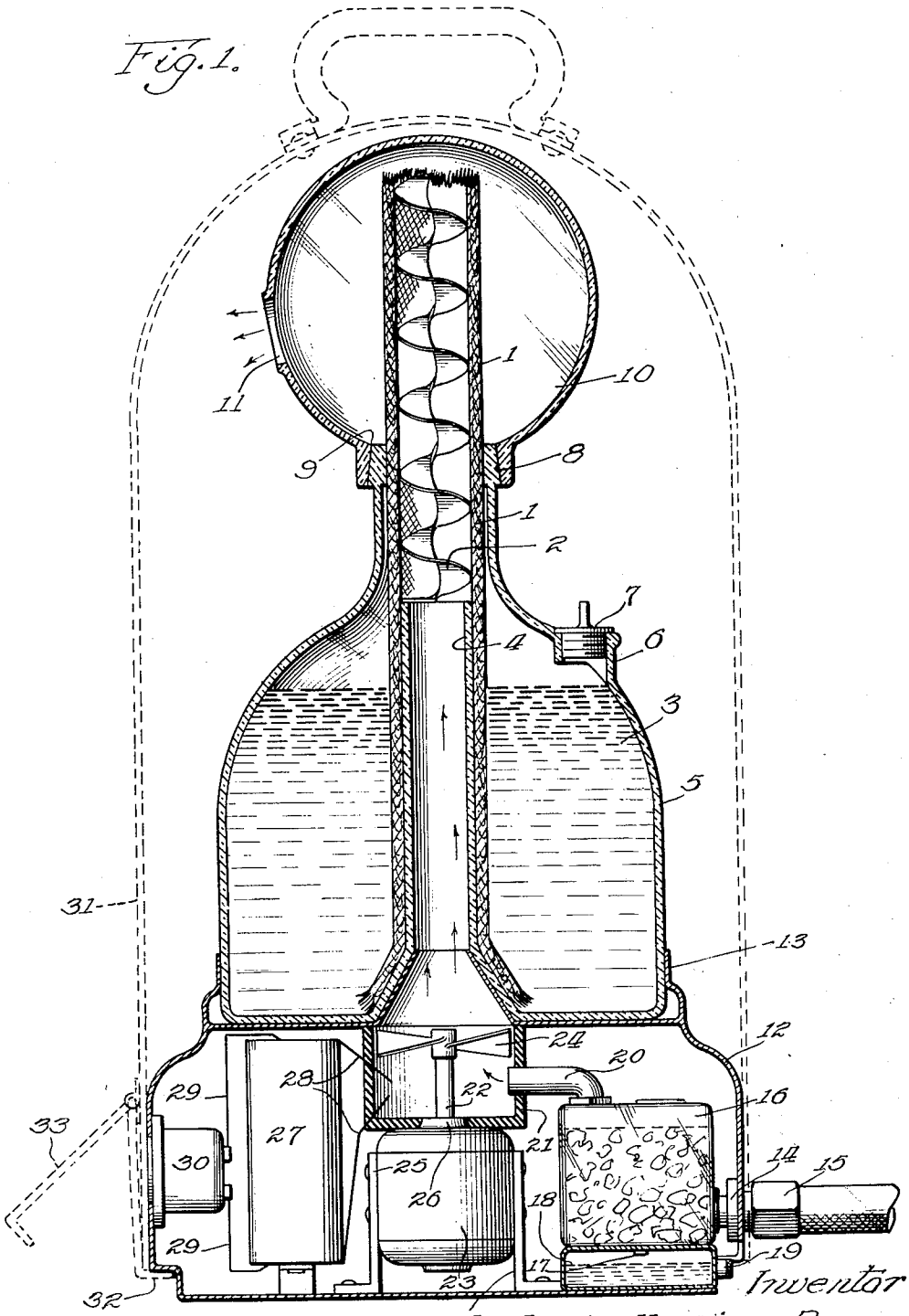
Aug. 29, 1933. L. H. ROGERS 1,924,805

APPARATUS FOR THE PRODUCTION OF GASEOUS OZONIDES

Filed Oct. 23, 1930 2 Sheets-Sheet 1

Fig. 1.



Witness
Arthur M. Franke.

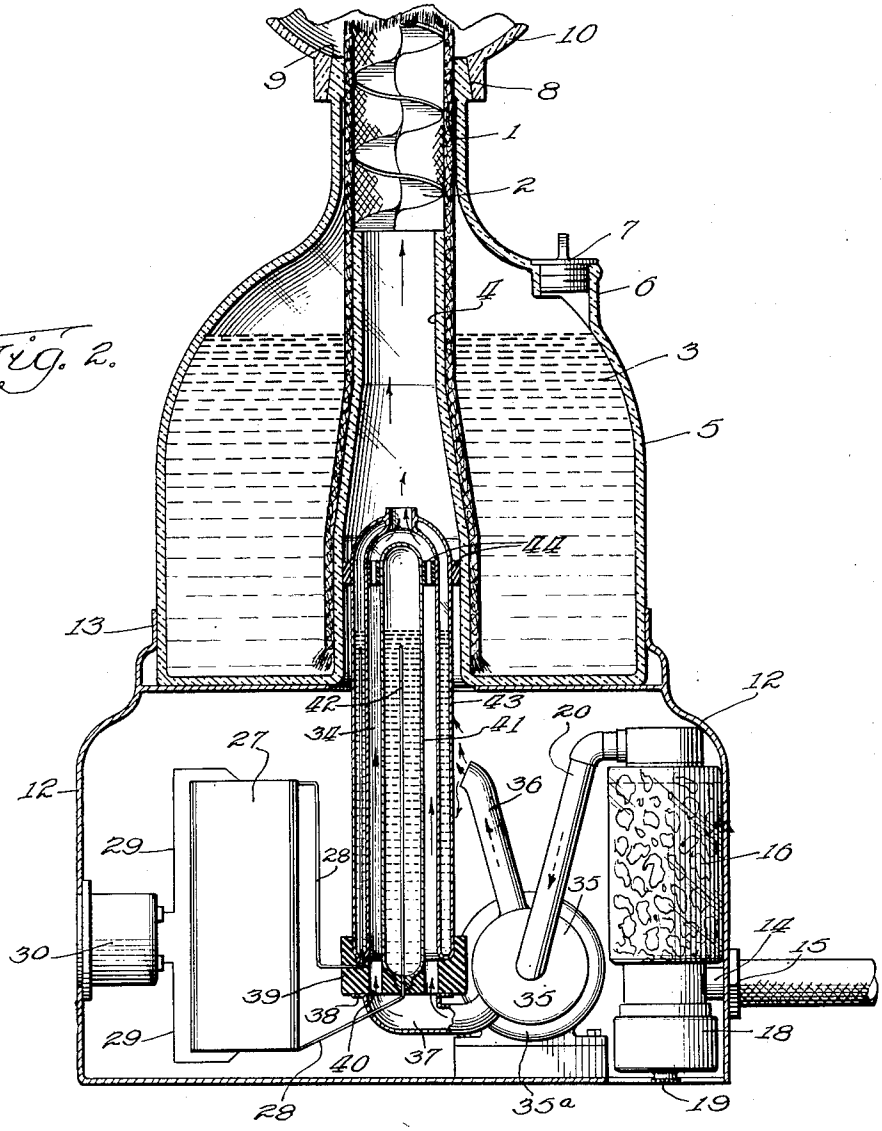
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Fig. 2.



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UNITED STATES PATENT OFFICE

1,924,805

APPARATUS FOR THE PRODUCTION OF GASEOUS OZONIDES

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Application October 23, 1930. Serial No. 490,726

11 Claims. (Cl. 23—282)

My invention relates to an improved method of producing a germicidal respirable gas such as gaseous ozonide.

The main object of my invention is to produce apparatus of high efficiency which is self-regulating, compact in form, and portable, and further to provide an improved method of commingling the constituent materials; to provide a removable, absorbent wick or the like; to provide convenient means for holding the wick and for saving the by-product found on the wick; to provide an improved container for the hemiterpene or the like; and to provide in compact portable form means for drying the air admitted; means for forcing circulation of the dried air, and for the production of ozone from an air stream preferably dry.

One of the novel features of my invention is the method of commingling the hemiterpenes with the ozone, which comprises a wick or the like, the lower end of which is immersed in the liquid to be vaporized, and the upper end forms an extensive surface saturated with the liquid over which surface ozone in a dry air stream is forced, the wick being positioned to form a closure between the vapor and the liquid in the reservoir. The wick is mounted on an open spiral form and is conveniently installed and removed. The used wicks are the source of a valuable pharmaceutical product, namely ozonated pinene pitch.

An illustrative embodiment of my invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical section of the complete apparatus showing the housing in dotted lines.

Fig. 2 is a vertical section with upper parts broken off showing an ozone generator tube installed.

In the apparatus as shown in Fig. 1, a wick 1 of absorbent material is partially mounted on an open spiral form 2. The lower end of the wick is normally immersed in the pinene solution 3, and telescopes the inner tubular portion 4 of the reservoir 5. The reservoir 5 has a filling neck 6 provided with a stopper 7. The main neck of the reservoir 5 has a ground taper face 8, which coacts with the opening 9 of the ball head 10, which is also provided with a side outlet 11.

The container or reservoir 5 is seated on a base section 12, which has flanges 13 engaging the lower rim of the reservoir 5. The base section 12 has an air inlet 14 and a hose connection 15. The air inlet is directly connected with a drier 16 containing calcium chloride or the like. The drier 16 has a gravity outlet 17 in the bottom, through which the moisture taken out by the calcium chloride is deposited in a receptacle 18. The receptacle 18 has a screw cap 19 permitting the removal of the accumulated water from the receptacle. The air drier 16 is provided with a conduit 20 which connects with the fan box 21. Into the center of the fan box projects a vertical shaft 22 of an electric motor 23, and the shaft is equipped with a fan 24. The eletric motor is centered and held in position by brackets 25, and the fan box 21 is centered on the shaft bearing 26 of the motor 23. Enclosed in the base section is a transformer 27 having output leads 28—28 which terminate as electrodes inside the fan box 21. The current input leads 29—29 of the transformer are connected to an electric receptacle 30. The electric receptacle 30 is electrically connected with the electric motor 23 by wires not shown.

A convenient carrying case 31 or housing cover is shown in dotted lines. The removable carrying case is held in position by symmetrically placed flanges 32 and mounted on snap hinges 33. An alternative form is shown in Fig. 2, with the cover detached, and with the same numerals indicating like parts.

Referring to Fig. 2, an ozone generating tube 34 occupies the central portion in the base section 12 and the upper end of the ozone generator projects into the inner tubular portion 4, which forms a central air passage through the fluid container 5. Between the ozone generator 34 and the drier 16 is mounted an enclosed fan 35 driven by an electric motor 35*a*. The conduit 20 connects the drier 16 with the inlet to the fan 35. Two delivery outlets 36 and 37 are provided from the fan casing. The outlet 36 delivers air to the outside of the ozone generator 34. The outlet 37 delivers air to the center of the lower section 12 and has an integral horizontal flange 38 upon which is fastened a block 39 having air passages 40. The upper surface of the block 39 is shaped to form a seat for the ozone generator tube 34. The ozone generating tube is constructed of two separate pieces. The central portion 41 comprises a round glass tube having an etched inner surface and containing an electrode 42 which is fused in the wall of the glass tube. The central electrode 42 is completely immersed in an electrolyte, and the tube is hermetically sealed. The electrode 42 is electrically connected with one of the output leads 28 of the transformer 27. The outside section 43 of the ozone generator 34 is shaped like an open top bell jar and provided

with etched double walls. An electric lead 28, extending as an electrode, is fused in between the walls and completely immersed in electrolyte. In sealing the sections 41 and 43, enough free space is left to take care of the expansion.

The spacing relation between the sections 41 and 43 of the ozone generator 34 is provided by the seat in the block 39 and spacers 44 which maintain clearance between sections 42 and 43 and the inside of the center air passage through the reservoir.

In operation, the reservoir is filled with pinene or the like, substantially to the height of the filling neck. A circular wick is slipped over an open spiral form which form enters the wick for about one-half its length. The other end of the wick is telescoped over the inner tubular portion of the reservoir until the spiral rests on the top of the inner tube. The spiral acts as a support for the upper portion of the wick and insures contact between the rising gases and the saturated wick. The web of the open spiral also forms a neat and convenient way of handling the wick without touching the wick itself. After the wick has been adjusted in correct operating position, the ball head is placed on the taper flange of the reservoir. The air inlet tube is arranged to take air from any desired source. Electric connection is made with the electric receptacle 30 from any ordinary alternating current house circuit. Since the electric motor and transformer are connected in parallel relation, both will operate. The motor forces a current of air through the drier and delivers the dry air to the ozonizer connected to the transformer terminals. In one case, Fig. 1, the ozone is produced in the fan box, and in the other case, Fig. 2, the dry air is forced through and around a special ozone generator, preferably sealed hermetically. In both cases the dry air and ozone are forced up through the central passage in the reservoir, where commingling with pinene takes place through intimate contact with the pinene saturated wick. The swirling action of the currents of air and ozone in following the contours of the open spiral produces the rapid formation of pinene vapor, and the chemical combination with the ozone forms an optically visible pinene ozonized product. When the vapors pass out of the top of the wick into the ball, they are still in the presence of the outside of the wick, which is also saturated with pinene. Experience has proven that the saturated wick is much more satisfactory and more efficient and easier to handle and adjust than the evaporating tanks formerly used. When the wick method is used no definite level of pinene in the reservoir is necessarily maintained. The active surface of the wick is substantially the same whether the reservoir is full or nearly empty.

When the wick surface is once properly adjusted, no further regulation is necessary. This eliminates flow valves and by-passes as a part of the construction. A proper wick adjustment is made in the factory, and no further adjustment is required by the user. In operation, a by-product is obtained which is deposited on the wick. This by-product is considered a valuable pharmaceutical product, and can easily be removed, since it is deposited on the wick. Since the wick forms a closure between the vapor and the reservoir, the use of the wick eliminates the annoying problem of frequently cleaning the usual evaporating tank.

Experience has proved the peculiar relations between the pinene and ozone, in that ozone forms a chemical bond with the liquid pinene. The chemical combination of ozone and vapor of pinene (two invisible vapors), results in a visible product of bluish-white appearance. This product, called "vapor" for convenience, is composed of myriads of solids so minute and light as to float lazily in an ordinary atmosphere. These "solids" are separate and distinct molecules of the radical of the terpene group (C_5H_8) after combination with ozone (O_3). The ozone gives the combined molecule its color and is held by chemical encapsulation, rendering the caustic properties of ozone not less potent but more sluggish. Ozone, per se, a most powerful oxidizing agent, cannot be inhaled in strength. Its caustic properties are so severe, its action is immediate and destructive in the presence of moisture such as provided by the surface of the respiratory tract, but when encapsulated in a terpene molecule the resultant product becomes not only visible but pleasantly respirable, without destroying the caustic properties of the ozone which may be available under conditions which provide a greater degree of chemical attraction, which is the condition when the combined molecule is $2(C_5H_8)O_3$.

My invention comprises a pinene saturated wick of a predetermined length and body which provides a pick-up offer of pinene vapor to the ozone, in basic form. The entire combining surface of the wick designed to be exposed to the action of the ozone, will always be in a saturated condition as long as any pinene remains in the container. The creation or presence of the pinene vapor does not depend on the presence of an air current. The ozone molecule supply predetermined to be of a certain quantity, will, at all times, come into contact with a sufficient number of pinene molecules for absorption, and with these conditions fixed, no free ozone can be emitted from the top globe into the atmosphere to be inhaled.

I claim:

1. In apparatus for producing gaseous ozonides, a reservoir for pinene, a wick in said reservoir for absorbing pinene, a passage formed by said wick above the liquid level in said reservoir, and means for flowing ozonized air through the passage formed by said wick.

2. In apparatus for producing gaseous ozonides, a reservoir for a liquid, a wick in said reservoir for absorbing liquid, a passage formed by said wick above the liquid level in said reservoir, and means for flowing ozonized air through the passage formed by said wick.

3. In apparatus for producing gaseous ozonides, a reservoir for pinene, a wick extending into the reservoir and arranged to dip into said pinene, a passage defined by said wick above the liquid level in said reservoir, means for flowing ozonized air over that portion of the wick above the liquid level of the reservoir.

4. In apparatus for producing gaseous ozonides, a reservoir for pinene, a wick dipping into and forming a closure to said reservoir, a portion of said wick extending above said reservoir and arranged to become saturated with pinene, a passage formed by said wick and extending above said reservoir, means to force an air stream through said passage, means to ozonize said air stream, and means for causing said ozonized air stream to contact intimately the portion of said wick which extends above said reservoir.

5. In apparatus for producing gaseous ozonides, a reservoir for pinene, a wick dipping into

and forming a closure for said reservoir, a portion of said wick extending above said reservoir and forming a passage having its walls coated with pinene, a fan propelling an air stream through said passage, a motor driving said fan, means to ozonize said air stream, a drier interposed in said air stream, and means for contacting said ozonized air stream with the pinene coated portion of said wick which extends above said reservoir.

6. In apparatus for producing gaseous ozonides, a reservoir having an inner tube therein, said reservoir containing a liquid, an open spiral, a wick threaded on said open spiral and extending over the inner tube and into said liquid, a base section supporting said reservoir and adapted to encase an ozone generator, and means to force an air stream through said ozone generator and through the passage formed about said open spiral.

7. In apparatus for producing gaseous ozonides, a reservoir for pinene having an inner tube through its center, an open spiral above said tube, a wick threaded on said open spiral and extending over the inner tube into said reservoir, a base section supporting said reservoir and encasing an ozone generator, means for forcing a dry air stream through said ozone generator and through the passage formed about said open spiral.

8. In gaseous ozonide apparatus, an ozone generator comprising a hermetically sealed central element having an electrode immersed in an electrolyte in an etched glass container with a fused in terminal, a hermetically sealed tubular outside element with double walls having an electrode immersed in an electrolyte in an etched glass container with a fused in terminal, and means for holding said elements to form an air channel between therein.

9. In gaseous ozonide apparatus, an ozone generator comprising a central hermetically sealed etched glass container having an electrode immersed in an electrolyte therein, a terminal on said electrode fused into said container, a belljar shaped glass container with double walls surrounding said central container and having an electrolyte hermetically enclosed between said double walls, an electrode immersed in said electrolyte and having a terminal fused into said surrounding container, and means for holding said containers in concentric relation, said belljar-shaped container having a central passage through its dome to permit the flow of air between said concentric containers.

10. In apparatus for producing gaseous mixtures, a liquid reservoir having an inner tube extending therein, an open spiral, a wick threaded on said open spiral and extending over said inner tube into said reservoir, a base section supporting said reservoir, said base section housing means for forcing an air stream through said inner tube and through the passage formed about said open spiral.

11. In apparatus for producing gaseous mixtures, a reservoir, an inner tube extending upwardly through said reservoir, an open spiral above said tube, a wick threaded on said open spiral and extending over said inner tube into said reservoir, said wick forming a closure between the said inner tube and said reservoir, and a base section supporting said reservoir, said base section housing means for forcing an air stream through said inner tube.

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