Jan. 15, 1924. 1,480,787

L. W. SERRELL

ELECTRIC HEATER

Filed Oct. 16, 1920 3 Sheets-Sheet 1

Fig. 1.

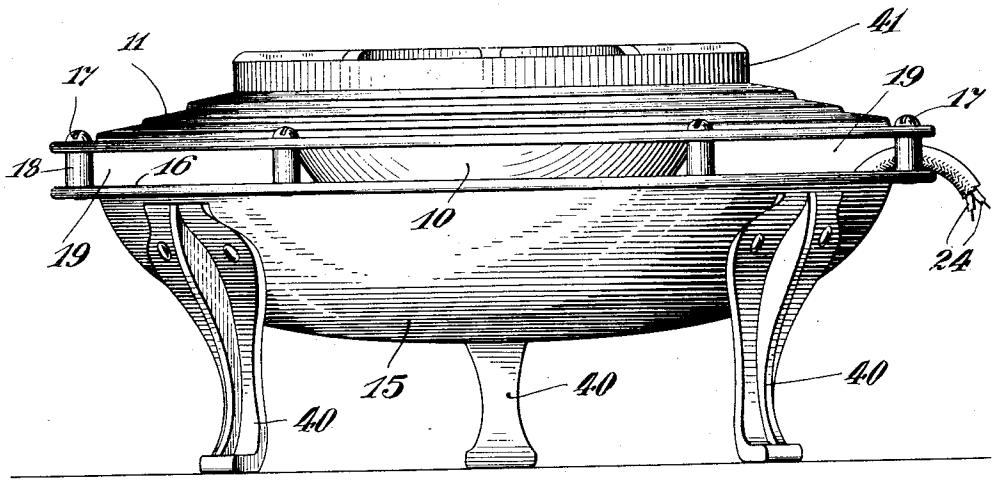
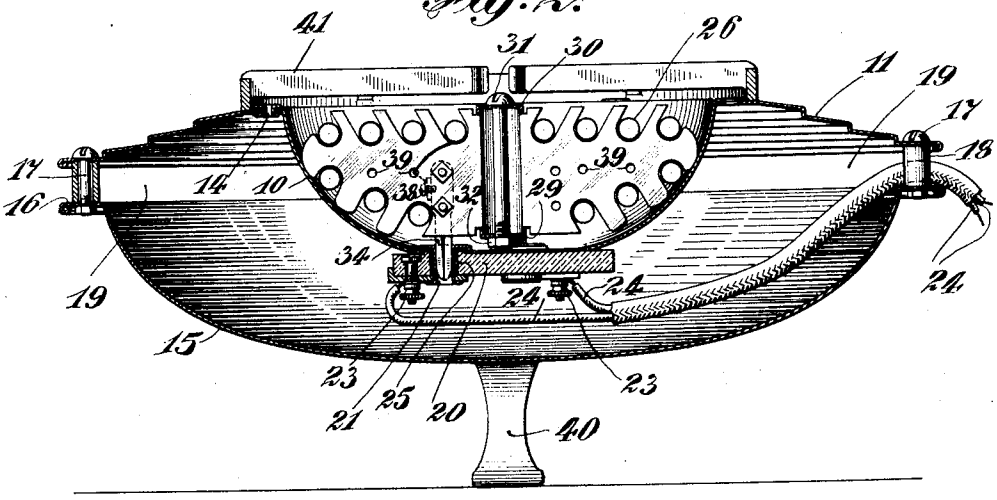


Fig. 2.



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Fig. 3.

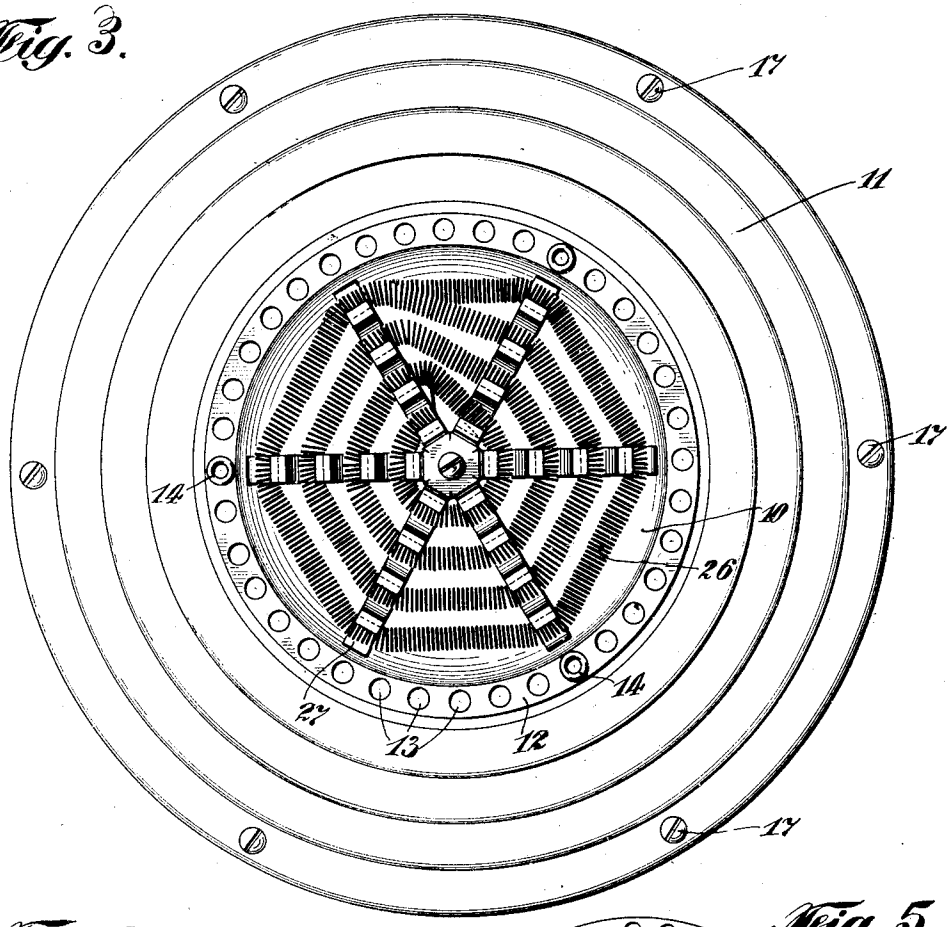


Fig. 4.

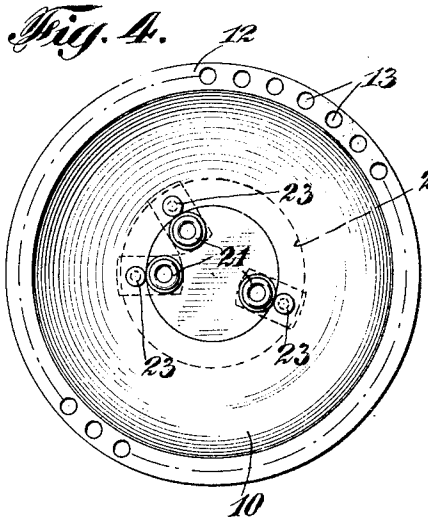
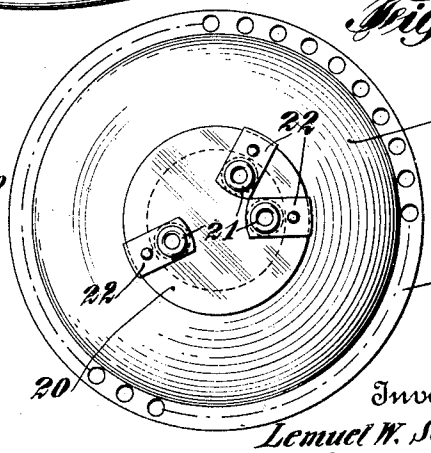


Fig. 5.



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Fig. 6.

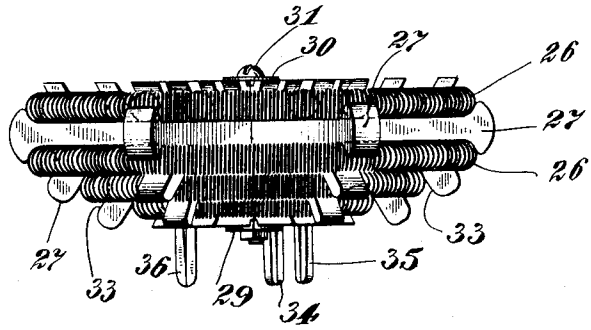


Fig. 7.

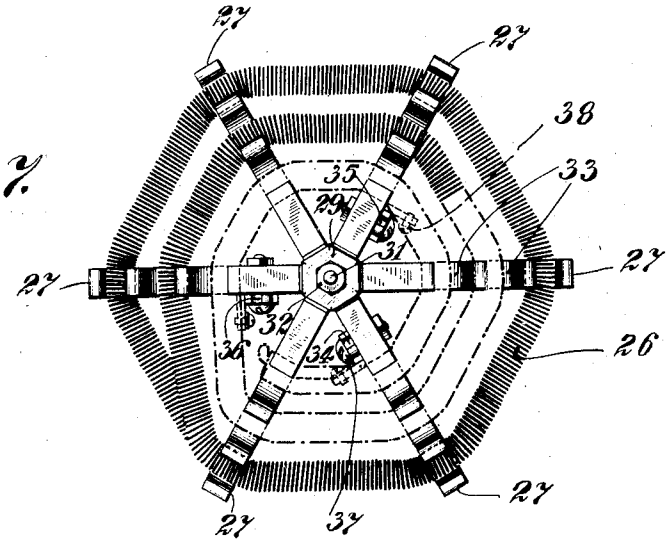


Fig. 8.

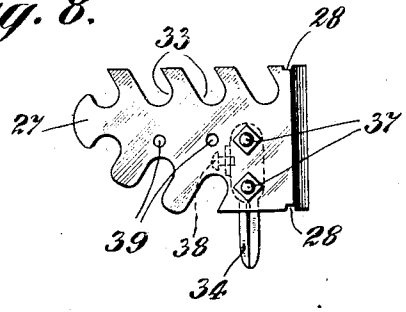
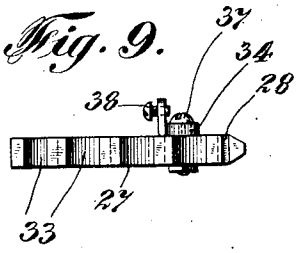


Fig. 9.



Inventor

Lemuel W. Serrell

By his Attorneys Serrell & Son

Patented Jan. 15, 1924.

1,480,787

UNITED STATES PATENT OFFICE.

LEMUEL W. SERRELL, OF NEW YORK, N. Y., ASSIGNOR TO SERRELL ELECTRIC APPLIANCE CORPORATION, A CORPORATION OF DELAWARE.

ELECTRIC HEATER.

Application filed October 16, 1920. Serial No. 417,372.

To all whom it may concern:

Be it known that I, LEMUEL W. SERRELL, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented an Improvement in Electric Heaters, of which the following is a specification.

My invention relates to electric heaters for cooking purposes, and particularly for boiling water quickly. In electric heaters heretofore made of this character, the heating elements have been laid in porcelain or similar material; embedded between iron plates or in cast iron, and the heat generated by the passage of electric current through such resistance wires is radiated uniformly in all directions, that radiating downwardly being absorbed by the porcelain or other material causing a waste of energy, as only a limited amount of the heat is free to function directly upon the vessel containing the water to be boiled.

The object of my present invention is to provide a device in which the heat generated by the electric current is concentrated and caused to impinge directly upon the bottom of the pot or vessel containing the liquid, whereby a maximum efficiency is obtained without wastage of heat. In carrying out my invention, I employ a concave reflector parabolically shaped, preferably polished on its interior surface, into which I insert radiant heating coils openly supported on a skeleton frame of insulating material and so constructed as to practically fill the interior of the reflector. These openly supported radiant coils are so arranged that only a very small portion of the coil touches the support, the balance of the coil being free to radiate its heat directly into the air. The skeleton support does away with absorption and conduction losses and permits the heat to rise naturally, and by deflection from the polished surface of the reflector. A greater amount of the heat is thus free to act directly on the bottom of the vessel placed above the heater, the heat however, that is reflected from the concave deflector, heats the same and this heat being conducted through the deflector warms the air on the under side of the reflector to a high temperature, and to save this wastage I provide, first, an apron that surrounds the reflector and which slopes downwardly and outwardly so that should liquid boil over it will run away from and not into the reflector. I also provide a shell which is fastened to the under side of the apron, but spaced therefrom so as to leave an air space between it and the apron, with an opening to the atmosphere around the outer edge of the apron, and I also provide a series of air vents around the periphery of the concave reflector containing the heating element, all so arranged that the air in the confined space between the reflector and apron and the shell which is heated, may escape through these vents and add its heat energy to the column of heat rising from the heating element. In doing so, it causes cold air to be drawn in at the outer edge of the apron, which travels to the center, down the inner surface of the lower shell, where it rises and replaces the escaping heated air on the under side of the concave reflector. A circulation of air is thus established that absorbs a large amount of the heat conducted through the reflector that would otherwise be wasted, which heat is not only used effectively on the bottom of the vessel containing the liquid, but the circulation of the air cools the concave reflector, stops any injury to the reflecting surface which might occur by the intense heat from the radiant heating coil, and gives a maximum effeciency to the entire heating element. By this new and novel construction I produce a torch like heat column similar to that produced by a gas range burner that will boil water in practically the same time as a gas range burner, which no other form of electric hot plate as yet devised will do.

The details of construction and operation are hereinafter particularly described.

In the accompanying drawings:

Figure 1 is an elevation of my improved electric heater complete.

Fig. 2 is a central vertical section of the same.

Fig. 3 is a top view of the same, the grate being removed.

Fig. 4 is a top view of the reflector.

Fig. 5 is an inverted plan of the same.

Fig. 6 is an elevation of the heating element removed.

Fig. 7 is a bottom plan view of the same.

Fig. 8 is a side view of one of the arms of the supporting frame for the heating coil, and

Fig. 9 is a top view of the same.

Similar reference characters denote like parts throughout the several views.

10, indicates a metallic concave reflector preferably polished on its interior, and having a circular apron 11 extending outwardly from and surrounding its periphery. This apron may be integral with the reflector, but I prefer to provide the reflector with an annular flange 12 around its periphery to which the apron is secured. In the preferred form, the apron has a central circular opening of slightly larger diameter than the upper part of the reflector, so that when the reflector is placed into such opening its flange 12 will rest upon the top of the apron. Uniformly spaced openings are made in the apron adjacent its inner edge, and similar and aligned openings are made in the flange 12 of the reflector, thus forming a series of air vents 13 around the periphery of the reflector. The apron may be secured to the reflector in any suitable manner, but I prefer to employ eyelets 14 which may be inserted within two or more of the aligned openings forming the air vents, as shown. The apron is preferably sloped slightly downwardly away from the reflector for the purpose of carrying off any liquid that might boil over, and it may be stepped concentrically as shown, for the purpose of giving it greater stiffness. The outer edge of the apron extends horizontally and is provided with spaced openings for the purpose hereinafter set forth.

15 denotes an outer shell provided with a horizontal annular flange 16 of corresponding diameter to the outer edge of the apron 11; this flange 16 is also provided with spaced openings, corresponding and in alignment with the openings in the outer edge of the apron. The apron 11 and the outer shell 15 are secured together by bolts 17 which pass through the openings in the outer horizontal edge of the apron and flange 16 of the shell, there being spacing sleeves 18 surrounding said bolts between the respective flanges, which serve to separate the apron and shell a predetermined distance, leaving cold air inlets 19 therebetween.

The bottom of the reflector 10 is preferably flattened at its center and provided with three spaced openings therein. 20 denotes a disk of insulating material secured to the under side of the reflector 10 at its center by sleeve or eyelets 21 passing through the openings in the bottom of the reflector and through similar and aligned openings in the disk. The lower ends of these eyelets 21 also pass through openings in one end of contact strips 22, the ends of the eyelets being upset within the reflector and upon the contact strips 22. The free ends of these contact strips are upwardly turned over the outer edge of the disk 20, and each strip is provided with a threaded hole to receive the binding screws 23 for the conductor wires 24, there being aligned holes through the disk 20 into which the ends of the screws 23 may pass. Insulating bushings 25 are employed to prevent contact between the reflector and the eyelets 21.

26 indicates a heating coil which is arranged within the reflector 10 upon a skeleton support comprising a plurality of flat arms 27 of insulating material, each arm being convergingly beveled vertically at one end whereby these ends of the respective arms fit together at a common center with the arms extending therefrom in spaced vertical relation to each other. On the upper and lower edges of each arm adjacent its beveled end there is a notch 28. 29 and 30 are two metal disks, each provided with a central opening and overturned outer edge, which are placed at the top and bottom of the arms 27 at their meeting point when assembled, the overturned edges of the disk fitting into the notches 28 on the arms. A screw 31 is passed through the openings in these disks and a nut 32 screwed upon the lower projecting end of the screw, thus securely holding the arms 27 together, there being sufficient space between the assembled ends of the arms to permit of the passage of said screw.

The top edges of the arms 27 are in the same horizontal plane, their free ends being curved to conform to the interior of the reflector, and both the top and curved edges of these arms are provided with spaced recesses or open slots 33.

Vertically disposed terminal contacts 34, 35, 36 are secured to three of the arms 27 (one contact to each arm) by bolts or screws 37, the lower ends of such contacts being split longitudinally and extending below the arms 27 a predetermined distance.

The heating coil 26 is uniformly wound around the skeleton support, being inserted into the recesses or slots 33 in the respective arms 27; one end of the coil 26 is connected to the contact 34 by a binding screw 38 and the other end of the coil is similarly connected to one of the other terminal contacts 35 or 36. Holes 39 are preferably provided in the arms 27 through which the end or ends of the heating coil 26 may be passed to facilitate connection with the terminal contacts.

In placing the heating element within the reflector, the projecting lower split ends of the terminal contacts 34, 35, 36 are pushed through the sleeves or eyelets 21 connecting the insulating disk 20 with the under side of the reflector, thus making electrical connection with the lead wires 24; these terminal contacts not only facilitate the proper positioning of the heating element within the reflector, but also serve to hold it in fixed relation thereto.

A grate 41, is placed over the heating element, being seated upon the apron 11, the outer edge of the flange 12, of the reflector 10, serving to center the grate. The vessel holding the liquid to be boiled is to be seated upon this grate.

My improved heating device may be supported in any suitable manner. It may be seated within an opening in the top of an electric oven with the flange 16 of the shell 15 resting upon the top of the oven surrounding such opening, but I prefer to provide legs 40, as shown, so that the device may be stood upon a table or upon any other convenient support.

By the employment of the skeleton frame for the heating coil, only a comparatively small portion of the coil contacts with the supporting arms of the frame, which leaves the major portion free to radiate the heat directly into the air, thus greatly lessening absorption and conduction losses, the heat rising naturally, and by deflection from the polished surface of the concave reflector, while the use of the apron and lower shell, with the cold air inlets and heated air outlets provided thereby, gives additional heat energy to the column of heat rising from the heating coil. The circulation of air produced by this arrangement at the same time cooling the concave reflector, thereby preventing any injury to the reflecting surface from the intense heat from the radiant heating coil, giving a maximum efficiency to the entire heating element.

I claim as my invention:

1. An electric heater comprising a concave reflector, an openly supported electric heating element therein consisting of a resistance coil and an insulating support therefor comprising a plurality of divergent arms provided with notched edges into which said coil is inserted and uniformly wound about said support and terminal contacts, forming means by which said heating element may be placed in or removed from said reflector.

2. An electric heater comprising a concave reflector, an openly supported heating element uniformly distributed within the same and an apron surrounding said reflector.

3. An electric heater comprising a concave reflector, an openly supported heating coil uniformly distributed within the same, an apron surrounding said reflector, a lower shell and means for attaching the same thereto and in spaced relation therefrom.

4. An electric heater comprising a concave reflector, an openly supported heating coil uniformly distributed within the same, an apron extending outwardly from said reflector and surrounding the same, a series of air vents surrounding the periphery of said reflector and a lower shell held in spaced relation therefrom.

5. An electric heater comprising a concave reflector, an insulating support therein consisting of a plurality of divergent arms connected together at one end and curved on their free ends to conform to the shape of the reflector, each arm being provided with spaced notches on its edges and a resistance coil inserted into said notches and uniformly wound about said support.

6. An electric heater comprising a concave reflector, an openly supported heating coil uniformly distributed within and substantially filling the same, an apron extending outwardly from said reflector and surrounding the same; a lower shell held in spaced relation from said apron so as to leave an air space between, with an opening to the atmosphere, and a series of air vents surrounding the periphery of the reflector through which the heated air on the under side of the reflector may escape while cold air is drawn from the atmosphere to replace the same.

7. An electric heater comprising a concave reflector, a heating coil, an insulating support for the same consisting of a plurality of divergent arms connected together at one end, each arm being provided with spaced notches on its edges to support said coil, an apron extending outwardly from said reflector and surrounding the same; a lower shell fastened to, but in spaced relation from said apron so as to leave an air space between, with an opening to the atmosphere, and a series of air vents surrounding the periphery of the reflector through which the heated air on the under side of the reflector may escape, while cold air is drawn in from the atmosphere to replace the same.

8. An electric heater comprising a concave reflector provided with an outwardly turned annular flange having spaced apertures therein, an apron connected to said flange, a lower shell, means for supporting the same below the apron in such manner as to leave an air space therebetween, an openly supported heating coil within the reflector, and a skeleton insulating support for said coil.

9. An electric heater, comprising a concave reflector, a heating element located substantially within the periphery of the reflector, an outer shell in spaced relation with the reflector, and an apron substantially covering the space between the periphery of the reflector and the periphery of the shell, cold air inlets being provided substantially at the periphery of the shell and heated air outlets being provided substantially at the periphery of the reflector.

Signed by me this 7th day of October, 1920.

LEMUEL W. SERRELL.