

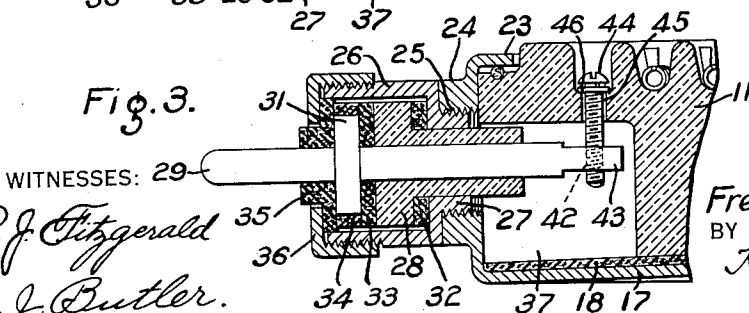
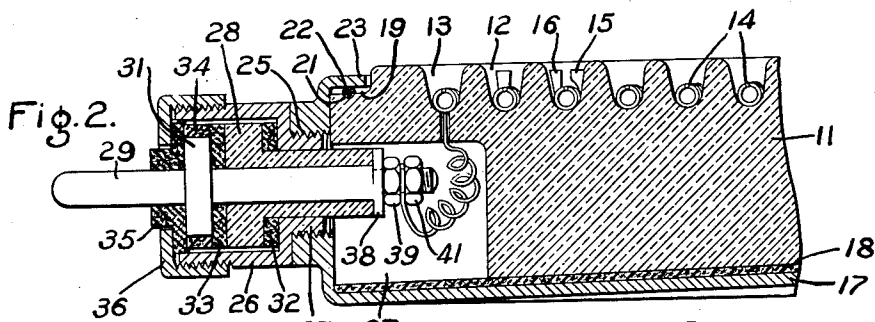
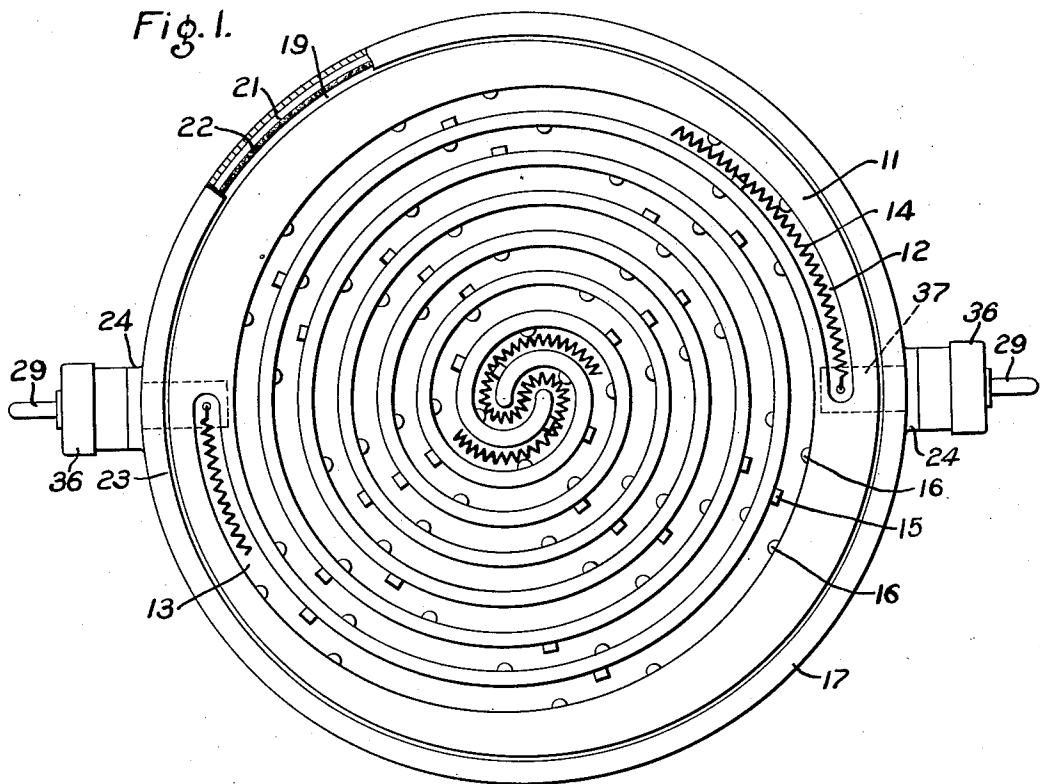
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1,579,732

F. E. OWEN

ELECTRIC HEATING UNIT

Filed August 2, 1924



WITNESSES:

R. J. Fitzgerald
R. J. Butler.

INVENTOR
Frederick E. Owen.
BY *A. M. Biegel*
ATTORNEY

UNITED STATES PATENT OFFICE.

FREDERICK E. OWEN, OF EAST PALESTINE, OHIO.

ELECTRIC HEATING UNIT.

Application filed August 2, 1924. Serial No. 729,677.

To all whom it may concern:

Be it known that I, FREDERICK E. OWEN, a citizen of the United States, and a resident of East Palestine, in the county of Columbiana and State of Ohio, have invented a new and useful Improvement in Electric Heating Units, of which the following is a specification.

My invention relates to electric heating devices and particularly to electric heating units.

One object of my invention is to provide a relatively simple, light-weight, and easily manufactured, heating unit for a so-called fireless cooker.

Another object of my invention is to provide a semi-encased heating unit in which the cooler portions of a refractory member, comprising a part of the unit, shall be encased in metal to prevent absorption of odors.

Another object of my invention is to provide a heating unit embodying a resistor-supporting member and a metal casing therefor with interfitting means for preventing relative movement of the two parts.

In practicing my invention I provide a plate of refractory electric-insulating material having a substantially open groove in its upper face. I provide further a metal casing, of substantially cup-shape, that surrounds the bottom and the side portions of the plate, and is bent around or over an upper shoulder of the refractory plate. The casing is provided with a plurality of lugs to receive the inner end of metal housings within which are located terminal member assemblies suitably insulated therefrom, and held therein by a metal cap member having screw-threaded engagement with the housing.

In the single sheet of drawings,

Figure 1 is a top plan view of a heating unit embodying my invention, certain portions thereof being cut away to show the interior construction thereof.

Fig. 2 is a view, in vertical section there-through, a portion only of the unit being shown on an enlarged scale; and,

Fig. 3 is a fragmentary view, in vertical section showing a modified form of construction embodying my invention.

A brick or plate 11, of refractory electric-insulating material, is provided with a plu-

rality of spiral grooves 12 and 13 in its upper surface. The plate 11 may be of any suitable or desired contour and dimensions as may be required by the device or apparatus with which it is to be operatively associated and which it is to heat. Hence while I have illustrated a substantially circular plate, I do not desire to be limited thereto, as the plate may be square or rectangular.

A resistor member 14 that may comprise a suitable metal wire wound into extended helical form is located in the substantially open grooves 12 and 13. Any suitable or desired means for holding or retaining the resistor member 14 in the otherwise open groove or grooves may be provided, but I have illustrated a preferred construction that is more particularly described and claimed in a co-pending application by Clarence W. Williams, Serial No. 689,467, filed Jan. 30, 1924.

The means for retaining the resistor member within the grooves comprises a plurality of spaced horizontally-extending lugs 15 that are integral with one of the side walls of the groove, and pairs of ribs 16 extending substantially vertically of the plate and integral with the other side wall of the groove, both ribs being spaced from the integral lug. As is more particularly explained in the hereinbefore mentioned application, the helically-wound resistor member is placed in its proper operative position by a movement thereof at substantially right angles to the face of the refractory plate, after which it is pressed into the groove and held below the over-hanging lugs by the opposing spaced ribs.

I have illustrated a pair of spiral grooves in order that one end of the resistor member may be located in substantially diametrically-spaced position relatively to the other end thereof and that suitable terminal members connected thereto may be located in diametrically-spaced positions. If a different contour of refractory plate and heating unit is employed a different configuration of groove or grooves may be used.

A metal casing 17, of substantially cup-shape, is provided for the refractory plate 11, and is of substantially the same contour and of substantially the same depth as the plate 11. The plate 11 fits snugly within the casing 17, a sheet or plate 18 of a suit-

able heat-insulating material being located therebetween. The plate or sheet 18 may be of asbestos or some similar material that will retard the flow of heat from the bottom surface of the refractory plate 11 to the bottom portion of the casing 17.

The plate 11 is provided, at its upper portion and adjacent to the edge thereof, with a shoulder portion 19 having a shallow groove 21 therein to receive a resilient gasket member 22, that may also be of asbestos. The upper edge portion of the annular part of the casing 17 is bent over the shoulder portion 19 and into close engagement with the gasket 22, whereby substantially all but the upper grooved surface of the plate 11 is covered by a metal casing.

The metal casing 17 is provided with a pair of integral hollow lugs 24 that extend a short distance radially from the periphery of the casing 17 and have their inner surface provided with suitable screw threads 25. A metal housing 26, that may be of substantially circular form in lateral section, has an inner reduced end portion 27 that is provided with external screw threads adapted to engage the screw threads 25 on the lug 24. The housing 26 is of substantially tubular form, the inner diameter of the portion 27 being sufficiently large to permit of extending therethrough the reduced inner end portion of a tubular member 28 of a refractory electric-insulating material. A metal terminal pin 29 has a portion extending through the member 28 and has also an outer end portion extending outside of the housing 26, an intermediate integral flange portion 31 being provided thereon of greater diameter than the other parts of the terminal pin. A washer 32, of fibrous, resilient, electric-insulating material such as asbestos, is located between the outer end of the portion 27 of the housing and the inner face of the outer enlarged end portion of the member 28. A substantially similar washer 33 is located between the outer end surface of the member 28 and the inner surface of the enlarged portion 31. An annular collar 34, also of fibrous electric-insulating material, is provided between the outer periphery of the portion 31 and the inner surface of the housing 26. A bushing 35, that is preferably also of a fibrous and resilient material such as asbestos, surrounds the outer portion of the terminal pin 29 and has its inner surface in operative engagement with the outer surface of the enlarged portion 31. A metal cap member 36, of substantially cup-shape, fits over a portion of the bushing 35 and has screw-threaded engagement with the outer end of the housing 26.

The inner ends of the members 29 extend into chambers 37 that are provided in the refractory plate 11 at substantially the bottom portion thereof. The inner ends of the

members 29 are made of reduced diameter and are provided with screw threads. A washer member 38 is pressed against the inner end of the refractory insulating bushing 28 by a nut 39, and one of the ends of the resistor member 14 is clamped around the end of the terminal pin 29 and against the nut 39 by a second nut 41.

In Fig. 3 of the drawing, I have illustrated a modified form of terminal member aggregate, the main difference from that illustrated in Fig. 2 of the drawing being in the method of connecting the end of the resistor member to the terminal pin 29. The terminal pin 29 is made longer in this form and is provided with a screw-threaded opening 42 extending laterally therethrough at the inner end thereof, which end may be provided with flattened portions as illustrated by the numeral 43 in the drawing. A machine screw 44 extends from the bottom of the outer end of the groove through an opening 45 into the chamber 37 and is adapted to fit into the screw-threaded opening 42. By placing the end of the resistor member 14 under the head of the screw 44 and between it and a washer 46, a suitable electrical connection is made between the resistor member 14 and the terminal pin 29.

In the assembly of the heating unit the resistor member 14 may be placed in the open groove and the refractory plate may then be placed within the casing 17 and the upper flange portion 23 may be turned over on the gasket 22 and the shoulder 19 by any suitable means, such as by rolling or by a suitable press. The ends of the resistor member 14 are brought out through the respective chambers 37 and through the lugs 24 and also through the housing 26 which latter have been screwed into the co-operating lugs. The terminal pin 29, in the construction illustrated in Fig. 2 of the drawings, is mounted in its proper operative position relatively to the insulating bushing 28 and the insulating washer 33, the metal washer 38 and the nut 39 being located thereon. The end of the resistor member 41 is placed around the reduced inner end portion of the pin 29 and held there by the nut 41 which is drawn up tight.

The above described connection of the end of the resistor wire 14 to the ends of the terminal pins is made with the inner end of the terminal pins located just outside of the outer ends of the respective housings 26, after which the terminal pin and the insulating members operatively associated therewith are pushed into the housing and into substantially the position illustrated in Fig. 2 of the drawing. The initially extended ends of the resistor wire will thereby be caused to coil up in the chambers 37. The insulating collar 34 is then put into place and also the bushing 35, after which the cap

member 36 may be mounted on the housing, whereby the terminal pin assembly is held in its proper operative position within the housing and in substantially the position illustrated in Fig. 2 of the drawing.

When the modification illustrated in Fig. 3 of the drawing is employed, the terminal pin, together with the refractory bushing 28, and the inner washers 32 and 33, are pushed into the housing and into substantially the position illustrated in this figure of the drawings. The screw 44 may then be placed in its proper operative position in the opening 45 and be caused to engage the inner end of the terminal pin. After this the annular member 34, the bushing 35, and the cap member 36 may be mounted in their proper operative positions, substantially as illustrated in the drawings, thereby to hold the terminal pin in its proper operative position within the housing.

A heating unit of the herein described construction is particularly applicable for use in electrically heated cooking devices of the fireless cooker type, wherein the heating unit is to be located at the bottom of the cooking chamber and the cooking vessels are to be located thereabove. A refractory plate is very desirable to support the otherwise open or bare heating element or resistor member because of its relatively high electric-insulating characteristics. It has, however, the drawback of being relatively porous, and will tend to absorb odors from the food being cooked. By providing a substantially bare heating resistor I am enabled to raise the temperature of the cooking vessel very quickly, particularly if the cooking vessel is permitted to rest directly upon the top surface of the refractory plate. The metal casing surrounds and covers all of the surface of the refractory plate that is not occupied by the heating element, and prevents the absorption of odors from the food being cooked by those parts of the refractory plate that are at somewhat lower temperature than the resistor member itself or those parts of the refractory plate closely adjacent to the resistor member.

The metal casing may be made either in the form of a punching or it may be made a casting. The plate 18 of heat-insulating material located between the bottom of the refractory plate and the bottom of the casing tends to reduce the flow of heat downwardly from the refractory plate.

Any suitable or desired construction of stationary contact members may be provided in the cooking device with which a heater unit embodying my invention is to be associated, and this contact member may be of a resilient type to permit of easy and quick insertion therein and removal therefrom of the projecting terminal pins.

The thickness of the insulating bushings

35 may be made as large as is found suitable or necessary in view of the fact that the creeping distance between the terminal pin and the metal cap member must be large enough to prevent a ground developing therebetween when the heating unit is used in a substantially closed heating chamber that may be filled with moisture-laden vapor from the food being cooked.

It may be noted further that it is intended to operate the resistor member 14 at such a relatively high temperature that no cooking odors will be absorbed by the refractory material located immediately adjacent thereto. In case any of the food should be spilled on the upper surface, as by boiling over, the relatively high temperature of the heating element and of the upper surface of the heating unit will burn any such food and in this way also tend to prevent the cooking odors from being absorbed by the refractory plate.

A heating unit embodying my invention may be easily and quickly repaired in case of a burnout of the resistor member, as the latter may be quickly removed, as may also the cap members from the terminal member assembly, to permit of disconnecting the ends of the resistor wire from the terminal pins. Re-assembly may be effected as was hereinbefore described.

As the terminal pins extend into the chambers in the refractory plate, to interfit therewith, relative movement of the casing and the refractory plate is effectively prevented. While I have illustrated my invention in a preferred embodiment, I do not desire to be limited to the exact structures shown in the drawing, and desire that only such limitations shall be placed upon the claims as are imposed by the prior art.

I claim as my invention:—

1. In a heating unit, in combination, a refractory member having a substantially open groove in one face thereof, a resistor member in said groove, and a metal casing enclosing the bottom surface and the annular periphery only of said refractory member and secured thereto.

2. In a heating unit, the combination with a refractory member of electric-insulating material having a substantially open groove in one face thereof, and a resistor member in said groove, of a metal casing, of substantially cup-shape, enclosing the bottom and the sides only of said refractory member and secured thereto by a bent-over portion thereof.

3. In a heating unit, the combination with a refractory member of electric-insulating material having a substantially open groove in one face thereof, and a resistor member in said groove, of a metal casing, of substantially cup-shape, enclosing the bottom and the sides only of said refractory mem-

ber and having the rim thereof bent over said refractory member below the upper surface thereof.

4. In a heating unit, the combination with
5 a refractory member of electric-insulating material having a substantially open groove in one face thereof, and a resistor member in said groove, of a metal casing, of substantially cup-shape, enclosing the bottom
10 and the sides only of said refractory member, and a terminal member aggregate supported by said metal casing and interfitting with said refractory member.

5. In a heating unit, the combination with
15 a refractory member of electric-insulating material having a substantially open groove in one face thereof, and a resistor member in said groove, of a metal casing, of substantially cup-shape, enclosing the bottom
20 and the sides only of said refractory member, a terminal housing supported by said casing, a terminal pin insulatedly mounted in said housing and interfitting with said refractory member, and a cap member on
25 said housing for holding said terminal pin therein.

6. In a heating unit, the combination with a refractory member of electric-insulating material, and a resistor member located in
30 one face thereof, of a metal casing member, of substantially cup-shape, for receiving said refractory member, and integral means on said casing member for holding said refractory member therein.

35 7. In a heating unit, the combination with a refractory member of electric-insulating material, and a resistor member located in one face thereof, of a metal casing member, of substantially cup-shape, enclosing said
40 refractory member on all surfaces except

that occupied by the resistor, to prevent the reception and retention of cooking odors by the relatively cooler portions of said refractory member.

8. In a heating unit, the combination with
45 a refractory member of electric-insulating material, and a resistor member located in one face thereof, of a metal casing member, of substantially cup-shape, for receiving said refractory member, and a terminal
50 member assembly supported by said casing member and projecting into said refractory member to prevent relative movements of the two members.

9. In a heating unit, the combination with
55 a refractory resistor-supporting member, and an enclosing casing therefor, of means supported by said casing for preventing relative movement of said refractory member and said casing.
60

10. In a heating unit, the combination with a refractory member, a resistor supported thereby, and an enclosing casing, of means constituting terminal members for
65 said resistor and effective to prevent relative movements of said refractory member and said casing.

11. In a heating unit, the combination with a refractory member, a substantially
70 uncovered resistor member located in the upper surface thereof, and a metal casing enclosing all of said refractory member except the upper surface, of a plurality of terminal members supported by said casing
75 and interfitting with said refractory member to prevent relative movement thereof.

In testimony whereof, I have hereunto subscribed my name this 31st day of July, 1924.

FREDERICK E. OWEN.