Aug. 19, 1930. H. J. RIDER 1,773,546

ELECTRIC IMMERSION HEATER

Filed May 10, 1929

Fig. 1.

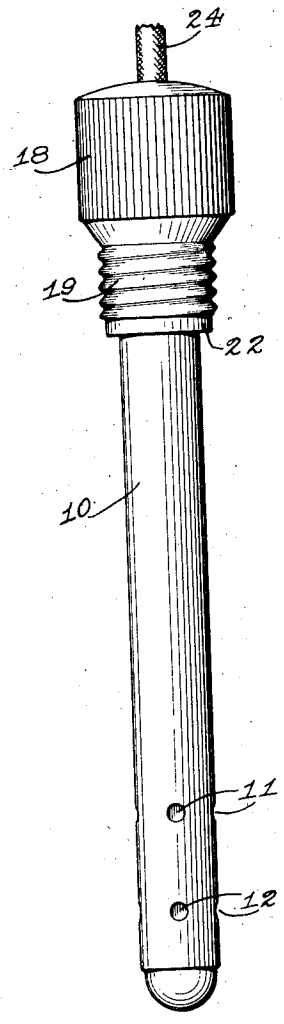


Fig. 2.

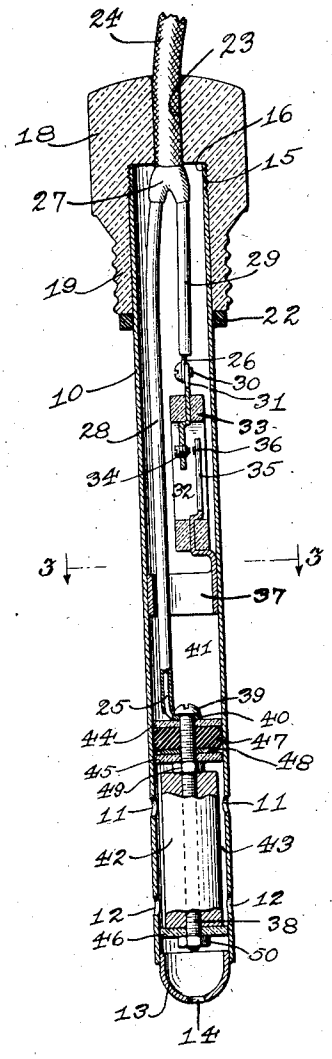


Fig. 3.

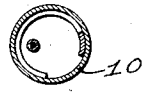
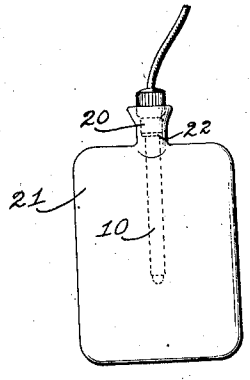


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRIC IMMERSION HEATER

Application filed May 10, 1929. Serial No. 361,906.

This invention relates to electric heaters, and more particularly to an electric water heater which is adapted to be immersed in a body of water for raising the temperature thereof.

One object of this invention is to provide an electric water heater in which the water itself forms a part of the electric circuit.

A further object is to provide an immersion water heater of the above nature having an interior heating electrode contained within an outer metallic shell electrode which also encloses a thermostat.

A further object is to provide a device of the above nature which will be simple in construction, inexpensive to manufacture, easy to manipulate, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view there has been illustrated on the accompanying drawings one form in which the invention may be conveniently embodied in practice.

Fig. 1 represents a view in elevation of the electric immersion water heater.

Fig. 2 is a longitudinal sectional view of the same.

Fig. 3 is a transverse sectional view of the same taken along the plane indicated by the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 4 is a view on a reduced scale of a hot water bag in which the present invention has been installed.

Referring now to the drawings in which like reference numerals denote corresponding parts through out the several views, the numeral 10 indicates an outer metallic tube or shell open at both ends and provided with two rows of spaced perforations 11 and 12 near the bottom end thereof for permitting free circulation of the water into and out of the heating chamber. The bottom end of the shell 10 is adapted to be closed by a substantially semi-spherical hollow cap member 13 having a central circulation opening 14. The top of the tube 10 is provided with a short outer threaded section 15 adapted to engage with an inner threaded section 16 provided within a hollow screw cap 18 which is adapted to be fitted over the uper end of the shell 10.

The lower end 19 of the screw cap 18 is reduced in diameter and provided with external threads for engaging within the neck portion 20 of a hot water bottle 21 in case it is desired to heat the water therewithin. A soft rubber washer 22 is preferably provided on the shell 10 below the lower end of the threaded section 19 to form a leak-proof seat in the neck 20 of the hot water bottle 21.

In order to supply heating current to the heating electrodes, the upper screw cap 18 is provided with a central passage 23 for a two-wire electrical-conductor cord 24, the wires 25 and 26 of which are separated within said screw cap 18 and are held in proper position by insulating tape 27. The wire 25 of said cord is relatively long and the wire 26 is relatively short, said wires being preferably encased in flexible insulating "macaroni" tubes 28 and 29 respectively, as clearly shown in Fig. 2.

The lower end of the short wire 26 is attached to the upper terminal 31 of a small compact thermostat 32 by means of a binding screw 30. The terminal 31 is connected to an insulating rectangular ring member 33, and said terminal 31 has an adjustable horizontal pointed screw plug contact 34 mounted therein to form the stationary contact of the thermostat 32. The movable contact of the thermostat is formed by a flexible bi-metallic strip 35 extending upwardly from the base of the ring member 33, said strip 35 having a small projection 36 near the upper end thereof for engaging the point of the screw plug 34.

The bi-metallic strip 35 is connected with the lower terminal of the thermostat 32 which comprises an expanding split ring 37 adapted to press outwardly upon the interior of the shell 10 for producing a good electrical contact therewith.

The long wire 25 is connected at its lower end to the central heating electrode by means of an elongated bolt 38 arranged concentrically within the shell 10 and threaded throughout its length. The lower extremity of the wire 25 is adapted to be clamped between the head 39 of the bolt 38 and a metal washer 40 located below said head 39.

The central heating electrode comprises a tubular metal plug 42 located concentrically within the shell 10 in alinement with the perforations 11 and 12 thereof. The surrounding portion of the shell 10 serves as the outer heating electrode and the space 43 between said electrodes comprises the heating chamber for the water circulating therethrough.

In order to hold the plug electrode 42 securely in its concentric position, provision is made of three spacing discs 44, 45, and 46 which are fitted tightly upon the bolt 38 and are preferably formed of any suitable waterproof insulating material such as "bakelite." The discs 44 and 45 are spaced apart by means of a soft rubber plug 47 having a beaded periphery, and below said plug 47 is a small metal washer 48. By means of this construction, a tight joint is produced which will prevent leakage of water from the heating chamber 43 into the thermostat-containing space 41 above it.

A pair of nuts 49 and 50 are also provided on the bolt 38 for holding the parts of the heating element in tightly assembled condition, the nut 49 being located between the top of the plug 42 and the disc 45, while the nut 50 is located below the disc 46.

Operation

In operation, current will flow from the central plug electrode 42 to the surrounding shell electrode 10 through the water contained in the heating chamber 43 which will be rapidly heated. The heated water will leave the heating chamber 43 through the upper circulation openings 11 permitting cold water to enter through the lower openings 12, thus rapidly disseminating the heat throughout the entire body of water.

One advantage of the present invention lies in the fact that the shell of the device is utilized to form one electrode of the water heater, complicated and expensive heating coils and thin carbon heating elements are eliminated, and the present water heater is practically foolproof and unbreakable.

A further advantage is that the operator may utilize the rubber screw cap as a handle and thus avoid all danger of shocks and burns.

It will be understood that the thermostat is not absolutely essential to the operation of the device, but may be omitted if it is desired to cheapen the construction or produce a higher degree of heat.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, a thermostat located in the upper part of said shell, means for connecting one terminal of said thermostat to said shell, and means for connecting the other terminal of said thermostat and the interior heating electrode to the two terminals of a source of current.

2. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, a thermostat located in the upper part of said shell, means for connecting one terminal of said thermostat to said shell, and means for connecting the other terminal of said thermostat and the interior heating electrode to the two terminals of a source of current, said thermostat being connected with said shell by a resilient expanding contact ring.

3. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, means for forming a leakproof joint between the interior heating electrode and the upper part of the shell, the portion of said shell surrounding said interior heating electrode being perforated to permit a circulation of water, and means for connecting said shell and interior electrode to a source of current.

4. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, means for forming a leakproof joint between the interior heating electrode and the upper part of the shell, means for connecting said shell and interior heating electrode to a source of current, the bottom of said shell being closed by a substantially semi-spherical hollo cap.

5. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, means for forming a leakproof joint between the interior heating electrode and the upper part of the shell, a bimetallic thermostat located in said upper part, means for connecting one terminal of said thermostat to said shell, and means for connecting the other terminal of said thermostat and the interior heating electrode to the two terminals of a source of current.

6. In an electrical immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode located concentrically within said shell and insulated therefrom, means for forming a leak-proof joint between the interior heating electrode and the upper part of the shell, means for connecting said shell and said interior heating electrode to the two terminals of a source of current.

7. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode comprising a tubular metal plug located concentrically within said shell and insulated therefrom, means for forming a leak-proof joint between the interior heating electrode and the upper part of the shell, and means for connecting said shell and said plug to a source of current.

8. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode comprising a tubular metal plug located concentrically within said shell and insulated therefrom, means for forming a leak-proof joint between the interior heating electrode and the upper part of the shell, means for holding said plug concentrically within said shell, and means for connecting said shell and said plug to a source of current.

9. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode comprising a tubular metal plug located concentrically within said shell, a bolt within said plug, a plurality of insulating discs fitted on said bolt and fitting within said shell for holding said plug concentrically within said shell, means for forming a leak-proof joint between the interior heating electrode and the upper part of the shell, and means for connecting said shell and plug to the two terminals of a source of current.

10. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode comprising a tubular metal plug located concentrically within said shell and insulated therefrom, a soft rubber packing plug for forming a leak-proof joint between the interior heating electrode and the upper part of the shell, and means for connecting said shell and said interior electrode to a source of current.

11. In an electric immersion water heater, an outer metallic shell forming one heating electrode, an interior heating electrode comprising a tubular plug of conductive material located within said shell and insulated therefrom, a tubular insulating cap fitted over the upper end of said shell, and a two-wire conductor cord passing through said cap and connected to said shell and interior electrode and means within said shell for automatically controlling the temperature of the water being heated.

In testimony whereof, I have affixed my signature to this specification.

HARRY J. RIDER.