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ELECTRIC WATER HEATER.
APPLICATION FILED MAR. 29, 1909.

939,605.

Patented Nov. 9, 1909.

Fig. 1.

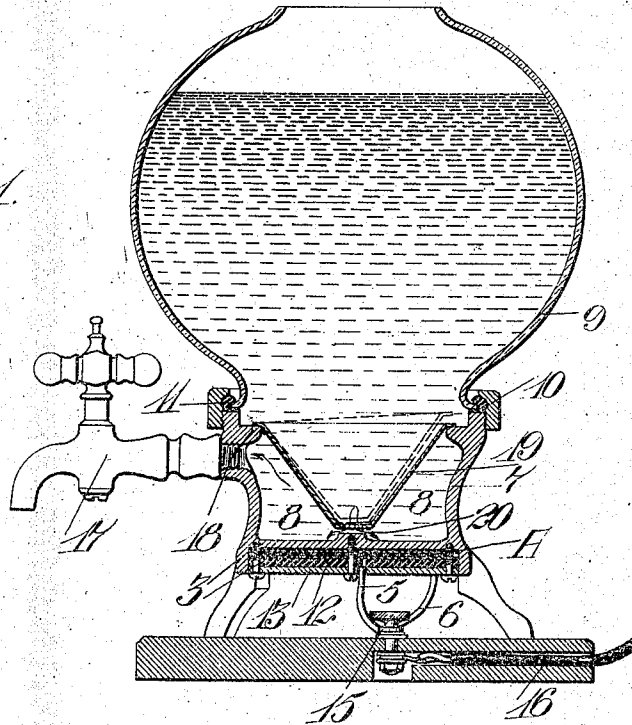


Fig. 2.

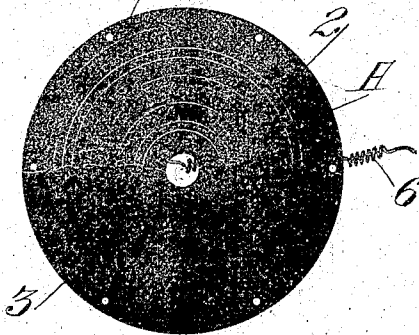
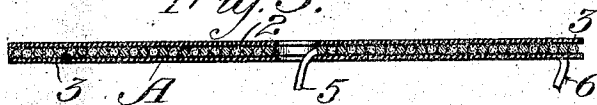


Fig. 3.



Witnesses.

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ELECTRIC WATER-HEATER.

939,605.

Specification of Letters Patent.

Patented Nov. 9, 1909.

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To all whom it may concern:

Be it known that we, HENRI G. LEVY and GEORGE N. BLANCHARD, citizens of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Electric Water-Heaters, of which the following is a specification.

Our invention relates to electrical heating appliances, and pertains especially to a water-heater for use by dentists and others. Its object is to provide a simple, neat, compact, practical water-heater of few parts, occupying a small amount of space, and in which the heating element is so arranged that provision is made for the expansion and contraction of this heating element without any loss of heat, or disarrangement of parts due to expansion and contraction; and to insure the best possible contact for the rapid transmission of heat from the heating element of the body of the fluid to be heated, and at the same time affording means to prevent the over-heating or burning out of the heating element. It also provides a device which will have means for facilitating the quick heating of a small quantity of water in a comparatively large vessel, and maintaining the more highly heated part of the water separate from the rest so that a continuous supply of hot water may be drawn.

The invention consists of the parts, and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical section. Fig. 2 is a plan view partly broken away, of the heating element. Fig. 3 is a section of same.

In the practical embodiment of the invention we employ a heating element, represented more particularly in Figs. 2 and 3. This heating element comprises essentially a heating coil A, wound in the form of a flat spiral, and with the various turns of the coil suitably insulated from each other by appropriate means, as an asbestos string 2. This coil is laid between two sheets of mica 3, or other suitable thin material which will afford suitable electrical insulation, but which will not be too much of a detriment for the transmission of heat from the coil to the vessel to which the heating element is applied. These backing insulating sheets 3,

with the intervening coil A and insulating strip 2, are suitably secured or held together by a suitable bonding material, as shellac, and the terminals 5—6 of the coil are brought out through suitable perforations in one of the insulating sheets 3.

The heating coil A may be wound to obtain various peripheral shapes; the essential feature however being that the coil lies in a horizontal plane, and with its insulation constitutes a thin flat sheet-like device; the thickness of this element varying of course with the size of the heating wire employed. An element suitable for heating vessels containing from one to two gallons of water would not ordinarily be over one-thirty-second of an inch in thickness.

In Fig. 1, we have shown a convenient method of applying a heating element for water-heater, in which 7 represents a base casting inclosing a hot water chamber 8, and at the top of which casting is detachably secured a glass bowl or reservoir 9, the bowl being secured to the casting by suitable means, as the gland ring 10. A tight joint is made by means of a rubber gasket 11. The under side of the bottom of the casting 7 is carefully machined to provide a smooth, flat surface and chamber suitable to receive the heating element represented by the coil A, and its insulating backings 3. Against the under side of the element is placed a layer of asbestos 12, or other suitable insulating material, and against the layer is placed a metal plate 13, and the parts are all held to the casting by suitable means. The terminal wires 5 and 6 of the coil are brought out through the insulation 12 and plate 13, and connected to binding-posts 15 to which the line wires 16 are attached. The receptacle 7 has a draw off cock 17, and an internal flange 18, carefully machined, on which loosely rests an inverted conical valve partition 19; this valve 19 having an opening 20 at its apex, for a downward circulation of the cold water above. The space 8 between the valve and the wall of the receptacle 7 forms a hot water chamber, from which the hot water is first withdrawn.

In practice, the parts being assembled in the manner described and shown, and the heater filled with water, a current is turned on and the heat from the coil radiates

through the thin upper mica partitions 13, and the metal bottom of the receptacle 7 to heat the latter and heat the water in the hot water chamber 8. When the bottom of the receptacle becomes heated, the hot water rises to the top of chamber 8, and starts a circulation within said chamber. As soon as the hot water reaches the boiling point, both the steam and hot water rise into the reservoir 9 and around the peripheral supporting flange of the valve 19, the latter resting loose on the flange 18. Almost as soon as the heat is turned on, hot water may be withdrawn from the cock 17. As soon as the hot water is drawn off from the chamber 8 through the cock 17, or circulates upward into the reservoir 9, a downward current of cold water passes through the opening in the apex of the inverted conical partition and replenishes the water so displaced in the heating chamber 8. Thus it is seen that the part 19 performs the double function of a partition to inclose the hot water and separate it from the cold, and of a self-seating safety valve allowing for the escape of hot water and steam, when necessary, from the chamber 8. No part of the heating coil or the heating element is submerged, and expansion and contraction of the coil may take place in a plane parallel to the bottom of the receptacle 7, without forming any air gap therewith, or otherwise interfering with the transmission of the heat to the contained liquid. Also the parts are easily dismantled, so that the interior of the reservoir in the interior of the receptacle can be easily cleaned, there being no narrow water passages in which dirt can collect.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. A heating unit comprising two sheets of insulated material the opposed surfaces of which are normally coated with a binder which will become active on the application of heat thereto; and a winding of bare metal and insulating material between the sheets forming a flat insulated coil, said winding being united to the sheets to bind the several parts and thereby form a substantially rigid heating element.

2. A heating unit comprising two opposed sheets of mica having their adjacent surfaces coated with a substance which fuses on the application of heat thereto, and a flat coil between said sheets and in contact therewith, said coil being formed of alternate windings of bare wire and asbestos twine, and said coating serving as a binder for uniting the sheets to each other and to said coil.

3. A heating unit comprising two sheets of insulating material and an interposed flat coil composed of a winding of bare wire and intermediate asbestos twine, and a shel-

lac coating on the inner surfaces of the sheets for uniting the sheets and winding to each other when heat is applied thereto.

4. The combination with a water-containing receptacle provided with a flat-faced under surface, of a heating unit comprising two sheets of insulating material, the opposed surfaces of which are normally coated with a binder which will become active on the application of heat thereto, and a winding of bare metal and insulating material between the sheets forming a flat insulated coil, said winding being united to the sheets to combine the several parts and thereby form a substantially rigid heating element, the terminals of the wire extending outward from between the sheets, one of said sheets lying against the said flat-faced surface of the receptacle, a plate forming a base support for the other sheet, and fastenings for securing the base support and intermediate heating element.

5. A water-heater consisting of a reservoir, with a flat bottom, and one side of said flat bottom having a recess, a heating coil in said recess, and a loose fitting conically inverted valve in the reservoir, the apex of the valve open and contiguous to said bottom, said valve forming a conical partition in the reservoir.

6. In a water-heater, the combination of a reservoir and an inverted conical valve and partition in said reservoir, said valve having its apex open and arranged contiguous to the bottom of said reservoir, and means for heating the latter.

7. In a water-heater, the combination of a reservoir, and an inverted conical valve, and partition in said reservoir, said valve having its apex open and arranged contiguous to the bottom of said reservoir, and means for heating the latter, said reservoir having a draw-off cock tapping the space on the under side of said partition.

8. In an electrical water-heater, a reservoir having a flat bottom, and an internal annular flange above its bottom, and a conical inverted partition and valve having an annular base flange resting on the flange in said reservoir, the apex of said valve open and contiguous to the bottom of the reservoir, means for heating the latter, and a cock tapping the space on the under side of said partition.

9. A water-heater comprising a reservoir having a flat bottom, the under side of said bottom having a recess, the bottom of said recess forming also the bottom of the reservoir, a flat coil of a naked wire in said recess and spaced sheets of mica inclosing the coil whereby the latter is insulated from the bottom insulation on the outside of said coil, means for holding the latter to the bottom, and the terminals of said coil extending out underneath said insulation.

10. A water-heater comprising a reservoir
having a flat bottom, the under side of said
bottom having a recess, the bottom of said
recess forming also the bottom of the reser-
voir, a flat coil in said recess and insulated
5 from the bottom, insulation on the outside
of said coil, means for holding the latter to
the bottom, the terminals of said coil ex-
tending out underneath said insulation, and
10 a loose fitting inverted hollow, conical par-
tition supported in the reservoir, with the
apex of said partition open and contiguous

to the bottom of the reservoir, and a cock
tapping this space on the under side of said
partition.

In testimony whereof we have hereunto
set our hands in presence of two subscribing
witnesses.

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Witnesses:

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