

March 25, 1941.

M. W. HANKS ET AL

2,235,879

VAPORIZER

Filed Dec. 4, 1937

2 Sheets-Sheet 1

Fig. 1

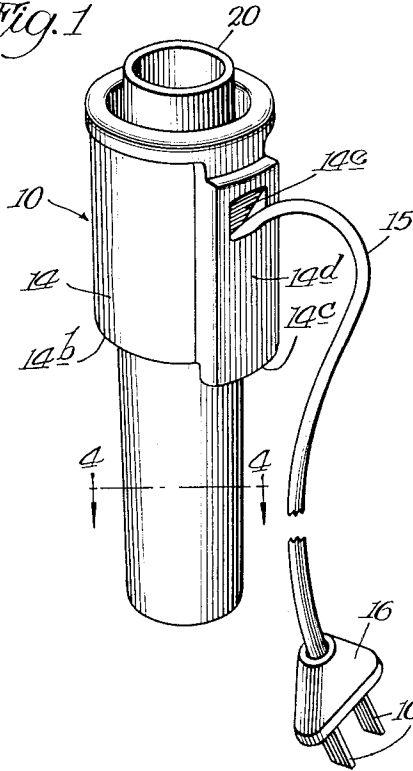


Fig. 2

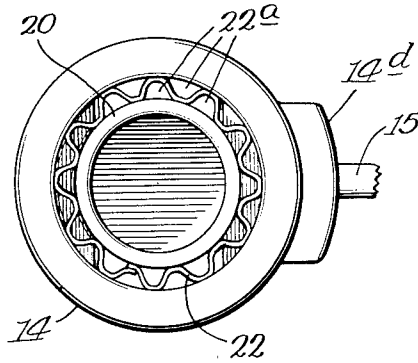


Fig. 3

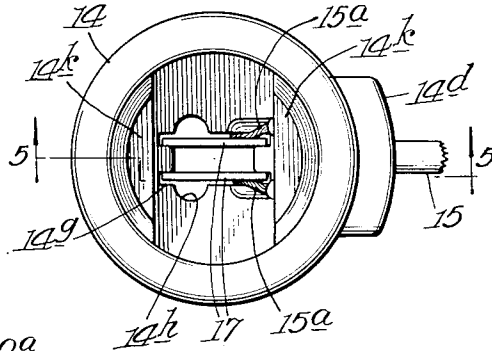


Fig. 8

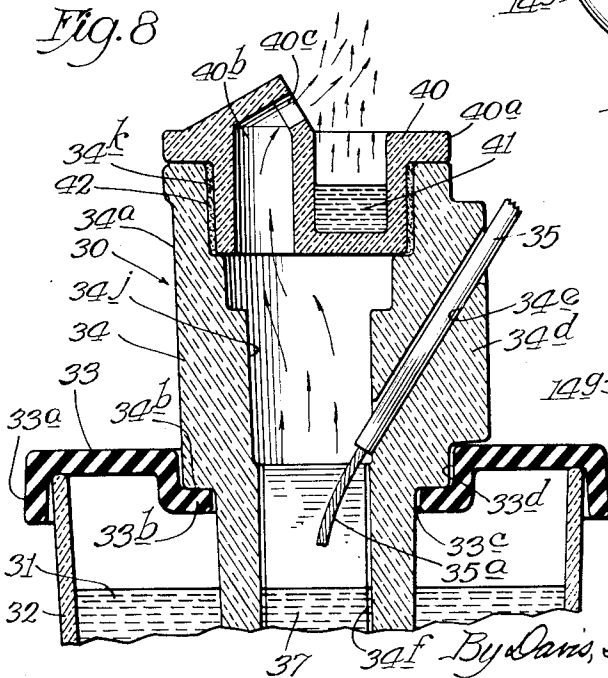
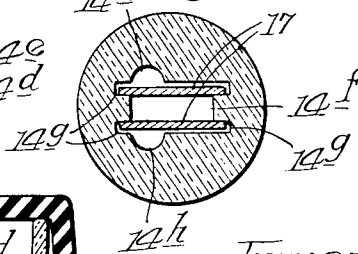


Fig. 4



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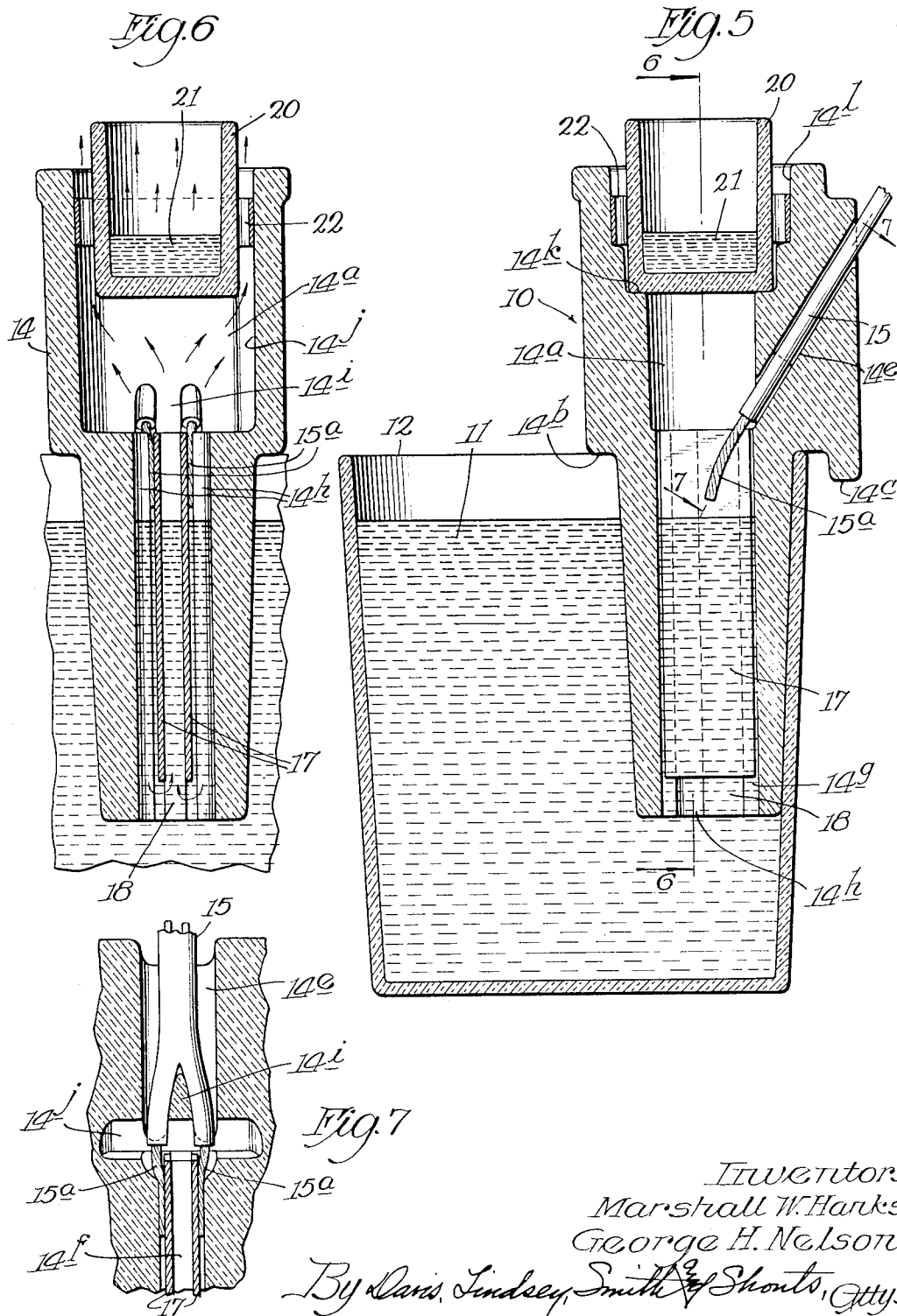
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,235,879

VAPORIZER

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19 Claims. (Cl. 219—40)

This invention relates to improvements in vaporizers and its purpose is to provide an improved device of the liquid conductor heater type wherein water or other fluid is adapted to be vaporized by an electric current passing through the fluid between spaced electrodes, thereby producing steam or vapor which may be used to heat a medicament, such as benzoin, eucalyptus, mentholatum, and the like, with the result that the vapor of the medicament rises with the steam and may be inhaled by the user. The liquid conductor heater principle employed in the construction of the present invention is similar to that embodied in the liquid conductor heaters of United States Patents Nos. 2,015,671 and 2,015,672, both dated October 1, 1935.

The principal object of the invention is to provide an improved portable vaporizer embodying a receptacle for a medicament and capable of being partially immersed in a glass of water or the like so that when the device is connected in an electric circuit the current will flow between the spaced electrodes embodied in the device to effect the heating of the water and the resulting vaporization of the medicament by the action of the steam rising from the water.

A further object of the invention is to provide an improved vaporizer comprising an insulating body adapted to be immersed in water and having a restricted passage containing spaced electrodes adapted to be connected by the water so that when the circuit of the electrodes is energized a current will pass between the electrodes and the water in the restricted passage will be quickly vaporized.

Still another object of the invention is to provide an improved vaporizer comprising a receptacle for a medicament removably held in place in an insulating body by novel means which permit the receptacle to be removed when desired and which permit steam generated by the device to circulate around the receptacle.

Another object of the invention is to provide an improved vaporizer comprising spaced electrodes and having novel means for establishing an electrical connection between these electrodes and conductors which are adapted to be connected in an electric supply circuit.

Another object of the invention is to provide a vaporizer having means for generating steam and having an improved receptacle for a medicament whereby the medicament is vaporized and the vapor thereof caused to flow in a predetermined direction intermingled with the steam so

that the mixture may be inhaled by the user of the device.

A further object is to provide an improved vaporizer adapted to be used as a closure for a vessel containing a liquid and comprising an insulating body having a passage communicating with the chamber of the vessel and having spaced electrodes therein to be connected by the liquid.

Still another object is to provide an improved electrical device of the liquid conductor type which may be used either for vaporizing a medicament or as a humidifier for increasing the moisture content of the atmosphere.

Other objects of the invention relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings, in which two embodiments are illustrated. In the drawings,

Figure 1 is a perspective view of the improved vaporizer of the present invention, when removed from the water glass or other vessel with which it is usually employed;

Fig. 2 shows an enlarged top plan view of the vaporizer illustrated in Fig. 1;

Fig. 3 shows a top plan view similar to that of Fig. 2 with the receptacle for the medicament removed;

Fig. 4 shows a transverse horizontal section through the lower portion of the vaporizer illustrated in Fig. 1, the section being taken on the line 4—4 of Fig. 1;

Fig. 5 shows a vertical section through the vaporizer and a glass of water with which it is ordinarily used, the section through the vaporizer being taken on the line 5—5 of Fig. 3;

Fig. 6 shows a vertical section taken on the line 6—6 of Fig. 5;

Fig. 7 shows an enlarged inclined section taken on the line 7—7 of Fig. 5, illustrating the method of connecting the electric conductors with the spaced electrodes; and

Fig. 8 is a partial sectional view, similar to that of Fig. 5, showing a modified form of construction adapted to act as a closure for the vessel and embodying a different form of receptacle for the medicament, which causes the vapors of the medicament to mingle with the steam arising from the chamber of the vaporizer.

As illustrated in the drawings, the improved vaporizer 10 is adapted to be partially immersed in a body of water or other liquid 11 contained in a vessel 12 which may be an ordinary water glass or the like. The vaporizer 10 comprises a

hollow insulating body 14 of porcelain, "Bakelite," or other suitable insulating material, having the upper part thereof enlarged as shown at 14^a, thus forming an annular shoulder 14^b which is preferably provided at one side of the insulating body with a downwardly extending flange or lip 14^c so that the device may be mounted upon the edge of the vessel 12, as shown in Fig. 5, with the lip or flange extending downwardly on the outside of the vessel. This lip or flange is formed as a downward extension of a lateral enlargement 14^d, shown particularly in Fig. 1, from the upper part of which a downwardly inclined passage 14^e leads to the interior chamber of the insulating body for containing the flexible cord 15 comprising a pair of insulated conductors which lead from the fitting 16 having spaced terminals or blades 16^a adapted to be inserted in the usual outlet plug of the electric lighting circuit of the place where the vaporizer is to be used.

The insulating body 14 is circular in cross section and the lower portion thereof may be tapered downwardly, as shown in Fig. 5, to correspond to the taper of the outer wall of the water glass 12. The lower, tapered portion of the insulating body is provided with an upwardly extending passage 14^f of substantially rectangular cross section which contains a pair of spaced electrodes 17, preferably in the form of flat metal plates of stainless steel, Monel metal, or the like, having their edges engaging vertical grooves 14^g which are formed in the insulating material at the corners of the rectangular passage, as shown particularly in Fig. 3. These electrodes preferably terminate somewhat above the lower end of the insulating body, leaving a chamber 18 for a purpose hereinafter described.

The electric conductors which are embodied in the flexible cord 15 have the insulation removed from the extremities thereof, beyond the inner edge of the inclined passage 14^e, thus providing extremities 15^a which are adapted to contact the sides of the metal electrodes 17, as shown particularly in Figs. 5 and 7, thus establishing an electrical connection between the electrodes and the supply circuits. In assembling the device, the flexible cord 15 is put into place first with the extremities 15^a of the conductors extending into the passage 14^e adjacent the sides thereof, and the metal electrode plates 17 are then inserted, with their edges engaging the grooves 14^g until their upper ends reach the position shown in Figs. 5, 6, and 7, wherein the extremities 15^a of the conductors are wedged tightly between the plates and the lateral walls of the passage 14^e. In this way the detachable connection is readily formed and it will be apparent that this arrangement, wherein the electrodes are frictionally held in place, permits the electrodes to be readily removed and replaced when desired. In order to limit the inward movement of the flexible cord 15 through the passage 14^e, the insulating body is preferably provided with a lug 14^f extending across the passage 14^e to divide this passage at its lower or inner edge, as shown in Fig. 7, so that the inner ends of the insulated conductors may extend on opposite sides thereof.

In order to facilitate the downward flow about the electrodes of water of condensation which forms on the upper part of the device while it is in operation, and of the water which is carried upwardly by the bubbles during the heating and evaporation of the water, the opposite walls of the rectangular passage 14^f, formed in the insulating body, are provided throughout their length

with vertically extending grooves 14^h, shown particularly in Figs. 3 and 6, which permit the water in the vessel 12 to rise upwardly on the outer sides of the electrodes and also facilitate the downward flow of the water of condensation and of the water carried upwardly by the rising bubbles between the electrodes. With this device partially immersed in the water of the vessel, the water establishes a connection between the electrodes and the current flowing through this intermediate body of water causes it to vaporize with the result that steam passes upwardly into the chamber 14ⁱ, which is formed in the enlarged portion 14^a of the insulating body. This space forms a boiling chamber, which prevents the water from sputtering out at the top of the device, and any excess water collecting in this chamber as a result of the boiling operation quickly returns downwardly through the grooves 14^h. This water which flows downwardly enters the space 18 at the bottom of the insulating body and is largely re-vaporized without intermingling with the body of water in the vessel, so that the vaporization of the liquid is initiated and maintained without heating an excessive portion of the main body of liquid 11.

The steam which is generated between the spaced electrodes 17 is adapted to flow upwardly around a cup 20, formed of porcelain, "Bakelite" or other suitable insulating material, which is adapted to contain a medicament to be vaporized. This medicament 21 may be inserted in the cup in liquid form or be placed therein by saturating a body of cotton or the like. At the upper end of the boiling chamber 14ⁱ, the hollow insulating body 14 is provided with a pair of oppositely disposed shoulders 14^k, upon which the receptacle 20 is adapted to rest, as shown particularly in Fig. 5, and the cup is held in place on the shoulders by a transversely corrugated circular spring 22 of bronze or other suitable metal, which is placed around the cup or receptacle with its ends overlapping and the outer portions of its convolutions engaging the outer annular surface 14^j of the chamber in which the cup is mounted. The convolutions of this circular spring provide a number of vertical passages 22^a, as shown in Fig. 2, which permit the steam to circulate upwardly about the cup or receptacle 20 so that the medicament 21 therein is heated and vaporized, the vapor being given off through the mouth of the receptacle and mingling with the steam which passes upwardly around it so that it may be inhaled by the user. In this way, the receptacle 20 is frictionally held in place and may be readily removed when it is desired to clean this member or the interior of the insulating body in which it is normally mounted. If desired, the receptacle 20 may be removed and the remaining parts of the device may be employed as an humidifier. In some cases, it may be desirable to secure the receptacle 20 by cement to the shoulders 14^k upon which it rests.

In Fig. 8 of the drawings there is shown a modification of the invention which is adapted for use where it is desired to give the steam and vapors a definite direction of flow or discharge from the vaporizer and where it is important to prevent danger of electric shock by contact with the liquid being vaporized between the electrodes. In this form of the invention, the vaporizer 30 is adapted to be partially immersed in a body of water or other liquid 31 in a vessel 32, formed preferably of insulating material, and provided with a cover 33, also formed preferably of porce-

lain, "Bakelite," or other suitable material. The vaporizer 30 comprises a hollow insulating body 34 formed of porcelain, "Bakelite," or the like and having the upper part thereof enlarged, as shown at 34^a, thus forming an annular shoulder 34^b which is adapted to rest upon the annular flange 33^b which is formed on the cover 33 around the central opening 33^c thereof through which the lower tapered portion of the insulating body 34 extends. The cover 33 has an outer annular flange 33^a which extends downwardly around the upper edge of the vessel 32 and the annular flange 33^b is depressed below the body portion of the cover 33, thus forming a circular pocket 33^d in which the enlarged portion 34^a of the insulating body is seated. This enlarged part of the insulating body is provided at one side with a lateral boss or extension 34^d, thus forming an increased thickness of insulating material through which there is provided a downwardly and inwardly inclined passage 34^c for containing the flexible cord 35 embodying a pair of insulated conductors leading from a source of supply and having their lower bare extremities 35^a connected in the manner previously described with a pair of spaced electrodes 37 which are mounted in the passage 34^c of rectangular cross section formed in the lower part of the insulating body. These electrodes are mounted in the manner described in connection with the form shown in Fig. 1 and when the water or other liquid is vaporized by the passage of an electric current between the electrodes, the steam rises upwardly through the chamber 34ⁱ which is formed in the enlarged portion 34^a of the insulating body above the upper ends of the electrodes. This chamber is enlarged at its upper end as shown at 34^k and this enlargement is engaged by a cup or receptacle 40 adapted to contain a medicament 41 to be vaporized. This cup or receptacle is held in place by packing material 42 placed between its peripheral surface and the wall of the chamber 34^k and it has an annular flange 40^a which extends outwardly over the top edge of the insulating body 34. This cup has a passage 40^b extending upwardly at the side of the receptacle for the medicament 41 and this passage 40^b is provided with an inclined outlet port 40^c which directs the steam passing upwardly through the passage 40^b over the upper end of the receptacle which contains the medicament so that the steam and vapors of the medicament are thoroughly mingled and have a definite direction of flow as they pass upwardly from the device.

It will be apparent that with the form of construction shown in Fig. 8, it will be impossible for the user of the device to get an electric shock by bringing the fingers into contact with the body of water 31 in the vessel while the device is in operation. The vessel 32 and its cover 33 may be a bottle or any other vessel having a mouth 33^c through which the lower or reduced portion of the insulating body 34 may be inserted. In the use of either form of the invention, the receptacle 20 or 40 for containing the medicament may be allowed to remain empty or may be removed from the insulating body of the device so that steam alone may be discharged from the insulating body for humidifying purposes only.

Although two forms of the invention have been shown and described by way of illustration, it will be understood that it may be constructed

in various other embodiments coming within the scope of the appended claims.

We claim:

1. A device of the class described, comprising a hollow insulating body open at its upper and lower ends and having a continuous vertical passage therethrough, a receptacle for a medicament located and mounted within the upper end of said body, spaced electrodes mounted in the lower portion of said body and adapted to be connected by a liquid when the said portion of said body is immersed in said liquid, and means for connecting said electrodes to an electric circuit.
2. A device of the class described, comprising a hollow insulating body having a continuous vertical passage open at its upper and lower ends, a receptacle, means for removably securing said receptacle in the upper end of said body with vapor circulating spaces around it within said body, spaced electrodes mounted in the lower portion of said body, and means for connecting said spaced electrodes to an electric circuit.
3. A device of the class described, comprising a hollow insulating body, electric heating means mounted in said body, means for connecting said heating means to an electric circuit, said body having a chamber therein above said heating means, and a separate receptacle mounted above said chamber, said chamber extending continuously between said heating means and said receptacle.
4. A device of the class described, comprising a hollow insulating body, spaced electrodes mounted in the lower portion of said body, means for connecting said electrodes to an electric circuit, said body having a chamber therein above said electrodes, and a receptacle mounted above said chamber and having passages around the periphery thereof within said body.
5. A device of the class described, comprising a hollow insulating body having a continuous imperforate annular wall, spaced electrodes mounted in the lower portion of said body, means for connecting said electrodes to an electric circuit, said body having a chamber therein above said electrodes, and a receptacle mounted above said chamber and having a steam passage therethrough.
6. A device of the class described, comprising a hollow insulating body, electric conductors mounted in the wall of said body and having bare extremities extending into the chamber of said body, and spaced electrodes interlocked with said body and wedged into tight engagement with said bare extremities of said conductors, the wedging action of said conductors holding said electrodes against vertical displacement in said body.
7. A device of the class described, comprising an insulating body having a vertical passage therethrough provided with opposed grooves, a pair of flat electrodes having their opposite edges engaging said grooves, and conductors connected to said electrodes and holding said electrodes in place in said grooves.
8. A device of the class described, comprising a hollow insulating body having a downwardly and inwardly inclined passage communicating with the interior chamber of said body, electric conductors mounted in said passage and having bare extremities extending into said chamber, and spaced electrodes mounted in said chamber and engaging the bare extremities of said conductors, said conductors being arranged to

wedge said electrodes into frictional engagement with said body to hold said electrodes in place.

9. A device of the class described, comprising a hollow insulating body having a downwardly and inwardly inclined passage communicating with the interior chamber of said body, electric conductors mounted in said passage and having bare extremities extending into said chamber, spaced electrodes mounted in said chamber and engaging the bare extremities of said conductors, and a receptacle mounted in the upper portion of said body.

10. A device of the class described, comprising an insulating body having a vertical passage therethrough, a pair of spaced electrodes mounted in the lower portion of said passage and terminating above the lower end of said body, said electrodes being spaced from the opposite walls of said passage to provide chambers which communicate with the space between said electrodes through the portion of said passage located below said electrodes, and means for connecting said electrodes to an electric circuit, said body having a vapor chamber above said electrodes.

11. A device of the class described, comprising an insulating body open at its lower end and having a vertical passage therethrough, a pair of spaced electrodes mounted in the lower portion of said passage and terminating above the lower end of said body, means for connecting said electrodes to an electric circuit, said body having a vapor chamber above said electrodes formed by the continuous surrounding wall of said passage, and a receptacle mounted above said chamber and provided with means for permitting the escape in proximity thereto of vapor rising from said chamber.

12. A device of the class described, comprising an insulating body having a vertical passage therethrough, a pair of spaced electrodes mounted in the lower portion of said passage and terminating above the lower end of said body, and means for connecting said electrodes to an electric circuit, said body having grooves therein extending vertically on the outer sides of said electrodes.

13. A device of the class described, comprising an insulating body having a vertical passage therethrough, a pair of spaced electrodes mounted in the lower portion of said passage and terminating above the lower end of said body, and means for connecting said electrodes to an electric circuit, said body having grooves therein extending vertically on the outer sides of said electrodes and having a vapor chamber above said electrodes.

14. The combination with a vessel adapted to contain a liquid, of an insulating body having a laterally extending hook portion adapted to be

hung on the edge of said vessel and to extend into said liquid, said body having a vertical passage therethrough, spaced electrodes mounted in said passage and adapted to be connected by said liquid, and means for connecting said electrodes in an electric circuit.

15. The combination with a vessel adapted to contain a liquid, of an insulating body having a lateral hook portion adapted to be hung on the edge of said vessel and to extend into said liquid, said body having a vertical passage therethrough, spaced electrodes mounted in said passage and adapted to be connected by said liquid, means for connecting said electrodes in an electric circuit, and a receptacle for a medicament mounted in the upper end of said passage.

16. A device of the class described, comprising an insulating body having a vertical passage therethrough, a pair of spaced vertical electrodes extending across said passage and terminating above the lower end of said passage, said electrodes being spaced from the walls of said passage between their edges to provide spaces which communicate with the space between said electrodes through the portion of said passage located below said electrodes, and means for connecting said electrodes to an electric circuit.

17. A device of the class described, comprising an insulating body having a vertical passage therethrough, the walls of said passage being provided with opposite pairs of vertically extending spaced grooves, and a pair of flat spaced electrodes having their opposite edges mounted in said grooves.

18. A device of the class described, comprising an insulating body having a vertical passage therethrough, the walls of said passage being provided with opposite pairs of vertically extending spaced grooves, and a pair of flat spaced electrodes having their opposite edges mounted in said grooves, said electrodes being spaced from the walls of said passage which are opposite their flat faces and terminating above the lower end of said passage.

19. A device of the class described, comprising a hollow insulating body having a vertically extending passage extending therethrough, spaced electrodes mounted in the hollow portion of said passage, means extending through the side wall of said insulating body for connecting said electrodes in an electric circuit, a receptacle for a medicament mounted in the upper part of said passage, and means for securing said receptacle in place in said passage including an annular member providing vertical vapor passages around said receptacle.

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