May 12, 1931. R. F. McCARTNEY 1,804,885

ELECTRICAL IMMERSION HEATER

Filed Dec. 27, 1929

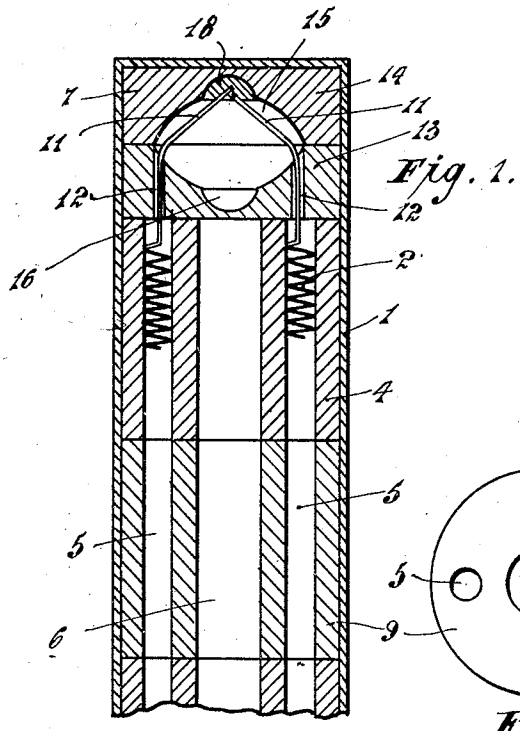


Fig. 1.

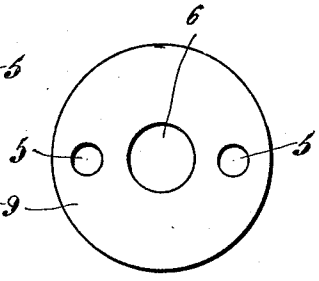


Fig. 3.

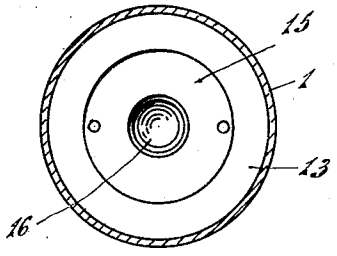


Fig. 2.

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UNITED STATES PATENT OFFICE

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ELECTRICAL IMMERSION HEATER

Application filed December 27, 1929, Serial No. 416,913, and in New Zealand January 21, 1929.

This invention relates to electrical immersion heaters using resistance wires as the primary heating elements.

The object of the invention is to improve the efficiency of such heaters by utilizing all the heat from the elements to the exterior wall, and also to prevent the heating elements from being burnt out if the supply of water should fail, or in the case of over-heating due to excessive heating on the exterior of the heater, or in any other case of overheating the elements.

A form of the invention is described with the aid of the accompanying drawings, wherein:—

Figure 1, is a cross section through the upper part of the water heating element.

Figure 2, is a plan on line A—A Figure 1.

Figure 3, is a plan of an insulating base.

Referring to the drawings, the container 1 is of metal of usual construction, having therein a heating element consisting of resistance windings 2 leading from terminals and passing into the insulating base 4 through the passages 5. The insulating base 4 is provided with a central opening 6 throughout its length. The insulating base, in the form of a number of cores 9 with their ends in intimate contact, is composed of steatite which is an insulator of electricity and also a conductor of heat and which can be machined to fit the container and bored to receive the helical coils of the resistance wires 2 threaded through the holes 10 bored in the material. The intimate contact between the coil, insulating base, and the containing metal tube keeps down the internal temperature of the immersion element and ensures a much longer life for the resistance wire. When these helical coils are in position the holes may be filled with magnesium oxide or any similar material which has heat conducting properties and also prevents the coils from sagging. In this way, the internal temperature can be kept at about 60 degrees F., at which temperature little or no oxidization of the resistance wire of the element takes place.

The ends 11 of the resistance wires pass through holes 12 in an annular cap 13 of porcelain or the like placed on the top of the insulating material 4 and retained in position by another porcelain cap 14. These caps fit the casing 1 and are hollowed or recessed as shown so that when they are placed together there is formed a chamber 15 between them. Each of the caps have respectively a cup shaped recess 16 and 17 at their centre, and these when the caps are in position are vertically opposite with each other. A piece of solder 18 is inserted in the chamber 15 and by applying external heat to the heater and retaining it in an inverted position, the lump of solder will melt and will flow into the recess 17 in the cap 14 and adhere around the ends 11 of the wires, and when solidified will form a contact piece between the two ends 11. Should the heater become overheated the solder 18 will melt and will drop away from the wires and flow into the recess 16 in the cap 13 and so break the circuit through the resistances. In such a case, all that it is necessary to do to repair the break is to heat externally the heater in an inverted position and the solder will flow from the recess 16 in the cap to the recess 17 in the cap 14 again joining the wires.

What I claim is:—

1. An electrical immmersion heater including a container, electrical heating means therein including insulating means and resistance wires arranged therethrough, means situated at one end of the heater and providing a chamber into which the resistance wires project, and a fusible metal joint for the ends of the wires normally situated at the upper end of the chamber which on excessive heating melts, breaks the contacts between the wires and flows into and collects in the bottom of the chamber from which point it will be retained ready to join the ends of the wires upon the heater being placed in the proper position and heated.

2. A heater as claimed in claim 1, wherein the means forming the chamber consists of two superposed caps of insulating material in the adjacent faces of which the chamber is provided.

3. A heater as claimed in claim 1, wherein the means providing the chamber consists of

an insulating cap arranged on the heating means and into which the resistance wires project, a second insulating cap supported on the first cap, each cap having its adjacent contacting faces hollowed to provide the chamber and each cap having a further cupped recess in its center adapted to receive the fusible metal.

In testimony whereof, I have signed my name to this specification.

R. F. McCARTNEY.