April 26, 1932. W. H. BATHRICK 1,855,507

ELECTRIC COOKING DEVICE

Filed Aug. 1, 1930

Fig. 2.

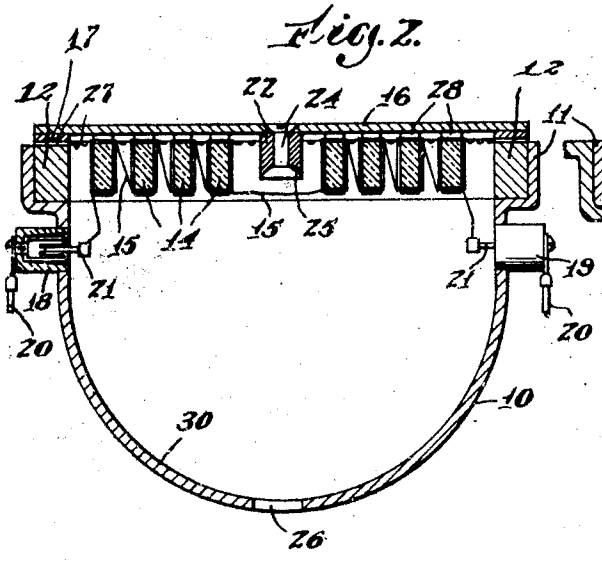


Fig. 3.

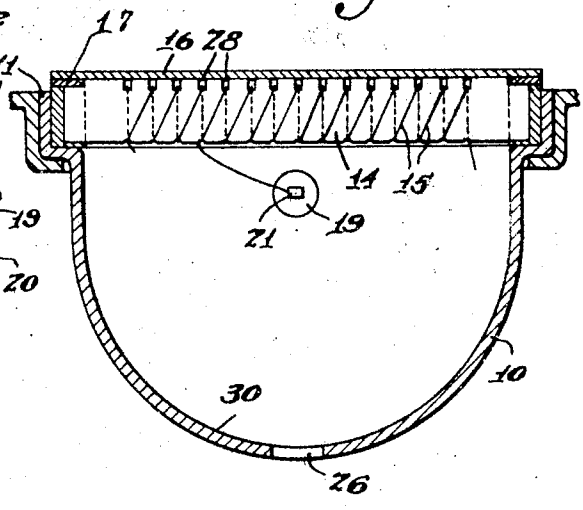


Fig. 1.

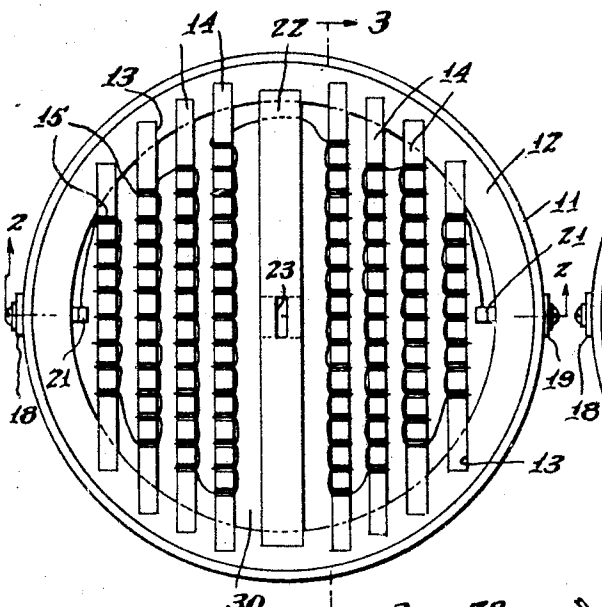
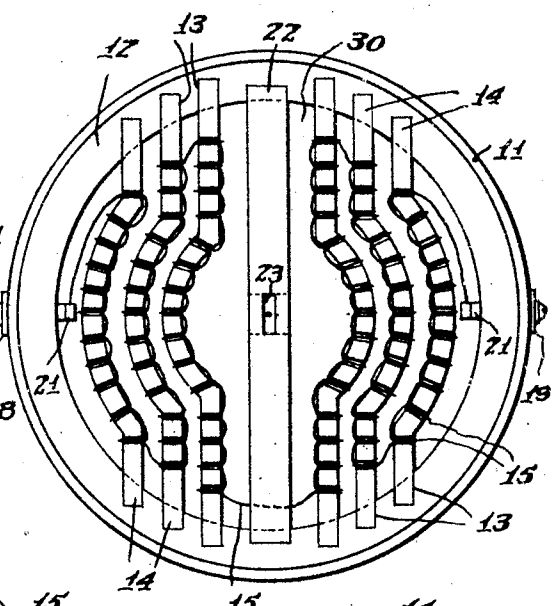


Fig. 5.



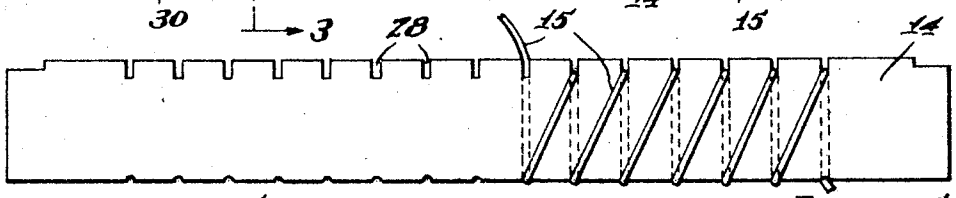


Fig. 4.

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1,855,507

UNITED STATES PATENT OFFICE

WALTER H. BATHRICK, OF BOSTON, MASSACHUSETTS

ELECTRIC COOKING DEVICE

Application filed August 1, 1930. Serial No. 472,214.

My present invention relates to cooking devices, and more particularly to an improved electric cooking device.

My device utilizes the electrical energy and converts it into a maximum concentration of heat on the objects to be heated or cooked. This is accomplished by a combination of the well known methods, as conduction, convection and radiation of heat from the heating coils, all of which are finally concentrated upon a relatively thin metallic plate, or cover, the cover also serving to protect the heating coils and prevent short-circuiting of such coils when liquids are boiled over their containers accidentally, as sometimes occurs.

This protection of the coils is also important even though the coils might not be short-circuited because such liquids usually contain food matter which crystallizes upon the heater elements and to a certain degree insulate it as well as other parts of the heat radiating elements, and reduces the efficiency of the whole unit.

The principal object of my invention, therefore, is an improved electric cooking device.

Another object is an electric cooking device in which heat conduction, convection and radiation are combined, each assisting the other to produce an intensely hot cover plate, thereby materially reducing the amount of electrical current necessary to produce the desired results.

Other objects and novel features comprising construction and operation of my device will appear as the description of the invention progresses.

Referring to the drawings:

Fig. 1 is a plan view of the heating unit with the cover removed;

Fig. 2 is a cross-section taken on the line 2—2 of Fig. 1;

Fig. 3 is another cross-section taken at right angles to Fig. 2, and indicated at 3—3 on Fig. 1;

Fig. 4 is a side elevation of one of the wound insulators used in my device particularly showing the excessive depth of the wire slots at its top edge purposely provided to facilitate the circulation of hot air under the cover plate, and

Fig. 5 shows a modified plan view of the heater unit similar to Fig. 1, but using curved insulator bars for the purpose of providing minimum obstruction at the central portion of the bottom of the cover plate where the reflected heat is the greatest.

Referring more in detail to the drawings, 10 indicates a cup-shaped casing which may be more or less solidly fixed in an electric cooking range, its upper edge comprising an outwardly extending flange 11 adapted to receive an annular insulator supporting ring 12. The ring 12 is provided with a series of slots 13 oppositely opposed on either side and adapted to receive a series of parallelly arranged insulator bars 14 on which are spaced at regular intervals windings of resistance wire 15.

Directly above the bars 14 and contacting with portions thereof, is a cover plate 16 preferably made of thin metal, the under side of which is dark in color and non-reflecting. Directly above the supporting ring 12 and adjacent the under side of the cover plate 16 is a flat ring 17 which may be permanently attached to the ring 12 by welding or otherwise, the purpose of which is to retain the insulator bars 14 in place when the unit is being handled, the ring 12, bars 14, and cover 16, comprising a removable unit. The resistance wire 15 is composed of one continuous winding, one end of which terminates in a plug socket 18, the other of which similarly terminates in a similar plug socket 19, both sockets, 18 and 19, being attached to the outer casing 10 and having feed wires 20 adapted to connect with the house current. The two ends of the wire 15 are provided with plugs 21 fitting to sockets 18 and 19 so that when the unit comprising the ring 12, bars 14, and cover 16, are raised, the wire 15 may be easily disconnected thereby disconnecting the heat unit from the rest of the range. The ring 12 is further provided with a central transverse bar 22 provided as a supporting element for the central portion of the cover 16, the cover being attached to the ring 12 at a central point in the supporting bar 22. At this point

I have provided a rectangular slot 23, better shown in Fig. 1, the long sides of the bottom of the slot being slightly beveled, as shown in Fig. 2. A screw 24 having its head countersunk in the cover plate 16, is inserted in the slot 23, the bottom of the screw body 24 being provided with outstanding oppositely opposed beveled sides 25, such that they may be inserted through the slot 23 like a key and then turned at right angles by means of a screw driver from the top firmly wedging the plate 16 to the bar 22, but being easily removed if desired.

At the centre bottom of the casing 10 is an air opening 26 provided for the purpose of admitting air to the inside of the casing, and at the outer ring 12 there are also provided air outlets 27. Similarly, over each of the resistance wires on the bars 14, air passages 28 are provided for the purpose of allowing the hot air generated from the coils and otherwise to circulate under the plate 16, providing proper conditions for heat convection.

The inner surface 30 of the casing 10 consists of a concaved highly polished surface for the purpose of reflecting and converging the radiant heat given off by the coils and the flat lower surface of the refractory bars upon a smaller central portion of the under side of the cover 16. The radius of curvature of the concaved surface 30 will be determined from an approximate location of the focus point of the reflected heat rays such that the cover plate intercepting the reflected rays will receive them over a small area. The heat thus concentrated upon the cover plate will be diffused radially through the cover plate both by conduction and by convection since a slow current of air is being passed over the said area. The net result of my invention is to produce a final cover temperature of higher degree for every watt of electrical energy used such that less current is necessary to obtain the desired cooking heat than would be possible without the combination. Each of the methods here combined namely; conduction from the bars to the plate, convection from the slow passage of air, and converged radiation are not acting separately but jointly making an extremely efficient and economically operated electrical cooking device with few or none of the objectionable features sometimes encountered in this type of device.

Having thus described my invention, what I claim as new, is:

1. An electrical cooking unit comprising a substantially closed container having a flat top and curved bottom, heating coils attached to the under side of said top adapted to conduct heat thereto, a bright surface located on the inner side of said container adapted to reflect radiant heat against the bottom of said top, an air vent located at the bottom of said bowl, air vents located around the under edges of said top, said air vents adapted to distribute heat by convection to the underside of said top.

2. In an electrical cooking unit, a cover plate adapted to surmount a concaved lower casing, resistance wire insulators adapted to contact with the under side of said cover plate, said insulators provided with slotted edges to receive electrical resistance wire, air gaps located in the tops of said insulators between said wire and the bottom of said cover plate, an air inlet located in the bottom of said concaved casing, air outlets located adjacent the lower rim of said cover plate, said air gaps, inlets, and vents adapted to induce a flow of convection currents radially away from the cover plate center, said casing provided with a polished inner surface for the purpose of reflecting and converging radiant heat from said resistance wires and said insulator bars upon a smaller circular exposed area of the under side of the said cover plate.

3. In an electrical cooking unit, a cover plate adapted to surmount a concaved lower casing, resistance wire insulators adapted to contact with the under side of said cover plate, said insulators comprising refractory bars having mid-sections circularly shaped away from the center of said cover member, said insulators provided with slotted edges to receive electrical resistance wire, air gaps located in the tops of said insulators between said wire and the bottom of said cover plate, an air inlet located in the bottom of said concaved casing, air outlets located adjacent the lower rim of said cover plate, said air gaps, inlets, and vents adapted to induce a flow of convection currents radially away from the cover plate center, said casing provided with a polished inner surface for the purpose of reflecting and converging radiant heat from said resistances wires and said insulator bars upon a smaller circular exposed area of the under side of the said cover plate.

In testimony whereof I have affixed my signature.

WALTER H. BATHRICK.