W. S. HADAWAY, JR.

ELECTRIC HEATER.

APPLICATION FILED FEB. 11, 1913. RENEWED AUG. 2, 1915.

**1,174,032.**

Patented Feb. 29, 1916.

2 SHEETS—SHEET 1.

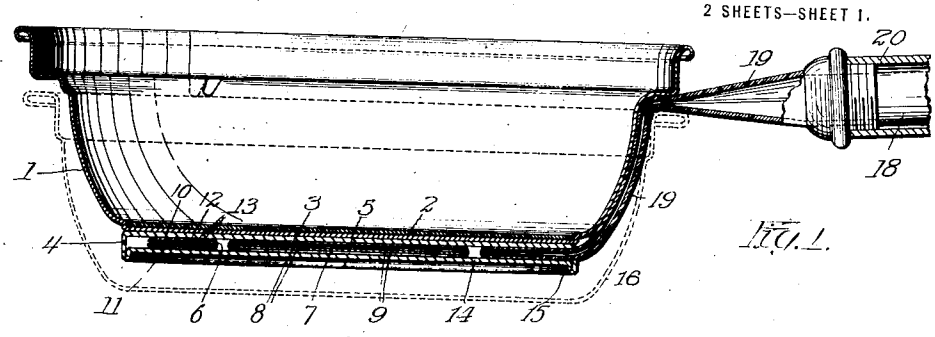



FIG. 1.

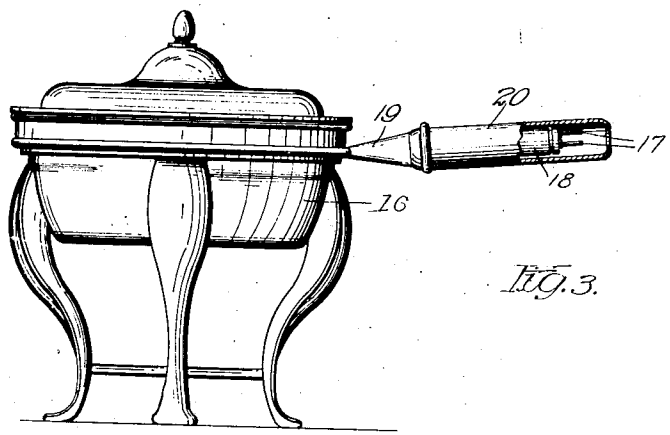



FIG. 3.

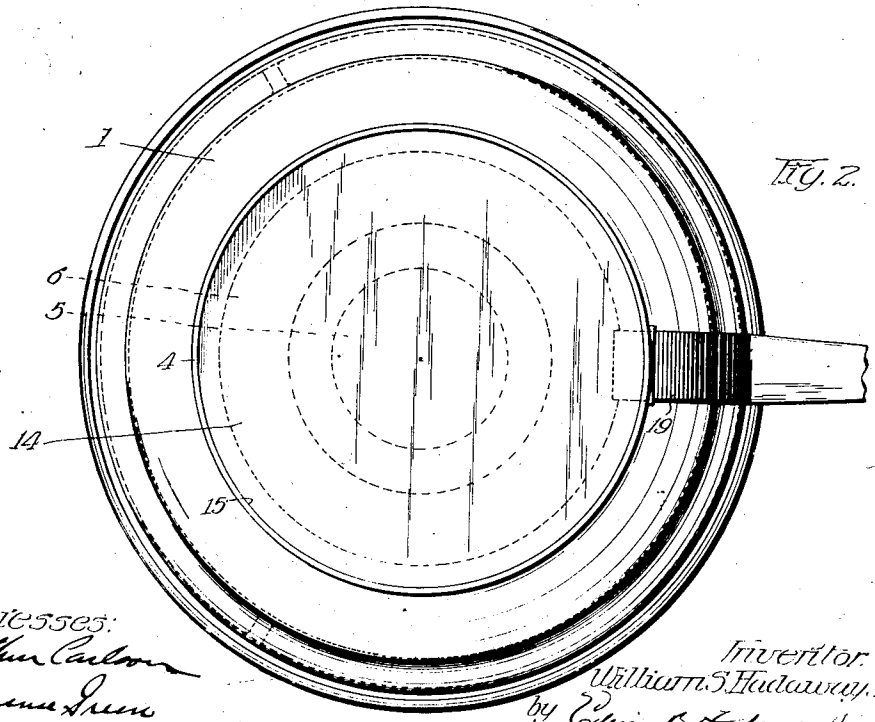



FIG. 2.

Witnesses:
Arthur Carlson
Clarence Green

Inventor:
William S. Hadaway, Jr.
by Edwin B. Hopkins Atty.

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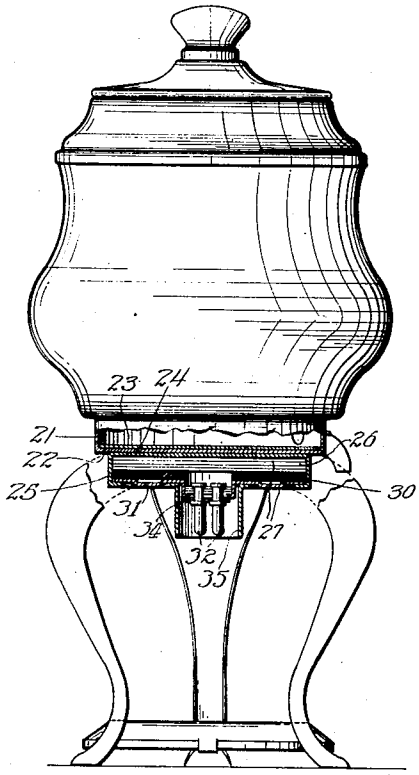



Fig. 4.

Fig. 5.

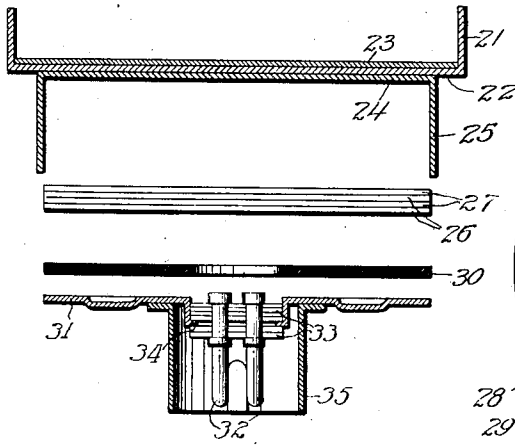
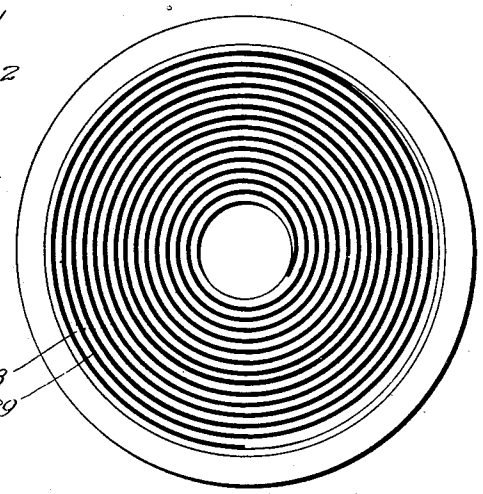



Fig. 6.




Witnesses:
Arthur Carson
Clarence Green

Inventor
William S. Hadaway, Jr.
by Edwin B. H. Tower, Jr.
Atty.

# UNITED STATES PATENT OFFICE.

WILLIAM S. HADAWAY, JR., OF NEW ROCHELLE, NEW YORK.

## ELECTRIC HEATER.

1,174,032. Specification of Letters Patent. Patented Feb. 29, 1916.

Application filed February 11, 1913, Serial No. 747,635. Renewed August 2, 1915. Serial No. 43,345.

*To all whom it may concern:*

Be it known that I, WILLIAM S. HADAWAY, Jr., a citizen of the United States, residing at New Rochelle, in the county of Westchester and State of New York, have invented new and useful Improvements in Electric Heaters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to electric heaters.

An object of the invention is to provide improved means for securing a resistor to the object to be heated.

Another object is to provide an improved method of integrally uniting a metallic resistor carrier to a body to which said carrier cannot be welded directly.

Further objects may be readily inferred from the more detailed description hereinafter given of the two embodiments of my invention, which I have illustrated in the accompanying drawings.

To aid in an understanding of said invention, I have shown one form of heater applied to a chafing-dish and the other form applied to a samovar. Either form of heater may, of course, be applied to either utensil or to any one of a number of other cooking or heating appliances.

Figure 1 of said drawings is a sectional elevation of the heating-pan of a chafing-dish. Fig. 2 is a bottom plan view thereof. Fig. 3 is an elevation of the entire chafing-dish. Fig. 4 is an elevation partly in section, of a samovar. Fig. 5 is a sectional elevation of various parts of the heating element detached from each other to show the method of assembling. Fig. 6 is a bottom plan view of the resistance coil.

The chafing-dish is of the usual form except for the heating-pan or cooking-pan 1, which is of novel construction in certain respects in which it embodies my invention. Said heating-pan, which is made of copper, silver or other metal of good heat conducting properties, has a shallow, circular depression in its base within which fits a thin, flat metal disk 2 of a thickness substantially equal to the depth of the recess, whereby the top of said disk is flush with the surrounding inner surface of the heating-pan.

Beneath the base of said pan and in contact therewith, is a flat metal resistor container 3, said container comprising a flat, circular top and a depending annular flange 4. Said resistor container 3 and said metal disk 2 are constructed of such material that they are readily adapted to be welded to each other.

Copper, silver and certain other metals cannot be satisfactorily welded to certain other metals as, for example, sheet iron, with any degree of success from a commercial standpoint. In order to integrally unite the resistor container to the base, which may be assumed to be copper, and to provide a good thermal contact between the two, I weld said metallic disk 2 to said container 3 through said copper bottom. One satisfactory method of effecting this operation is to electrically weld said elements to each other over large areas, whereby they are integrally united through the copper base, thereby forming substantially an integral, unitary construction of high thermal efficiency. The metal disk 2 employed may be made of any of a number of different materials satisfactory for the purpose. For example, any of the alloys of the nickel group will answer, although I do not limit myself to this material. The sheet metal container 3 may be made of ordinary sheet iron or mild steel, although certain grades of sheet iron are preferable to others. Of course, I do not limit myself to a resistance container made of the materials suggested.

The heating elements, which may assume various forms, are illustrated in the present instance as a pair of concentric heaters 5, 6. The inner disk-shaped heater 5 comprises a sheet metal disk or carrier electrically welded to the container 3 and to the disk 2, and has its edge bent over to embrace a smaller metallic disk 7. Between said disks the resistor 8 is secured, said resistor being insulated therefrom by disks of insulating material 9, for example, mica. The resistor may assume any one of a number of different forms, the specific form being immaterial in the present case. Furthermore, either one or two superimposed resistors may be used. The outer heater has the form of a ring, made up of two flat metallic rings 10, 11, the wider one being electrically welded to the carrier 3 and the disk 2 and having its edges flanged over the

smaller one. A resistor or resistors 12, of any suitable form, are held between said rings and insulated therefrom by rings 13 of insulating material. The resistors in both cases are held in close thermal contact with the base of the chafing-dish at all times, regardless of expansion and contraction. Of course, I do not limit myself to the use of two heaters. A greater or less number of heater units of any suitable shape may be used.

The resistance elements are inclosed by a cover plate 14 having a shallow annular flange 15 which fits within the flange 4, whereby the edges of the adjacent flanges may be welded together, thereby providing a water-tight inclosure therefor. The welding of the flanges may be accomplished by the use of an acetylene torch, or it may be effected in other ways.

The structure being water-tight, the entire pan may be immersed in water, in washing it. No reliance need be placed on any pressure which may be exerted upon the resistor carriers by the cover plate 14. In fact, said plate is intended, mainly, to provide a water-tight cover and to act as a heating plate to heat the water in contact therewith, as hereinafter described.

The resistors are held in close heat conducting relation with the bottom of the heating pan 1, being separated therefrom by thin heat conducting layers of metal and insulation which do not materially diminish the thermal efficiency of the device as a whole. Heat is conducted readily to the food within the heating pan and also to the water in the water pan 16, within which the heating pan is partially immersed in the usual manner. Accordingly the food is heated by heat conducted directly from the resistors through the bottom of the pan and it is also heated by water vapor which rises from the surface of the water and surrounds the side walls of the pan. Only a very little water is necessary or desirable under these circumstances as the heat is conveyed thereto from above and not from beneath the body of water. It is possible, therefore, to produce considerable heat locally at or near the surface of the water, from which surface vapor rises and it is not necessary to conduct a great deal of heat through the entire mass of water as in prior cases where a vapor lamp arranged beneath the water bath has been employed. Water being a poor conductor of heat, greater efficiency results from heat applied from above rather than from beneath the same, where it is desired to make use of the ascending water vapor or steam.

The water bath also acts as a regulator to regulate the heat conducted to the food pan and prevents overheating in substantially the same manner as in the old style chafing-dish. The heat may be so well regulated and controlled electrically, however, by the use of a suitable controller connected in circuit that, for certain purposes, the water pan may be dispensed with entirely.

The terminals of the resistors are suitably connected to circuit terminals 17, the latter being mounted upon but insulated from the end of a metallic tube 18, the other end of which is flattened out as at 19 and secured to the food pan as shown. A removable hollow handle 20 fits over the tube 18 and protects said terminal 17.

Not only are the resistance elements firmly held in position within a water-tight casing independently of any pressure which may be exerted by the cover 14, but the entire heating element is very thin, compact and ornamental, and the outline of the structure is such that its appearance does not differ materially from the appearance of an ordinary chafing-dish.

In Fig. 4 I have illustrated a samovar having an electric resistance element secured thereto as an integral and permanent part thereof, said resistance being secured in a manner somewhat similar to that just described. Within the receptacle 21 and against the copper or silver base 22, I place a metal disk 23 similar to the disk 2 previously described, and weld said disk to a sheet metal carrier 24 having an annular flange 25. A suitable resistor 26 is arranged within said carrier and insulated therefrom by mica disks 27. The resistor may assume any desired form and one or more may be employed. One suitable form is illustrated in Fig. 6 and consists of a spiral wire 28 having an asbestos string 29 interposed between the adjacent turns thereof. Mica or other insulating washers in the form of a disk 30 are arranged beneath the resistance, the various parts being held in position by a cover plate 31 secured by the bent over flange 25. The function of the lower washers is to minimize downward radiation of heat and thereby insure the conduction of most of the heat upwardly to the liquid within the samovar.

Suitable circuit terminals 32 are provided, which are carried by said cover plate 31, but are insulated therefrom by mica washers 33 arranged on opposite sides of a horizontal supporting flange 34, said terminals being headed over or riveted to the mica washers. A protecting casing 35 is provided for the terminals, said casing serving as a guide in connecting an attachment plug, and comprising a short metal tube having its upper end flanged outwardly and secured to the cover plate 31, preferably by welding.

It is to be understood, of course, that the invention is not limited to the two embodiments thereof described and illustrated, nor to their use with utensils of the kind illus-

trated, as various other forms may be devised and various changes made in the details of construction referred to herein, without departing from the spirit of the invention as expressed in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a device of the character described, a metallic resistance carrier, a body to be heated against which said carrier is located, and a metallic element arranged on the opposite side of said body, said element consisting of material adapted to be welded to said carrier, said metallic element and said carrier being welded together through said body.

2. In a device of the character described, a metallic container for a resistance, a body to be heated against which said container is located, a metallic plate of material adapted to be welded to said container arranged on the opposite side of said body, said plate and said container being integrally united to each other through said body, and a resistance within said container and insulated therefrom.

3. In combination, a sheet metal carrier comprising a top and a depending flange, a body to be heated beneath which said carrier is arranged, a metallic plate on the upper side of said body, said plate being welded to said carrier through said body, a resistance adapted to fit within the annular flange of said carrier, mica insulation on opposite sides of said resistance, and a cover plate beneath said resistance and insulated therefrom by said mica, said flange being bent inwardly to firmly secure said resistance in intimate heat-conducting relation with said body, whereby a compact unitary construction is provided.

4. The combination with a cooking utensil having a depression in its base, of a metallic plate fitting within said depression, a sheet metal container conforming substantially to the outline of said plate and arranged in contact with the under surface of said base, a cover plate fitting said container and a resistance arranged between said container and said cover plate and firmly held thereby, said container being integrally united to said metallic plate through the base of said utensil.

5. An electrically heated chafing-dish comprising a receptacle having a shallow circular depression in its base, an inverted cup-shaped sheet metal carrier arranged in contact with the under surface of said depressed portion, a metallic plate having a thickness substantially equal to the depth of said depression and fitting within the same, said carrier being welded to said plate through the base of the chafing-dish whereby it is integrally united thereto, a resistance in the form of a thin flat disk arranged within said carrier, a shallow flanged cover plate fitting within said carrier in inverted position, and mica disks arranged on opposite sides of said resistance to insulate the same from its metal support, said cover plate being welded to said carrier to provide a water-tight inclosure for said resistance.

6. An electrically heated chafing-dish comprising a receptacle having a shallow circular depression in its base, an inverted cup-shaped sheet metal carrier arranged in contact with the under surface of said depressed portion, a metallic plate having a thickness substantially equal to the depth of said depression and fitting within the same, said carrier being welded to said plate through the base of the chafing-dish whereby it is integrally united thereto, a resistance in the form of a thin flat disk arranged within said carrier, a shallow flanged cover plate fitting within said carrier in inverted position, mica disks arranged on opposite sides of said resistance to insulate the same from its metal support, said cover plate being welded to said carrier to provide a water-tight inclosure for said resistance, a hollow handle for said chafing-dish, and circuit terminals therein, said terminals being electrically connected to said resistance.

7. In combination, a heating plate, a container integrally united thereto and a plurality of concentric resistance carriers integrally united to said container, said container having a cover integrally united thereto, whereby said carriers are inclosed in a water-tight casing but are held independently of said cover.

8. In combination, a metallic plate of good thermal conductivity, a plate of less thermal conductivity on one side thereof and a metallic resistance container also of less thermal conductivity, on the opposite side thereof, said container being electrically welded to said second plate through said first plate, and a resistance carrier electrically welded to said container.

9. In combination, a metallic plate of good thermal conductivity, a plate of less thermal conductivity on one side thereof and a metallic resistance container also of less thermal conductivity, on the opposite side thereof, said container being electrically welded to said second plate through said first plate, a resistance carrier electrically welded to said container, and a cover integrally united to said container to provide a water-tight inclosure for said carrier.

10. In an electric heater, resistors, carriers therefor, and a pair of metallic plates between which said carriers are arranged, said carriers being welded to one of said plates and arranged concentrically with respect to each other.

11. In an electric heater, resistors, carriers therefor, and a pair of metallic plates be-

tween which said carriers are arranged, said carriers being welded to one of said plates and arranged concentrically with respect to each other, said plates being united at their edges to form a water-tight inclosure for said resistors.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM S. HADAWAY, JR.

Witnesses:
EDWIN N. LIGHTFOOT,
G. P. BROCKWAY.

Correction in Letters Patent No. 1,174,032.

It is hereby certified that in Letters Patent No. 1,174,032, granted February 29, 1916, upon the application of William S. Hadaway, Jr., of New Rochelle, New York, for an improvement in "Electric Heaters," an error appears in the printed specification requiring correction as follows: Page 3, line 45, claim 4, after the word "metal" insert the word *resistance;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of April, A. D., 1916.

[SEAL.]

R. F. WHITEHEAD,
*Acting Commissioner of Patents.*

Cl. 219—44.