plate or supporting surface which is uniformly heated throughout the surface thereof.

Second, to provide an electric heating device or unit which may be produced as a unit and installed as such merely by properly supporting and making connections to the source of current.

Third, to provide an electric heating device or unit which is highly efficient in the delivery of the heat units to the face of the device.

Fourth, to provide a structure having these advantages which is quite economical to produce and is very durable in use.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical section through a heating unit or device embodying our invention, on a line corresponding to line 1—1 of Fig. 2.

Fig. 2 is a top plan view of the structure shown in Fig. 1 with portions of the top plate broken away to disclose structure, and parts of the heating element being shown by dotted lines.

The embodiment of our invention illustrated comprises a base plate 1 of dish-shape or having an upstanding peripheral wall 2. This wall terminates in a laterally projecting flange 3. The top plate 4 is also of dish-shape or provided with the side wall 5 and is arranged in an inverted position upon the base plate. The rim of the top plate terminates in a laterally projecting flange 6 which is folded over or seamed over the flange 3. The flanges of the base and top plates are brazed or otherwise bonded together to provide a vapor-tight joint. The base and top members coact to provide a vacuum chamber 7.

Desirably the wall of the top plate is provided with a nipple-like extension 8 to facilitate creating a vacuum in the chamber. This extension 8 is sealed after the chamber is exhausted. The vacuum is desirably as near complete as is commercially practicable. The base member is provided with a heat insulating and deflector member 9 which constitutes a liner for the base member. This is desirably formed of ceramic

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material and has a concaved top face or surface 10 which serves as a collecting well or recess for a quantity of mercury indicated at 11.

The heating element, designated generally by the numeral 12, is formed into a spiral coil and comprises a suitable resistance wire 13 with a protective covering which, however, does not prevent the radiation of the heat from the resistance element. The resistance element is arranged on the top of the deflector or liner 9 and its convolutions are imbedded in the deflector in varying degrees from the center thereof outwardly so that the tops of the coils are supported in spaced parallel relation to the top plate and the major portion of the heating element is exposed within the vacuum chamber.

The heating element is provided with terminals 14 and 15 which are disposed through the deflector and base plate and provided with binding posts 16 to facilitate electrical connections thereto. When the heating element is heated, the mercury is vaporized and is heated in substantially the same ratio as the heating of the heating element and the mercury acts as a heat exchange between the heating element and the lining or deflector and the top. As stated, the vacuum is desirably as complete as is commercially practical. The mercury vapor has a high heat exchange value and contacts all surfaces within the chamber but inasmuch as the lining for the base is non-heat conducting, the heat is mainly conducted to the top plate.

The electrical heating device of our invention is highly efficient and is very durable and easily adapted to varying conditions and uses. We have not attempted to illustrate or describe such adaptations as we believe the disclosure made will enable those skilled in the art to embody or adapt our invention as may be desired.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An electric heating device comprising a dish-like base member having an outturned flange on its rim, a ceramic deflector member fitting within said base member and covering the side walls thereof and having a spherically concaved top surface, the center of which is disposed adjacent the center of the deflector member, an inverted dish-like top plate having an outturned flange on its rim superimposed upon and sealed to the flange of said base member, the base member and top plate coacting to provide a vacuum chamber, a spirally coiled electric heating element disposed on said deflector with the top of

its coils parallel to and spaced from said top plate, said heating element extending spirally outwardly from adjacent the center of the concaved top surface to adjacent the outer periphery of said surface, the convolutions of the heating element being imbedded in the concaved top surface of said deflector in varying degrees from the center thereof outwardly to present the tops of the coils in such spaced parallel relation to the top plate, the terminals of the heating element being disposed through said deflector and base member to facilitate electrical connection thereto, said chamber containing mercury in liquid form, the volume of the mercury being relatively small as compared to that of the chamber to prevent excessive pressure within the chamber upon vaporization of the mercury by heat from the heating element, the mercury when vaporized constituting means for transfer of heat from said heating element and deflector member to said top plate.

2. An electric heating device comprising a dish-like base member having an outturned flange on its rim, a ceramic deflector member fitting within said base member and covering the side walls thereof and having a spherically concaved top surface, the center of which is disposed adjacent the center of the deflector member, an inverted dish-like top plate having an outturned flange on its rim superimposed upon and sealed to the flange of said base member, the base member and top plate coacting to provide a vacuum chamber, an electric heating element disposed on said deflector in spaced relation to said top plate, said heating element extending spirally outwardly from adjacent the center of the concaved top surface to adjacent the outer periphery of said surface, the terminals of the heating element being disposed through said deflector and base member to facilitate electrical connection thereto, said chamber containing mercury in liquid form, the volume of the mercury being relatively small as compared to that of the chamber to prevent excessive pressure within the chamber upon vaporization of the mercury by heat from the heating element, the mercury when vaporized constituting means for transfer of heat from said heating element and deflector member to said top plate.

3. An electric heating device comprising a base member having an upstanding side wall, a ceramic deflector member disposed in said base member and covering the bottom and side wall of the base member, said deflector having a concaved top, a top plate having a peripheral downwardly projecting side wall superimposed upon and sealed to said base member and coacting with said base member to provide a vacuum chamber, an electrical heating element disposed on said deflector in contacting engagement therewith, the heating element having terminals disposed through the deflector and base member to facilitate the electrical connection to the heating element, said vacuum chamber containing mercury in liquid form, the volume of such mercury being substantially less than the volume of said chamber, said mercury when vaporized constituting means for transfer of heat from said heating element and deflector member to said top plate.

4. An electric heating device comprising a base member having an upstanding side wall, a ceramic deflector member disposed in said base member and covering the bottom and side wall of the base member, a top plate having a peripheral

downwardly projecting side wall superimposed upon and sealed to said base member and coacting with said base member to provide a vacuum chamber, an electrical heating element disposed within said chamber and in imbedded relation to the top surface of said deflector member, said vacuum chamber containing mercury in liquid form, the volume of such mercury being substantially less than the volume of said chamber, said mercury when vaporized constituting means for transfer of heat from said heating element and deflector member to said top plate.

5. An electric heating device comprising base and top members connected to provide a vacuum chamber, a ceramic deflector member disposed upon said base member and having a spherically concaved upper surface, and an electric heating element disposed within said chamber upon said deflector, said vacuum chamber containing mercury which, when vaporized by the heat from said heating element, acts as a heat conductor whereby the top member is substantially uniformly heated throughout the area thereof, the volume of the mercury being substantially less than that of the chamber.

6. An electric heating device comprising base and top members coacting to provide a vacuum chamber, a deflector member of non-heat conducting material disposed upon said base member and having a mercury collecting recess in the top thereof, an electric heating element disposed within said chamber in such relation to the recess as to vaporize mercury collected therein, said vacuum chamber containing mercury which, when vaporized, acts as a heat conductor for conducting heat to the top plate, the volume of the mercury being substantially less than that of the chamber.

7. An electric heating device comprising base and top members associated to provide a vacuum chamber, the top member being flat to constitute a support for utensils or the like, the bottom of the base member having a heat insulating covering provided with a mercury collecting recess, and an electric heating element disposed within said chamber in such relation to the recess therein as to vaporize mercury collected within the recess, said vacuum chamber containing mercury in such quantities that when vaporized by heat from the heating element the vapor acts to conduct heat to the top member, the volume of the mercury being substantially less than that of the chamber.

8. An electric heating device comprising base and top members coacting to provide a vacuum chamber, a heat insulating member disposed within said chamber upon said base member and having a mercury collecting recess in the top thereof, and an electric heating element disposed within said chamber in such relation to the recess as to vaporize mercury collected within the recess, the vacuum chamber containing mercury in such quantity that when vaporized it acts to conduct heat to the top member, the volume of the mercury being substantially less than that of the chamber.

9. An electric heating device comprising a vacuum chamber, an electrical heating element disposed in said chamber in spaced relation from one of the walls of said chamber, said wall constituting means for transfer of heat to the exterior of said chamber, said heating element having means contacting therewith and projecting therefrom to provide a heating surface of substantial area disposed in spaced relation

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from said wall, said chamber containing mercury in liquid form, the volume of the mercury being relatively small as compared to that of the chamber, said mercury when vaporized by heat from said heating element constituting means for transfer of heat from said heating element and heating surface to said wall.

10. An electric heating device comprising a vacuum chamber, an electrical heating element disposed in said chamber in spaced relation from one of the walls thereof, said wall constituting means for transfer of heat to the exterior of the chamber, said chamber containing mercury in liquid form, the volume of the mercury being relatively small as compared to that of the chamber, said mercury when vaporized by heat from said heating element constituting means for

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transfer of heat from said heating element to said wall.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,047,418	Kersher	Dec. 17, 1912
1,748,518	Midgley	Feb. 25, 1930
1,897,197	Jolos	Feb. 14, 1933

FOREIGN PATENTS

Number	Country	Date
329,478	Great Britain	May 22, 1930