Feb. 26, 1935. H. RITTERHOFF ET AL 1,992,635

THERMO ELECTRICAL HEATING ELEMENT

Filed Aug. 26, 1933

Fig. 1.

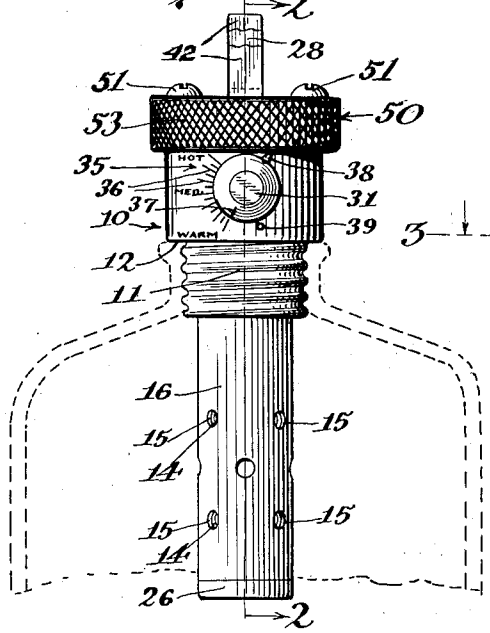


Fig. 2.

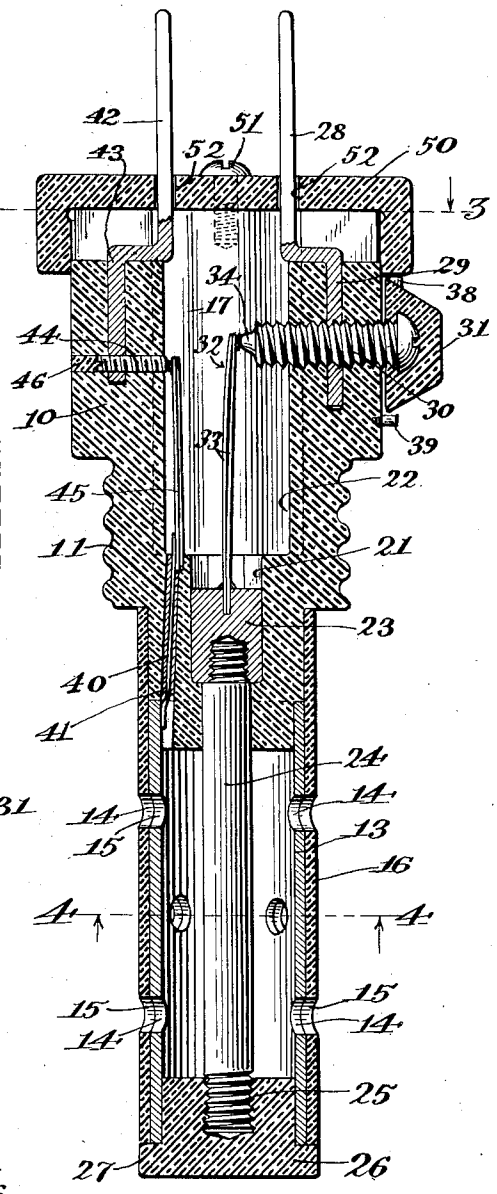


Fig. 3.

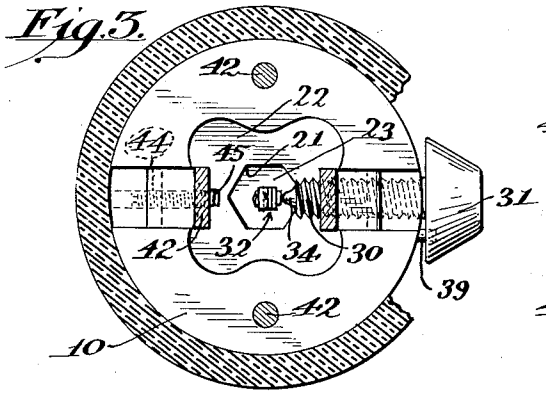
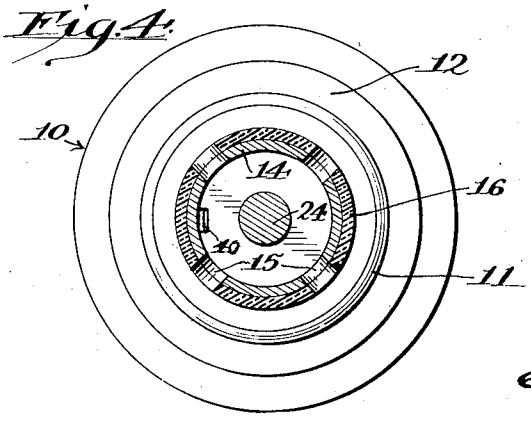


Fig. 4.



Inventors
Harry Ritterhoff
Homer Cessna.
Fred E. Reinhold

Edmund A. Stowe
Attorney.

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THERMO-ELECTRICAL HEATING ELEMENT

Harry Ritterhoff, Homer Cessna, and Fred E. Reinhold, Los Angeles, Calif., assignors of one-fourth to Alva J. Calhoun, Los Angeles, Calif.

Application August 26, 1933, Serial No. 686,936

1 Claim. (Cl. 219—40)

This invention relates to electric water heaters, and more particularly to a portable appliance of the character that is adapted to be immersed in the water within a container for raising the temperature of the same.

An object of the invention is to provide a heater of the character stated in which the water itself acts as a conductor, and provided with adjusting means whereby the temperature of the water may be regulated at will.

Another object is to provide an electric water heating appliance of simple construction, which will occupy but little space and may be quickly applied to the neck of a rubber water bottle or other container.

A further object is to provide a portable electric water heater of the immersion type which may be cheaply produced, easy to handle, and which will very efficiently perform its intended function.

Other objects and advantages will be apparent from the following description, reference being had to the accompanying drawing, in which:

Fig. 1 is a side elevation of the improved electrical fluid heating appliance.

Fig. 2 is an enlarged longitudinal section taken on line 2—2 of Fig. 1.

Fig. 3 is a transverse section taken on line 3—3 of Fig. 2.

Fig. 4 is a transverse section taken on line 4—4 of Fig. 2.

Referring more specifically to the drawing, 10 designates the body of the improved heating appliance, the body being formed of electrical insulating material such as hard rubber or bakelite.

The body is preferably of cylindrical shape in cross section and has formed thereon a portion that is externally screw threaded as indicated at 11 for connection with the internally threaded neck of a fluid container such as a hot water bottle indicated in dotted lines in Fig. 1.

Mounted on the lower end of the body and engaging a reduced diameter portion formed thereon below the threads is a metal tube 13 having a plurality of openings 14 therein that register with opening 15 in a sleeve or casing 16 formed of insulating material, the sleeve being provided in order that the heater may be handled without danger of receiving a shock when it is connected with a source of current.

Mounted in a recess 21 that communicates with the interior 22 of the body is a hexagonal nut or block 23 and screw threaded in said nut is a rod 24, the opposite end of which is screw threadedly connected as indicated at 25 to a closure head or plug 26, said plug having a shoulder 27 that engages the bottom faces of the tube and sleeve. The sleeve 13 and rod 24 serve as positive and negative electrodes.

Mounted in a recess formed in the body 10 is a connector post 28 having a depending leg 29 that is embedded in said body, the leg 29 and body being drilled and tapped for the reception of an adjustable screw contact 30, the head of which is embedded in a knob or handle 31 formed of electrical insulating material for turning the same.

Secured to the block 23 is a conventional thermostatic device 32 consisting of a pair of heat responsive elements 33, each of which have different coefficients of expansion, said elements being secured together at their upper ends. The thermostat normally engages the point 34 of the screw contact, i. e. when the parts are cold or contracted.

The thermostat also serves as an electrical conductor between the screw contact 30 and electrode 24 in addition to making and breaking the circuit therethrough.

Stamped or otherwise formed on the outer face of the body 10 is an indicating dial 35, the indices 36 of which register with a single mark 37 on the knob 31. The dial and mark serve to indicate the desired degree of temperature of the water heated by the device, i. e. by turning the knob to the right or left the time required to break the circuit between the screw contact may be varied.

Formed on the knob is a lug 38 and projecting from the body is a stop pin 39 that serves to limit turning movement of said knob, also to prevent the screw from being completely turned out of engagement with the thermostat.

Secured to the upper end of the sleeve 13 and extending through an opening formed in the body is a conductor 40, the space around the conductor being filled with suitable selling substance, such as a rubber cement, indicated at 41 after assembling in order to prevent escape of steam or water through said space into the interior of the body when the device is being used.

Mounted in a recess formed in the body at a point opposite to that of post 28 is a post 42 having a leg 43 embedded in the body, and screw threaded in said leg is a contact screw 44 that engages the free end of a thermostat 45, the opposite end of which is secured to the conductor 40.

This thermostat is of the same construction and is set to break the circuit at a higher tempera-

ture than that of the thermostat 32, the space back of the adjusting screw 44 being filled or plugged up as indicated at 46 after adjusting the same.

Mounted on the upper end of the body 10 is a closure cap 50 formed of insulating material, said cap being secured to the body by screws or the like 51 and having openings 52 formed therein for the reception of the connector posts 28 and 42, the side face of the cap being preferably knurled as indicated at 53 to facilitate handling of the appliance.

In use, the heating appliance is adapted to be connected to a usual plug of a socket secured to a flexible conduit, not shown. This is done by inserting the posts 28 and 42 through the slots formed therein.

The knob 31 is then adjusted to the temperature desired (by reference to the dial 36) and the appliance screwed into the neck of a container filled with liquid to be heated, whereupon the space within the tube becomes filled through the openings 14 and 15.

It will be noted that prior to immersion of the appliance in liquid no electric circuit has been established although the above connections have been made.

As soon as the space within the tube becomes filled or partially so, a circuit is established through the liquid which then acts as a resistance causing said tube and bar to become heated, resulting in raising the temperature of the liquid.

As the temperature of the liquid rises it acts upon the heat responsive elements 33 of the thermostat 32 (through the rod 24 and nut 23) causing one of them to expand at a greater rate than the other, the action of which causes the same to gradually straighten and at the same time move away from the point 34 of the contact screw 30 until the circuit is finally broken at this point.

The circuit then remains open or broken until the liquid cools off or reaches a temperature slightly below that of its high point, whereupon the circuit is reestablished.

In the event that the thermostat 32 should fail to function the thermostat 45 will break the circuit and thereby prevent overheating of the water in the container.

It will be understood that the appliance may be also advantageously employed to heat or boil water in open containers.

We claim:

An electric water heater of the character described comprising a hollow body formed of electrical insulating material having an externally screw threaded portion for connection with the neck of a liquid container, a perforated tubular member secured to said hollow body and forming one electrode, a metal block mounted in a recess formed in said body, a rod secured to said block and extending through said perforated tubular member and forming the other electrode, an adjustable screw contact threaded in said body and extending into its interior, a thermostat consisting of a pair of heat responsive elements having differential coefficients of expansion secured at one end to said block with their opposite ends secured together and normally engaging the end of said adjustable screw contact, a connector post mounted on and having a portion embedded in said body and threadedly engaging said adjustable screw contact, a second connector post mounted on and having a portion embedded in said body, a second screw contact threaded in said body and projecting into its interior and a second thermostat of the same construction as said first mentioned thermostat secured at one end to said perforated tubular member and normally engaging said second screw contact for the purpose set forth.

HARRY RITTERHOFF.
HOMER CESSNA.
FRED E. REINHOLD.