

March 15, 1938.

S. M. COE

2,111,206

ART OF VAPORIZING MEDICAMENTS AND OTHER MATERIALS

Filed Aug. 10, 1936

2 Sheets-Sheet 1

Fig. 1.

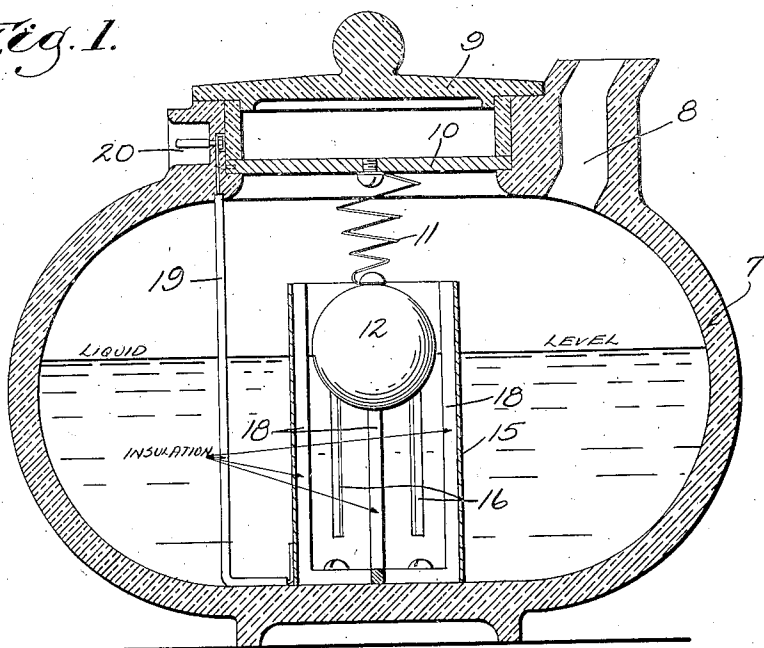
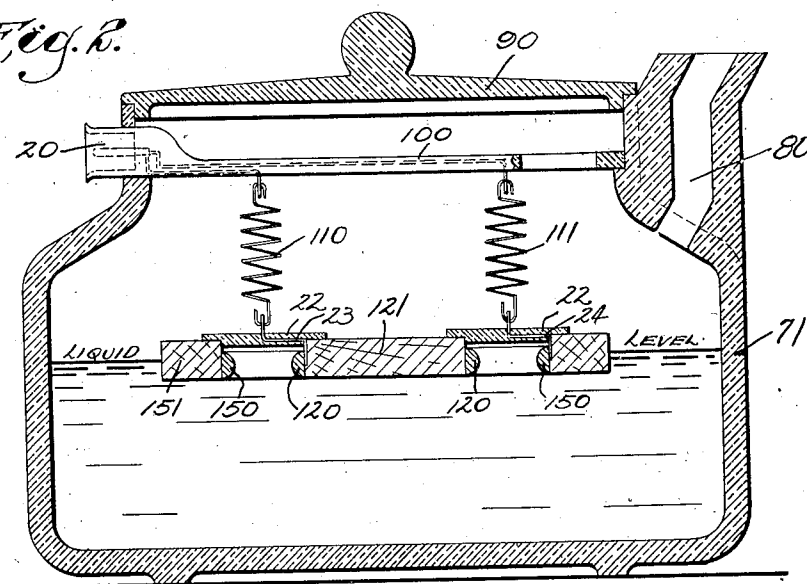


Fig. 2.



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Fig. 3.

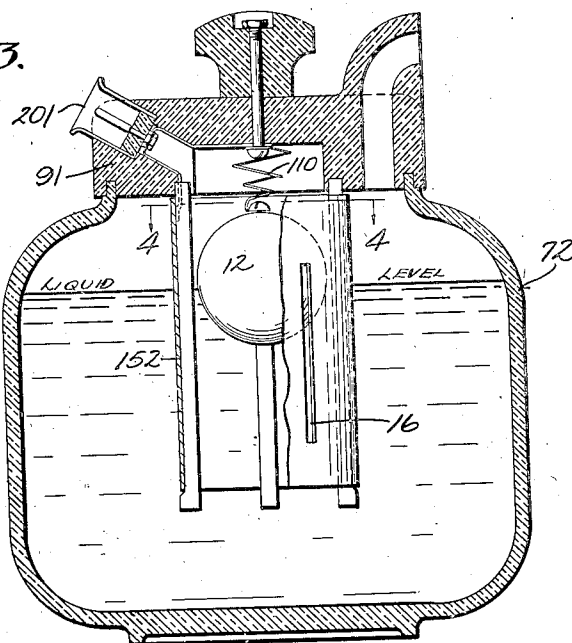


Fig. 4.

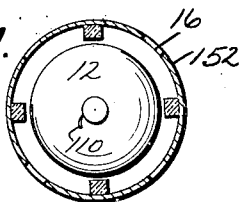


Fig. 5.

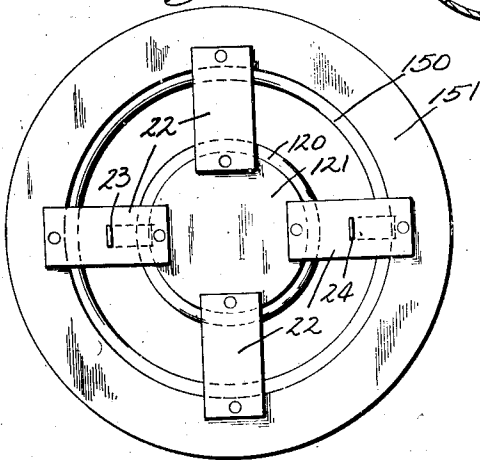
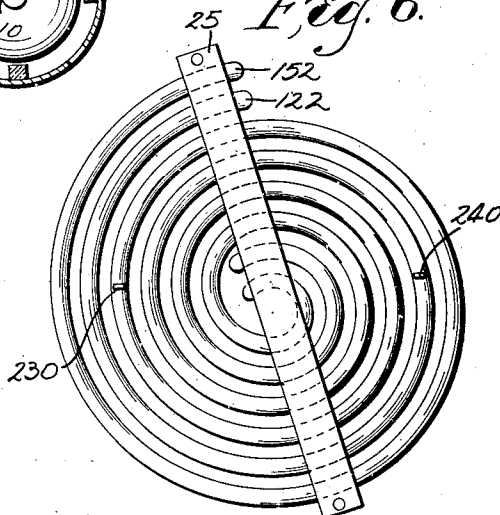


Fig. 6.



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ART OF VAPORIZING MEDICAMENTS AND
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Application August 10, 1936, Serial No. 95,298

12 Claims. (Cl. 219—40)

This invention relates to improvements in the art of vaporizing medicaments and other materials.

It is the primary object of the invention to provide an improved device and method for vaporizing certain materials which are apt to coagulate at the surface when vaporized between ordinary immersion type electrodes. It is my objective to provide for the evaporation of the liquid almost entirely in the surface stratum thereof, whereby the agitation and movement incident to the evaporation will break up any coagulation, and will also tend to prevent deposits on the walls of the container, and will make impossible the bridging of solids upon electrodes which in many devices short circuits the electrodes and prevents the normal function of the device.

Other objects pertain to details of construction and will appear more fully from the following disclosure.

In the drawings:

Figure 1 is a view in axial section of a vaporizing device embodying my invention.

Figure 2 is a similar view showing a modified construction of the apparatus.

Figure 3 is a view in axial section showing a still further modified embodiment of the invention.

Figure 4 is a view in transverse section taken on the line 4—4 in Figure 3.

Figure 5 is a plan view of the float used in the Figure 2 construction.

Figure 6 shows, in plan, a modified embodiment of float usable in the Figure 2 construction.

Like parts are identified by the same reference characters throughout the several views.

The container 7 holds a body of vaporizable liquid such as those inhalants used in respiratory diseases. The level of the liquid in the container will vary in use, and at the moment stands at the point indicated in Figure 1. The container has a discharge spout 8 for the vapors and a closure 9 which may be removed for the insertion of additional supplies of liquid.

Below the closure the mouth of the vessel is bridged by a conductor 10, from which depends a conductor 11 which is preferably helically coiled but has no particular resilience and serves merely to convey the current to a spherical float 12.

Resting on the bottom of the container 7 is a tubular electrode 15 having slots 16 at frequent intervals to permit free movement of the liquid to the interior of the electrode. At three or more

points about the interior of the tubular electrode 15 I provide guides 18 of insulating material which define the vertical path of movement of the spherical float 12 and determine the minimum spacing of such float from the tubular electrode 15.

An insulated conductor 19 is connected with electrode 15, and the bridge conductor 10 and the electrode conductor 19 are both led to a conventional electrical receptacle 20, to which an extension cord may be applied to impress the usual lighting circuit of 110 to 120 volts upon the electrodes 12 and 15.

Since the greatest diameter of the float will be at or near the surface of the liquid, and since this portion of the float will approach most closely to the tubular electrode 15, it will be apparent that practically all of the current traversing the body of liquid in the container 7 will pass through such liquid in the stratum thereof substantially at the surface. The heating effect occasioned by the resistance of the liquid will therefore produce great agitation and ebullition in this surface stratum in the evaporation of the liquid.

The resulting movement of the liquid will prevent any bridging of solids between the electrodes such as might otherwise occasion short circuiting, and I have found devices employing this principle can be operated successfully in liquids of such density that they would speedily incrust and stop the operation of a conventional immersion type evaporator heater.

In the construction shown in Figure 2 the container 71 differs only in form from that already described. The conventional electrical receptacle 20 is mounted on a member 100 which spans the mouth of the container immediately below the cover 90. In this construction both of the electrodes are floated, electrode 120 being mounted on a disk-like central float 121, and electrode 150 being mounted on an annular concentric float 151. The respective floats may be connected by the spacers 22, and the leads 23 and 24 may be used to connect the electrodes 120 and 150 respectively with the helically coiled and substantially non-resilient conductors 110 and 111 which are supplied with current from the receptacle 20. This gives an arrangement which is mechanically balanced so that insofar as the conductors 110 and 111 are subject to tension they will not unduly tilt the compound float which carries the electrodes. Like the device already described, the electrodes 120 and 150 will be uniformly spaced, and in this instance each electrode is of

such slight vertical extent as to assure the passage of substantially all of the current through the top stratum of the liquid only.

The violent ebullition which occurs upon the heating of such liquid to the boiling point, and the delivery through spout 80 of the vapors therefrom, will prevent incrustation until substantially all of the vaporizable material has been eliminated from the contents of the container 71.

The device shown in Figure 3 is very similar to that shown in Figure 1, but in this device all portions of the electrical apparatus are assembled upon the closure 91, which may be interchangeably positioned in any suitable vessel 72. The electrical receptacle 201 has connections to the tubular electrode 152 and through the helical conductor 110 to the spherical floating electrode 12 in the manner already described.

The device shown in Figure 6 may be used interchangeably with the float shown in Figure 5 in the apparatus shown in Figure 2. The electrodes 122 and 152 are tubular concentric helices, closed at their ends to comprise floats and maintained in spaced relation by the tie member 25 to which the successive turns of each helix are connected. At points substantially equidistant from the center I may provide terminals 230 and 240 to which the helical conductors 110 and 111 of Figure 2 may be secured.

The several helical conductors herein described have been referred to as being substantially without elasticity, but it will be understood that they have sufficient elasticity to resume their form after they have been tensioned by the downward movement of the float. They do not, however, have sufficient elasticity to have any appreciable lifting effect on the float, and in each instance the float will therefore preferably establish an electrical conducting path through the liquid in the apparatus in the stratum of the liquid immediately adjacent the surface.

I claim:

1. A method of vaporizing liquid for medicinal purposes, which method consists in passing a current through a stratum of said liquid immediately adjacent the surface thereof in sufficient intensity to heat such stratum to the point of vaporization independently of other portions of said liquid.

2. In a device of the character described, the combination with a tubular electrode and a float electrode reciprocable therein, of means spacing said electrodes, and means providing electrical connections respectively thereto.

3. In a device of the character described, the combination with a container for vaporizable liquid, of a relatively fixed tubular electrode having at least a portion arranged for immersion in the liquid in said container, a spherical electrode adapted to float on such liquid and positioned within the tubular electrode, means for spacing said electrodes, and means for providing electrical connections thereto.

4. In a device of the character described, a receptacle for medicinal liquids provided with a vent for the discharge of vapor in combination with means providing electrical connections mounted on said receptacle, a float comprising an electrode having a flexible connection with one of said electrical connections, and a complementary electrode encircling said float and fixed in said receptacle and provided with a conductor leading to another of said electrical connections, said complementary electrode having

dielectric means for guiding and positioning said float.

5. In a device of the character described, the combination with a receptacle for a liquid to be vaporized for medicinal purposes, said receptacle being provided with a vent for the discharge of the vapor of such liquid and having electrical terminals, of a float of convex form having its greatest diameter no lower than the level of the liquid upon which said float is buoyant, the float comprising an electrode and being provided with a flexible connection to one of said terminals, means providing a complementary electrode extending at least as high as the surface of liquid in said receptacle, and provided with a connection to the other of said terminals, whereby the current passing between said electrodes will be concentrated at the surface film of the medicated liquid in said receptacle.

6. In a device of the character described, the combination with a vented receptacle for a medicated liquid, said receptacle being provided with electrical terminals, of an electrode comprising a float buoyant upon the medicated liquid in said receptacle, and having a bottom upwardly convex toward a point at least as high as the level of such liquid, whereby the maximum wetted diameter of the float will be no lower than such level, and a second electrode having portions disposed about the periphery of said float at the liquid level in said receptacle, means supporting said second electrode from said receptacle, and means connecting said second electrode with one of said terminals, said second electrode being provided with an opening between said portions for the circulation between said electrodes of the liquid in said receptacle.

7. In a device of the character described, the combination with a vented container for vaporizable liquid, of a float having a submerged portion increasing in cross section to a maximum at least as high as the level of the liquid in said receptacle on which the float is buoyant, said float comprising an electrode, a second electrode having portions peripherally spaced about said float, and means connecting said portions in spaced relation to permit liquid circulation therebetween, electrical connections to the respective electrodes, and means for guiding said float whereby to maintain it in spaced position between the portions of the second electrode.

8. In a device of the character described, the combination with a vented receptacle provided with a filling opening and a closure therefor, of electrical terminals mounted on said receptacle, a float in said receptacle comprising an electrode removable through said opening and electrically connected with one of said terminals, a tubular electrode positioned on the bottom of the receptacle and encircling said float, and means connecting the tubular electrode with another of said terminals.

9. In a device of the character described, the combination with a vented receptacle provided with a filling opening and a closure therefor, of electrical terminals mounted on said receptacle, a float in said receptacle comprising an electrode removable through said opening and electrically connected with one of said terminals, a tubular electrode positioned on the bottom of the receptacle and encircling said float, and means connecting the tubular electrode with another of said terminals, said tubular electrode being apertured for the circulation of liquid therethrough, and

being provided with spaced means for the guidance of said float.

10. In a device of the character described, the combination with a receptacle having an aperture provided with a cover and an open vent, of a pair of electrodes individually receivable through said aperture, one of said electrodes comprising a stationary element mounted on the bottom of the receptacle and provided with guide means, and the other of said electrodes comprising a float guided by said means to rest upon the surface of the liquid in said receptacle, a bridge spanning the opening of said receptacle, a flexible electrical connection to said float supported by said bridge, and a separate electrical connection to the first mentioned electrode.

11. In a device of the character described, the combination with a receptacle provided with an

opening, a closure for said opening, and an open vent, of means spanning said receptacle immediately beneath said closure, a pair of electrodes receivable into said receptacle through said opening, at least one of said electrodes comprising a float, and electrical connections to said electrodes, at least one of said connections being flexibly expansible and supported by means spanning the opening of said receptacle.

12. In a device of the character described, the combination with a receptacle, of an electrode float therein, a second electrode having portions spaced from each other about the periphery of said float, means for suspending the second electrode from the receptacle, and electrical connections to the respective electrodes.

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