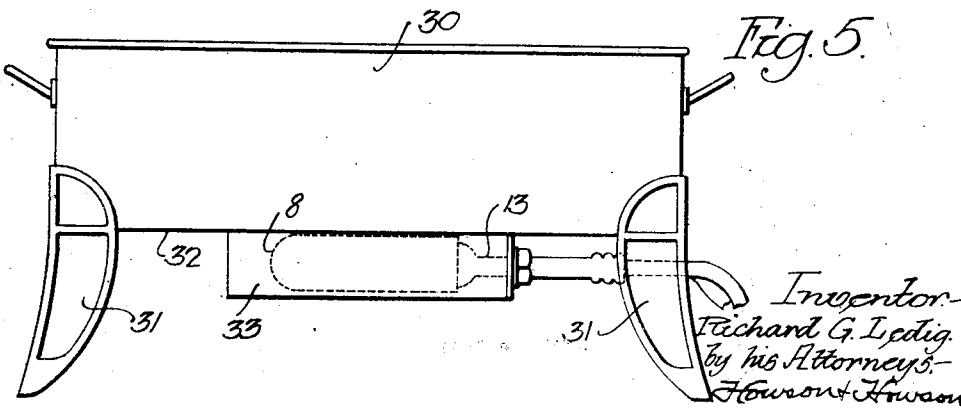
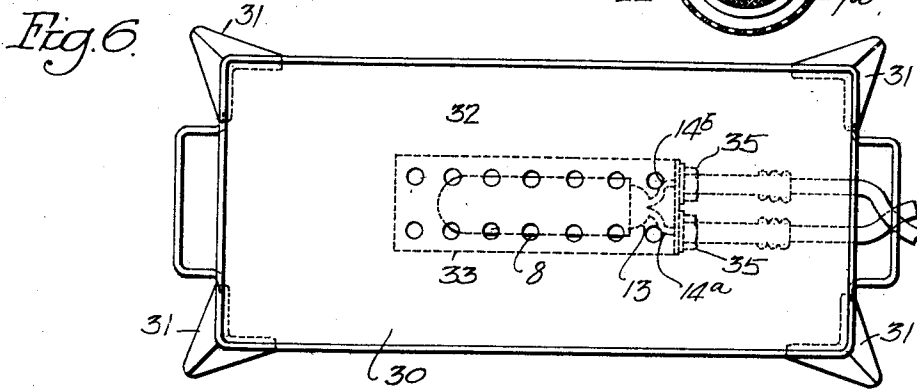
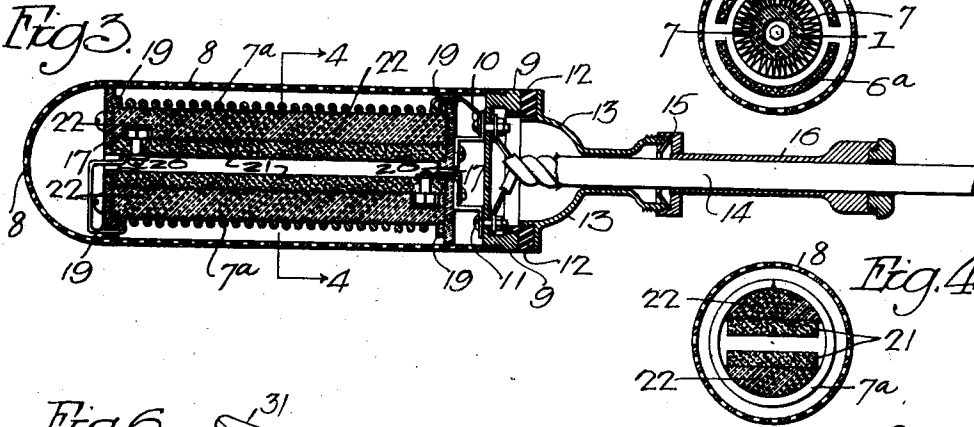
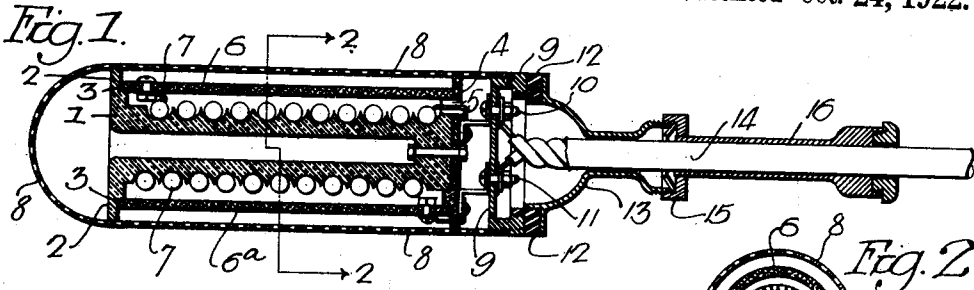


1,433,388.

Patented Oct. 24, 1922.



UNITED STATES PATENT OFFICE.

RICHARD G. LEDIG, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO A. MICKY COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

WATER HEATER.

Application filed March 24, 1922. Serial No. 546,333.

To all whom it may concern:

Be it known that I, RICHARD G. LEDIG, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented
5 Water Heaters, of which the following is a specification.

One object of my invention is to provide a relatively simple, substantial and convenient device for quickly and efficiently heating water or other liquids electrically, the invention especially having to do with a portable form of heater in which the electric current will flow only as long as certain conducting elements thereof are immersed
15 in or are electrically connected by the liquid to be heated.

It is further desired to provide a device for electrically heating liquid such as water, whose construction shall be such as to cause
20 current flow through it to cease in the absence of a body of liquid which serves to complete its circuit, the construction being such that danger of fire or injury to the instrument is effectually prevented even
25 though the liquid in which it was immersed should boil away or be drawn off or in case it is removed from the body of liquid which is being heated.

Another object of my invention is to provide a form of electrically heated sterilizer whose heating element shall operate only as long as it is surrounded by or immersed in water or other liquid, the construction being durable, substantial and compact.

35 These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Fig. 1 is a longitudinal vertical section of
40 a liquid heater of the immersion type constructed in accordance with my invention;

Fig. 2 is a transverse vertical section on the line 2—2, Fig. 1;

Fig. 3 is a longitudinal vertical section of
45 a modified form of liquid heater;

Fig. 4 is a transverse vertical section on the line 4—4, Fig. 3;

Figs. 5 and 6 are respectively a side elevation and a plan of a sterilizer having applied
50 to it a heater constructed in accordance with the showing of either of Figs. 1 or 3.

Referring to Figs. 1 and 2, I have illustrated my heater as consisting of a supporting body of refractory insulating material
55 such as porcelain made in the form of a tube

1 and having an outwardly extending flange 2 at one end. This flange is provided with an annular shoulder 3 and the opposite end of the said porcelain tube has mounted on or immediately adjacent it a disc 4 also of porcelain constituting a terminal cap having
60 a central circular recess for receiving and positioning the adjacent end of the porcelain tube 1 and also provided with an annular shoulder 5 of the same diameter as the shoulder 3.

These two shoulders are designed to fit into and properly support a pair of carbon plate 6—6^a curved substantially concentric with the porcelain tube 1, which is formed
70 with a helical or equivalent groove for the reception of a resistance element 7 in the form of a coil of wire. Mounted on the cap 4 and flange 2 is a perforated or reticulated metallic casing 8 of generally cylindrical
75 form having its end adjacent the open end of the tube 1 of a substantially hemispherical form and at its opposite end extending beyond the cap 4 for the reception of a flanged head 9 which may be of suitable material.

This head is preferably threaded into the casing 8 and supports a pair of terminals 10 and 11 of which the first is electrically
85 connected to one end of the wire resistance element 7, which is in turn connected to one of the carbon plates 6 while the other terminal is connected to the second carbon plate 6^a. A fibre or other insulating nut 12 is threaded into the flange of the head 9 and
90 in turn has threaded or otherwise suitably fixed to it a tubular metallic handle 13. A cable 14 having supply conductors for connection to the terminals 10 and 11 extends through a suitable stuffing box 15 into this handle 13,
95 outside of which it is protected for a short distance by a suitable flexible covering such as spring hose 16.

Under conditions of use there is obviously no current flow through the above described
100 heater until it is immersed in the water or other liquid to be heated. As soon however as the water passing through the reticulated casing 8 enters and fills the space between the carbon plates 6—6^a and the coil 7, current is free to flow through said liquid between these elements. The latter are thereupon heated and transfer their heat to the water within the tube 1 as well as to that within the casing 8 so that there is caused
110

a more or less violent circulation of said liquid and a rapid heating thereof.

In that form of my invention shown in Fig. 3 I provide a casing 8 having a head 9 with terminals 10 and 11 thereon, a handle 13 and supply conductors connected to said terminals as before. In this case however, I mount within the casing adjacent opposite ends thereof a pair of porcelain or other suitable plates 17 of insulating material, providing the adjacent faces of these with a diametrical transverse rib 20 and outer transverse ribs or projections 19—19 parallel therewith. On either side of and spaced apart by the ribs 20 are a pair of substantially parallel flat carbon plates 21 between which and the outer ribs 19 are mounted porcelain plates 22 whose outer surfaces are cylindrically curved while their inner surfaces are flat and designed to lie upon or adjacent the outer faces of the carbon plates 21 respectively.

A coil 7^a either in the form of a single strand or as an elongated coil, is wound helically upon the two porcelain plates 22 and has one end connected to one of the terminals as 10, while its other end is connected to one of the carbon plates, the second of which is connected to the second terminal 11. The carbon plates 21 are of such width that they are spaced away from the coils of the wire element 7^a so that as before there is no current flow through the device as long as it is not immersed in liquid. However when liquid is permitted to flow through the perforated casing 8 so as to electrically connect the carbon plates 21 and the heating coil 7^a, current is then free to flow so that said elements are heated and in turn raise the temperature of the water.

Obviously as soon as the device is removed from the body of liquid which has been heated or if said liquid should be all boiled away owing to the flow of current, or otherwise removed, said device will automatically go out of action, since there would be an open circuit between the carbon plates 21 and coil 7^a. In both of the above cases the wire coil serves primarily as a resistance element to limit the current flow and incidentally assists in raising the temperature of the liquid in which it is immersed.

One useful application of my invention is shown in Figs. 5 and 6 where I have illustrated a tank or pan 30 as supported on legs 31 and having in communication with it and depending from its bottom 32 a smaller receptacle 33, within which I mount a liquid

heater having either of the constructions shown in Figs. 1 or 3. In this case the conductors 14^a and 14^b enter one end of the receptacle 33 through suitable liquid tight tubes or stuffing boxes 35 and obviously any liquid placed in the tank will enter the receptacle 33 so that by establishing a circuit between the carbon elements there is permitted a current flow which generates heat.

Instruments or other articles to be sterilized or heated may be placed within the tank 30 and exposed to the action of the liquid circulating through it from the receptacle 33 and heater. If the device is continued in operation for a sufficient time all of the liquid may be boiled away from it and from the receptacle 33 without damage, since as before the current flow will cease as soon as the supply of liquid is so far diminished as to permit opening of the circuit between the two otherwise electrically isolated heating elements of the heater.

Those forms of my invention shown in Figs. 1 to 4 inclusive are further characterized by being conveniently portable since by means of their handle portions 14 they may be safely carried and placed in or removed from containers holding liquid to be heated.

I claim:

1. An electric heater consisting of a portable elongated reticulated casing; cylindrically curved carbon plates in said casing; a coiled wire mounted in the casing substantially concentric with said plates; and supply conductors connected to said plates and to said coiled wire.
2. The combination in a water heater of a body of insulating material; a wire coil coiled thereon; a pair of curved carbon plates mounted on said insulating body; a reticulated casing surrounding said parts; and supply conductors connected to the plates and to the coil.
3. The combination of a container; with an electric heater mounted in the lower part of said container and including two normally open circuited elements positioned to be electrically connected by liquid delivered to the container.
4. The combination of a container having a receptacle connected to its lower part; and an electric heater in said receptacle including two normally open-circuited heating elements positioned to be electrically connected by liquid flowing into said receptacle from the container.

RICHARD G. LEDIG.

Certificate of Correction.

It is hereby certified that the assignee in Letters Patent No. 1,433,388, granted October 24, 1922, upon the application of Richard G. Ledig, of Philadelphia, Pennsylvania, for an improvement in "Water Heaters," was erroneously described and specified as "A. Micky Company," whereas said assignee should have been described and specified as *A. Meckly Company*, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of November, A. D., 1922.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.

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[SEAL.]

KARL FENNING,
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