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ELECTRIC HEATER OF WATER AND OTHER LIQUIDS

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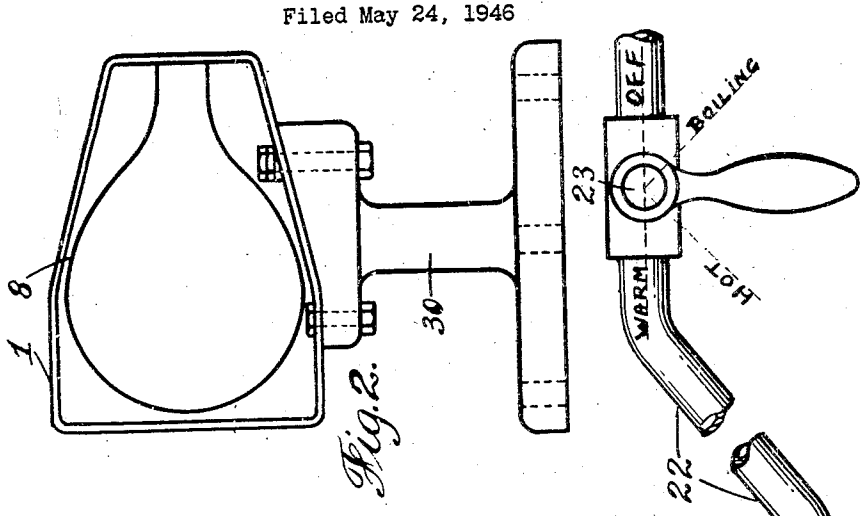


Fig. 2.

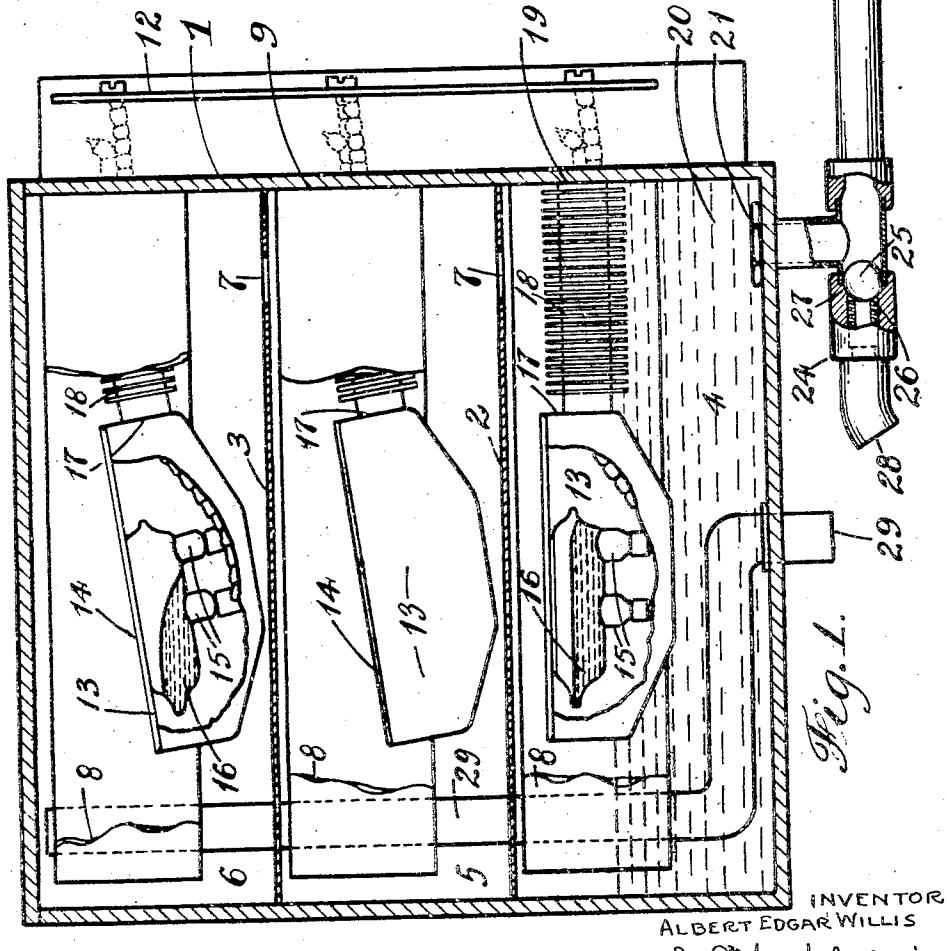


Fig. 1.

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ELECTRIC HEATER OF WATER AND OTHER LIQUIDS

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3 Claims. (Cl. 219—39)

1

This invention relates to electrical heaters for water and other liquids, of the kind in which an automatic circuit breaking device arranged inside the liquid heater is controlled by a buoyant member adapted automatically to cut off or restore the supply of electrical energy to an electric element located in said heater. According to the specification of my British Letters Patent Number 467,668 the buoyant member of the circuit breaking device associated with a kettle is carried by a deformable metallic tube, of bellows-like characteristic, secured liquid-tight at one end to the buoyant member and at the other end to the interior of the kettle.

The object of my invention is to provide an improved electric liquid heater adapted to make hot water available quickly or produce so called "instantaneous" hot water and to arrange in a simple and satisfactory manner for the automatic draining of the heater when liquid supply thereto ceases, thereby to provide a factor of safety in preventing a condition arising when the heater is wholly or partly full, the elements are switched on and heated liquid is not being withdrawn from the heater.

The invention comprises an electric liquid heater having the combination of parts hereinafter described in detail and more specifically defined in the appended claims.

In order that the invention may be readily carried into effect the preferred construction will now be described in detail with reference to the annexed drawing wherein:

Fig. 1 is a vertical sectional elevation of an electric water heater intended for domestic use. Fig. 2 is a top side plan of the heater including an attachment bracket and indicating an immersion heating element but omitting the circuit breaking devices shown in Fig. 1.

In the drawing, 1 indicates a robustly constructed copper container having a capacity of approximately ¾ of a pint and divided by partitions 2, 3 into three approximately uniform compartments, 4, 5, 6, which communicate by openings 7 in said partitions. In each of the said compartments, 4, 5, 6, is a known type of electrical heating element 8 secured to the wall 9 of the container in an ordinary manner and wired to a conventional terminal block 12; a buoyant switch 13 of the mercury type is also provided in each compartment, 4, 5, 6, and controls the supply of electric energy to the element 8, said switch comprising a liquid-tight casing 14 enclosing electrodes 15 and a body of mercury 16. This casing 14 is connected liquid-tight at 17 to an end of a

2

tubular metallic support 18 secured at 19 to the wall 9 of the container. Said metallic support 18 simulates a bellows in that it is deformable in response to the mass or buoyancy of the switch 13 and provides simple means for displaceably connecting the switch 13 to the wall 9 of the container. The mercury switch 13 is shown floating on liquid 20 in compartment 4 with the mercury 16 bridging the electrodes 15 whereas the switches 13 in the empty compartments 5, 6, are sagging under control of the deformable supports 18.

In the base of the compartment 4 is a water inlet 21 which communicates with a cold water supply pipe 22 controlled by a supply valve 23. Adjoining the inlet opening and at right angles to the axis thereof is a drain valve 24 comprising a spring-loaded ball 25 whose light spring 26 tends to displace it from the seating 27 but whose energy is less than normal water pressure as in the relationship of 3 lbs. to 10 lbs. per square inch. The outlet 28 of the drain valve 24 preferably merges with the delivery pipe 29 into a condensing chamber (not shown). The supply valve 23 has indications as shown associated therewith and which are relative to the progressive opening of said valve.

It will be readily understood that when a user opens the supply valve 23 water pressure in the supply pipe 22 will overcome the energy of the drain valve spring 26 and cause it to seat and close the drain valve. Water entering and rising in the compartment 4 will automatically float the mercury switch 13 and establish electrical supply to the heating element 8 therein. On the compartment 4 being filled, water heated by the element will leak through the opening 7 into the compartment 5, the switch 13 will be buoyed, the element 8 energised and the temperature of the water further raised. The same actions will take place in compartment 6 and water progressively heated in three stages will discharge into the delivery pipe 29. It follows that hot water can be obtained relatively quickly to boiling water according to the volume supplied to the container regulated by the supply valve 23.

When the user has drawn hot or boiling water as desired, the closing of the supply valve 23 and consequent removal of supply pressure on the ball valve 25 enables the energy of the spring 26 to unseat the ball 25 and open the drain valve 24, whereupon liquid in the compartments, 4, 5, 6, will drain through the inlet 21 and discharge through the outlet 28; all electrical heating elements 8 will be switched off automatically in the order of compartments 6, 5, 4, as their re-

spective buoyant switches 13 sag successively. The container 1 is provided with a rigid bracket 30 adapted to be attached to a surface, such as a wall in a scullery or bathroom.

For the purpose of attaining a quick rise in temperature in each compartment it is contemplated to employ heating elements each of 1¾ kw. having a joint consumption of 5¼ kw. per three element heater as illustrated in order to provide facilities for rapidly producing boiling water especially for shaving and tea-making purposes.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. An electric liquid heater comprising a liquid container, said container having a liquid inlet and a liquid outlet, electric heating elements supported in said container in superposed order, a source of current for heating said elements, a fully automatic switch associated with each of said elements, a float enclosing said switch, a flexible metal bellows connected liquid tight at one end to said float and connected liquid tight at the other end to the interior wall of said container, the said switches being dependent for individual operation of energising and de-energising their related elements upon liquid level in said container.

2. An electric liquid heater according to claim 1 and including a spring-loaded drain valve associated with said inlet and a supply pipe connecting said inlet to a liquid supply, said drain valve closing under predetermined supply pressure and opening under relief of said pressure.

3. An electric liquid heater comprising a liquid container, an attachment bracket on said container, said container having a liquid inlet and a liquid outlet, electric heating elements supported in said container in superposed order, a source of current for heating said elements, a fully automatic switch associated with each of said elements, a float enclosing said switch and a flexible metal bellows connected liquid tight at one end to said float and connected liquid tight at the other end to the interior wall of said container, the said switches being dependent for individual operation of energising and de-energising their related elements upon liquid level in said container and a spring-loaded drain valve associated with said inlet and a supply pipe connecting said inlet to a liquid supply, said drain valve closing under predetermined supply pressure and opening under relief of said pressure.

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