Aug. 31, 1948. P. W. PLUMMER 2,448,388

ELECTRIC HEATING DEVICE AND METHOD OF MAKING THE SAME

Filed Dec. 26, 1945

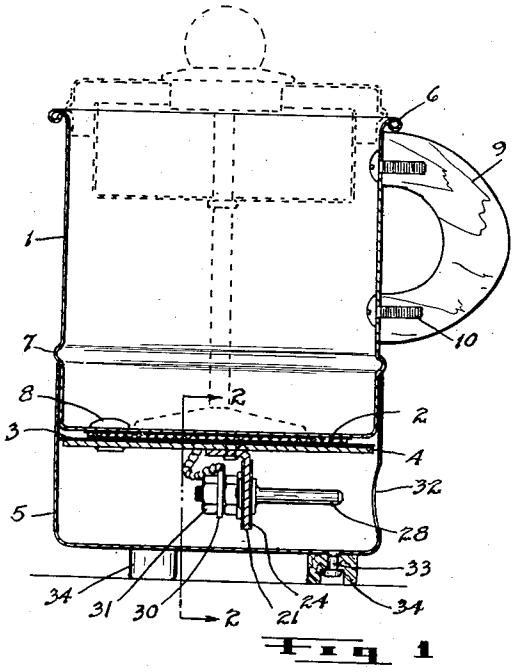


Fig 1

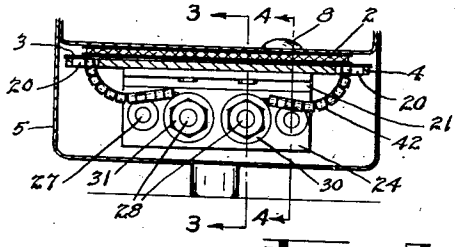


Fig 2

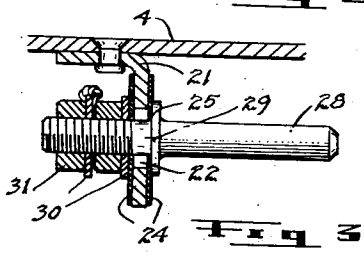


Fig 3

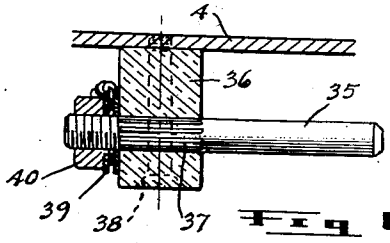


Fig 6

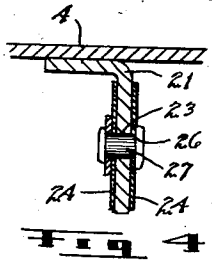
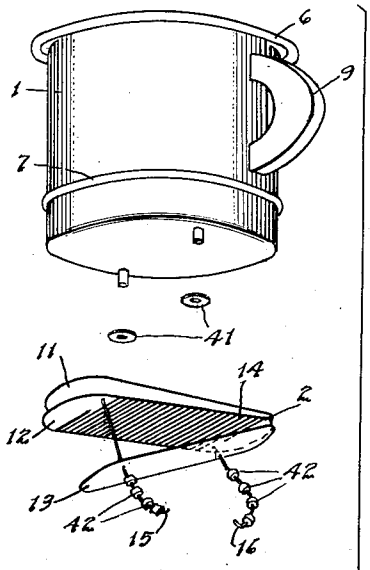
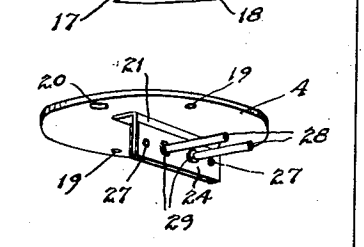


Fig 4





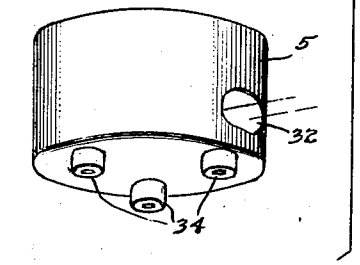


Fig 5

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ELECTRIC HEATING DEVICE AND METHOD OF MAKING THE SAME

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The invention particularly relates to the combination of an electric element and a container to be heated thereby, and the principal object thereof is to provide a novel construction embodying said combination and which will boil water and other liquids or generally, to raise the temperature of material placed in said container when said element is connected to a source of electro motive force.

A further object of the invention is to construct the device from a small number of manufactured parts which have been carefully designed for simplicity, cheapness and ease of assembly, to reduce the cost of production and place the product on the market at a very low price with all the advantages of similar, more expensive manufactured articles, while at the same time, fully complying with standard safety regulations.

A still further object of the invention is to assemble the device in a knock-down construction system so that it may be quickly dismantled for repairs or replacement and be re-assembled with the use of a few well known tools.

With the above important and other minor objects in view, which will become more apparent as the description proceeds, the complete construction, arrangement and assembly of the invention will now be described, reference being had to the accompanying drawings, in which:

Figure 1 is a vertical section taken centrally through the device.

Figure 2 is a partial cross section taken on the line 2—2, Figure 1.

Figure 3 is an enlarged section taken on the lines 3—3, Figure 2.

Figure 4 is an enlarged section taken on the lines 4—4, Figure 2.

Figure 5 is a perspective view of the individual parts forming the assembly.

Figure 6 is a modification of the construction shown in Figure 3.

In the drawings, like characters of reference indicate corresponding parts in the several figures.

The complete assembly is generally shown in Figure 1 and comprises respectively, a cup 1, electric element 2, heat insulating disc 3, retaining plate 4 and base member 5, all of which, with slight additions, will be hereinafter described in detail, reference being had to Figure 5.

The cup 1 comprises a cylindrical casing having one end open with a rolled edge 6 and the other end closed to form a bottom. Slightly up from the bottom, the sides are pressed out in an encircling bead 7, said bead being semi-circular in cross section, and for a purpose later described.

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Two diametrically opposite holes are punched through the bottom to receive a pair of brazier headed rivets 8, the heads being on the inside with their body thereof projecting through the bottom. A flat U-shaped handle 9, preferably hardwood, has the two legs tapped to receive a pair of screws 10 which pass through holes in the side of the cup 1 to hold the handle firmly thereto.

The cup 1, made of aluminum, spun and provided with the rolled edge, can be bought ready made through the usual trade channels. It can be held in jigs and the holes punched. The handles can be formed by passing a long length over suitable cutters and then sliced and dipped in paint ready for assembly. The encircling bead is readily formed with a bench tool.

The element 2 comprises three strips of insulation 11, 12 and 13, preferably formed from mica, with the centre strip 12 slightly narrower than the two outer ones and all considerably narrower than the distance between the rivets 8 on the cup so they can be received there between, clear of said rivets. A resistance wire 14 is wound around the central strip 12 in the usual manner with the ends 15 and 16 protruding from opposite corners thereof and passing through suitable holes in the strip 13. All three strips are aligned and pressed together so that the outer strips cover and insulate the resistance wire from outside contact.

The mica of the elements can be punched with a die in one operation and the resistance wire wound with machines for that purpose.

The heat insulating disc 3 is preferably formed from sheet asbestos of the same diameter as the bottom of the cup 1, and is provided with two diametrically opposite notches 17. A pair of diametrically opposite holes 18 are also provided through the asbestos in a different plane from the notches 17. This asbestos disc can be punched complete with holes and notches in one operation.

The retaining plate 4 is preferably metallic, having two diametrically opposite holes 19 and a further pair of larger diametrically opposite holes 20 in different planes to those 19. A metallic angle plate 21 is fastened as by rivets or spot welding to the under side of the retaining plate with one leg projecting downward, and this projecting leg is provided with two central fairly large holes 22 and two outer smaller holes 23, and all holes are aligned. A pair of insulation plates, preferably of mica, are received, one on each side of the projecting leg mentioned and they are each provided with two central holes 25 and two outer holes 26 which align with the holes 22 and 23 in the pro-

jecting leg, but the holes 25 are smaller than the central holes 22. Rivets 27 are passed through the outer holes mentioned and riveted over washers to hold the plates 24 firm to the leg. As the holes just fit the rivets, the central holes 25 centre on the larger holes 22 in the leg. A pair of contact prongs 28, having flanges 29, are pushed through these central holes and as the holes 25 just fit the prongs and are smaller than the holes 22 in the leg, the prongs are air-insulated therefrom. Washers 30 are passed over the prongs and nuts 31 screw on to draw the flanges 29 up tight.

The flat plate of the retaining plate can be punched complete with holes in one operation. The angle plate can be similarly punched and later bent. The insulation plates are each adaptable for punch production and the prongs are standard articles of manufacture.

The base member 5 is a cup shaped casing having an opening 32 in the side, shaped to receive a standard electric contact plug (not shown). Three equi-spaced holes are punched in the bottom to receive rivets 33 which hold three small sleeves 34, preferably of wood, thereto, and which form legs for the member. The cross sectional shape of one of these legs is clearly shown in Figure 1.

The base member, made of spun aluminum, can be bought ready made and suitable jigs will hold it for the holes to be punched. The wooden legs will be paint dipped before assembly and such assembly will be on a suitable jig.

It might be mentioned here, before describing the assembly, that the construction shown under the retaining plate may be modified such as by that shown in Figure 6. In this arrangement, the prongs 35 (similar to those 28) are molded in position in a rectangular block of insulation 36, such as porcelain, the prongs being splined as at 37 for better embedment therein. A pair of vertical holes are provided for screws or rivets 38 to pass through and fasten the block to the plate. The usual washers 39 and nuts 40 fasten the resistance wires to the prongs.

In assembly, the holes in the bottom of the cup 1 are brushed with a sealing compound such as that sold under the trade name of "Seal Tight." The rivets 8 are then passed through the holes with their heads on the inside. The cup 1 is turned with the bottom up and is slid over a suitable dolly to hold the rivets in place. The electric element 2 is then placed on the bottom of the cup 1, between and at right angles to the line of the rivets. Washers 41, shown in Figure 5, are then placed over the rivets, contact the bottom of the cup 1 and are held clear of the sides of the element. At this time, it might be mentioned, that the thickness of the washers correspond to the thickness of the element when pressed. The heat insulation disc 3 is then placed over the element and washers, the rivets being received by the notches 17 while the ends of the element wires 15 and 16 are drawn through the holes 18 in the disc. This insulation disc, being directly under the element, resists the passage of heat downward and accordingly, more heat passes upward to the cup 1. The retaining plate 4 is then placed over the insulation disc, the rivets passing through the holes 19 therein and the wires 15 and 16 being drawn through the holes 20. A series of beads 42, shown in Figure 5, are strung along the wires from the hole 20 and the wires are then fastened to the prongs 28 by the washers 30 and nuts 31. The retaining plate is then pressed tight against the bottom of the cup and the rivets squashed against the dolly as by a punch press.

The sealing compound forms a water tight connection between the rivets and the bottom of the cup 1, the washers 41 perfectly space the retaining plate from the bottom of the cup 1 so that the element is held firmly and not crushed or the cup mutilated. The beads 42 keep the wires 15 and 16 from coming into contact with other parts of the assembly. Obviously, bolts and nuts could be used in place of the rivets to fasten the heating members to the cup 1 and this would also materially assist repairs.

The base member 5 is rotated until the opening 32 is aligned with the prongs 28 and it is then pressed over the bottom of the cup 1 to enclose the element and associated parts and it is stopped by contact with the encircling bead 7 on the cup 1, at which time the prongs 28 are aligned with the opening 32. The assembly is then complete and merely requires a suitable plug and cord to connect the prongs to an electric light socket.

From the above, it will be apparent that I have produced a pleasing looking article of manufacture which is very compact and will heat liquid or other material placed in the cup. It can be used to heat beverages, nursing bottles, brew tea, heat shaving water, sterilize instruments or make coffee with the percolator attachment shown in dotted outline in Figure 1, or it can be used in small cooking. By placing a cover over the cup and connecting a flexible tube to an opening in the cover, it can be used for inhalations. Being small, it has many uses and advantages which instantly come to the mind of prospective purchasers and being a combination of an electric stove and a container plus a handle to lift both, it is readily portable and can be used wherever an electric light socket is available. As will be noted from the specification, great care and thought has been given to every part, and each part has been carefully designed for cheapness and placed in the best position for compactness, short connections and ease of assembly. The cheapness of construction is so low that it can be placed on the market far below the expected cost judged by its appearance. It is now being manufactured and sales are highly gratifying.

What I claim as my inventions is:

1. In a heating device, having a flat bottomed container, a flat electric heating element, a retaining plate supporting contact prongs, and an element enclosure member having an opening in the side thereof; the method of assembling the above members which consists in: fastening said plate to said container bottom in spaced relation thereto, with said element therebetween and said prongs thereunder; connecting the leads of said element to said contact prongs; and telescoping said enclosure member over the bottom portion of said container, clear of said prongs, to enclose said element, said plate and said prongs, and with said opening aligned with said prongs.

2. A flat bottomed container having fastening means projecting from said bottom; an electric insulation covered element positioned against said bottom between said fastening means; a heat resisting member positioned over said element and covered by a retaining member, secured to said bottom by said fastening means; said retaining member supporting a pair of contact prongs, electrically insulated therefrom and con-

nected to said element; a cup-shaped closure member having an opening in the side thereof, receivable over said assembled members, clear of said prongs and telescopically received by said container with said opening aligned with said prongs for the insertion of an electric plug to said prongs.

3. In a heating device: a cylindrical cup-shaped container having an electric element fastened to the bottom thereof and electrically connected to contact prongs supported by said container: a cylindrical cup-shaped member having an opening in the side thereof: said member receivable over said element, over and clear of said prongs, with the open end thereof telescopically mounted over the lower portion of said container and with said opening aligned with said prongs for the insertion of an electric plug to said prongs, and with the flat bottom of said member forming a heat shield.

4. A heating device, comprising: a pair of removable telescoping cup-shaped members forming a container and a chamber; an electric heating element enclosed within said chamber and fastened to the bottom of said container; contact prongs supported from the bottom of said container, insulated therefrom within and clear of said chamber casing and connected to said element; and an opening in the side wall of said chamber, aligned with said prongs, for insertion of an electric plug.

5. In a heating device: a pair of cup-shaped members telescoped together to form a container and a chamber; a flat electrically insulated element held against the bottom of said container

by a retaining plate and positioned within said chamber; an opening in the side of said chamber member; a pair of prongs supported by said retaining plate and positioned within and clear of the walls of said chamber member and aligned with the opening in the wall thereof for the reception of an electric plug inserted through said opening; and a heat insulating member positioned between said retaining plate and said element to direct the heat from said element to said container and away from the location of said plug.

6. In a heating device, having an electric element, a retaining plate therefor, and contact prongs connected to said element: a plate member projecting from said retaining plate and provided with a pair of spaced holes; insulating plates secured to either side of said member, provided with a pair of spaced holes of smaller diameter than the holes in said member and centred on the holes in said member: said contact prongs passing through the holes in said insulating plates and secured thereto.

PERCY WILLIAM PLUMMER.

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