H. A. NEWCOMB.

ELECTRIC IMMERSION HEATER.

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1,158,539.

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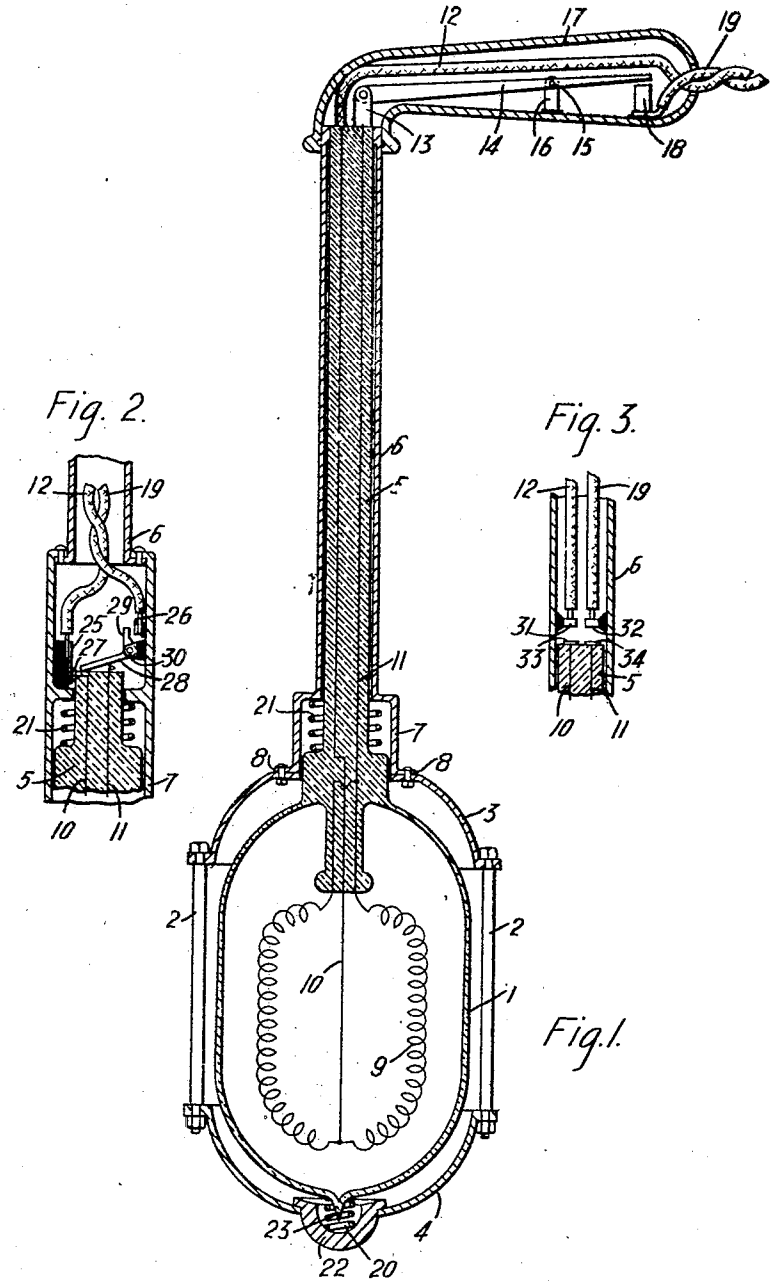


Fig. 1.

Fig. 2.

Fig. 3.

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ELECTRIC IMMERSION-HEATER.

1,158,539. Specification of Letters Patent. Patented Nov. 2, 1915.

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To all whom it may concern:

Be it known that I, HAROLD A. NEWCOMB, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Electric Immersion-Heaters, of which the following is a specification.

My invention relates to electric heating devices adapted to be immersed in liquids, and it has for its object to provide an electric immersion heater equipped with automatic means for insuring that current will be supplied to the device only during its immersion and will be interrupted as soon as the device is withdrawn from the liquid.

In the accompanying drawing, Figure 1 is a longitudinal central sectional view of an electric immersion heater of the bomb type constructed in accordance with my invention. Fig. 2 is a longitudinal sectional view showing a modified form of switching device, and Fig. 3 is a longitudinal sectional view similar to Fig. 2, showing another modified form of switching device.

Electric heating devices that are adapted for immersion in liquids are necessarily designed to carry much heavier currents than are required in devices that are to be used in the air, and it often happens that the current which immersion heaters carry is sufficient to burn out the heating coils when the heaters are removed from liquids without interrupting the current.

According to my present invention, I avoid the foregoing disadvantage by inclosing an electric heating coil, or other current-consuming device, within a casing that is of less specific gravity than the liquid in which the device is to be immersed; for example, in a glass bulb which is evacuated or filled with hydrogen. This casing or bulb is inclosed in a cage or outer casing of metal, which should be of sufficient weight to make the entire apparatus heavier than the liquid. I also provide coöperating contact members at the top of the bulb and at the top of the cage, the arrangement of the parts being such that, when the assembled device is plunged into water or other liquid, the inner bulb or casing will be buoyed up until its contact members engage the contact members that are secured to the outer case, thus permitting current to flow through the current-consuming element within the bulb. As soon as the device is removed from the liquid, the inner bulb or casing will fall by gravity to the bottom of the cage, thus immediately interrupting the current.

Referring now to the accompanying drawing, a glass bulb 1 is shown inclosed within a cage formed of metal rods 2 that are held together by means of top and bottom metallic casing members 3 and 4. The bulb 1 is provided with an elongated neck 5 that is inclosed within a tube 6, which may conveniently be made of brass or other suitable material, and which is enlarged, at its lower end, as shown at 7, the enlarged end being riveted at 8 to the top portion 3 of the cage. A current-consuming device, here shown as an incandescent filament 9, is inclosed within the glass bulb 1 and is attached to leading-in wires 10 and 11 which extend through the elongated neck 5 of the bulb 1. The neck 5 may conveniently be made tubular and filled with an insulating material after the leading-in wires have been introduced. The leading-in wire 10, as shown, is connected to a flexible conducting cord 12 that leads to an external source of energy, while the leading-in wire 11 is electrically connected to a lug 13 of conducting material, which is secured to the upper end of the neck 5 and is pivotally connected to a lever 14 of conducting material. The lever 14 is pivoted at 15 to a support 16 mounted on, and electrically insulated from, a handle casing 17, one end of which is attached to the upper end of the tube 6. The position of the member 16 in the handle 17 is preferably so selected that the longer arm of the lever 14 is attached to the lug 13, while the shorter arm of the lever 14 swings freely and is adapted to engage a contact member 18, which is secured within, and insulated from, the handle casing 17 and is electrically connected to a flexible conducting cord 19, similar to the cord 12, through which the circuit may be completed to the external source of energy.

The bulb 1 is resiliently supported within its inclosing cage by means of springs 20 and 21, the spring 20 being received in a recessed member 22 secured to the casing member 4 and being adapted to receive the tip 23 of the bulb 1. The spring 21 surrounds the neck 5 within the enlarged portion 7 of the tube 6, and the strength of the spring 21 should be so selected that it will yield to

the buoyant effect of the liquid into which the device may be immersed and permit the bulb to rise sufficiently to rock the lever 14 about its pivot 15 and bring the swinging end of the member 14 into engagement with the contact member 18, thus completing the electric circuit. The spring 21 should, however, be strong enough to sustain the weight of the bulb 1 if the device should be inverted when not immersed in liquid, thus insuring the separation of the contact members 14 and 18 at all times except when the device is immersed in liquid and the bulb consequently raised by its tendency to float.

Fig. 2 shows a modified form of terminal device in which the flexible terminal cords 12 and 19 are connected, respectively, to stationary terminal plates 25 and 26. The terminal plate 25 is engaged by a contact member 27 secured to the upper end of the neck 5, which may be much shorter than in the modification shown in Fig. 1. The contact member 27 is electrically connected to the leading-in wire 10, and the leading-in wire 11 is electrically connected to one arm 28 of a two-armed lever, the other arm 29 of which is adapted to engage the contact terminal plate 26. The two-armed lever 28—29 is pivoted at 30 to the enlargement 7 of the tube 6. In the operation of this form of my device, the bulb 1, when buoyed up by immersion in a liquid, causes the upper surface of the neck 5 to engage the relatively long arm 28 of the two-armed lever, thereby rocking the lever about its pivot and causing the arm 29 to engage the terminal plate 26, thus completing the circuit. The parts are restored to the positions shown in Fig. 2 when the device is removed from the liquid.

Fig. 3 shows a third modification of the current-interrupting device in which the conductors carried by the flexible cords 12 and 19 are rigidly secured to terminal blocks 31 and 32 that are mounted upon, and insulated from, the inner walls of the tube 6. The leading-in wires 10 and 11 are electrically connected to contact members 33 and 34 attached to the upper surface of the neck 5 that is associated with the bulb 1. It will be evident that the upward movement of the bulb 1, when immersed in a liquid, will cause the contact members 33 and 34 to engage the terminal blocks 31 and 32, respectively, and that this contact will be broken as soon as the device is removed from the liquid.

My invention may be advantageously applied to liquid sterilizers, for which use the buoyant bulb 1 should be made of a glass that is readily permeable by ultra-violet rays, while the conducting coil 9 should be composed of material that gives a light that is rich in such rays.

Numerous modifications may be effected in the structures which I have shown and described without departing from the spirit and scope of my invention, and it is therefore to be understood that my invention comprehends all such modifications and adaptations as fall within the scope of the appended claims.

I claim as my invention:

1. An electric immersion apparatus comprising a current-consuming device, means for supplying current to the said device when the device is immersed in a liquid and for interrupting the current when the device is removed from the liquid, and means for maintaining the circuit in open condition when the device is not immersed in liquid.

2. An electric immersion apparatus comprising a current-consuming device, a circuit for supplying current to the said device, and means for closing the said circuit when the device is immersed in a liquid and for opening the said circuit when the device is removed from the liquid.

3. An electric immersion apparatus comprising a current-consuming device inclosed in a buoyant container, a casing for the said container that is sufficiently heavy to cause the entire apparatus to sink when immersed in a liquid, and means for supplying current to the said current-consuming device when the apparatus is immersed in a liquid and for interrupting the supply of current when the apparatus is removed from the liquid.

4. An electric immersion apparatus comprising a current-consuming device inclosed in a buoyant container, a casing for the said container that is sufficiently heavy to cause the entire apparatus to sink when immersed in a liquid, coöperating contact members secured respectively to the said buoyant container and to the said casing, and means for supplying current to the said contact members.

5. An electric immersion apparatus comprising a current-consuming device inclosed in a buoyant container, a casing for the said container that is sufficiently heavy to cause the entire apparatus to sink when immersed in a liquid, a hollow handle secured to the said casing, a fixed contact member secured within the said handle, a movable contact member pivotally mounted within the said handle, and means for moving the said pivoted contact member in unison with the movements of the said buoyant container within the said casing, whereby the said contact members are brought into engagement when the apparatus is immersed in a liquid and disengaged when the apparatus is removed from the liquid.

6. An electric sterilizer comprising a current-consuming device capable of emitting ultra-violet rays, a buoyant container for

the said current-consuming device, the said container being composed of a material that is readily permeable by ultra-violet rays, and means for supplying current to the said current-consuming device when the sterilizer is immersed in a liquid and for interrupting the supply of current when the apparatus is removed from the liquid.

7. An electric immersion apparatus comprising a current-consuming device adapted to be immersed in a liquid, a circuit for supplying current to the said device, and means for automatically closing the said circuit when the device is immersed in a liquid.

In testimony whereof, I have hereunto subscribed my name this 31st day of March, 1915.

HAROLD A. NEWCOMB.