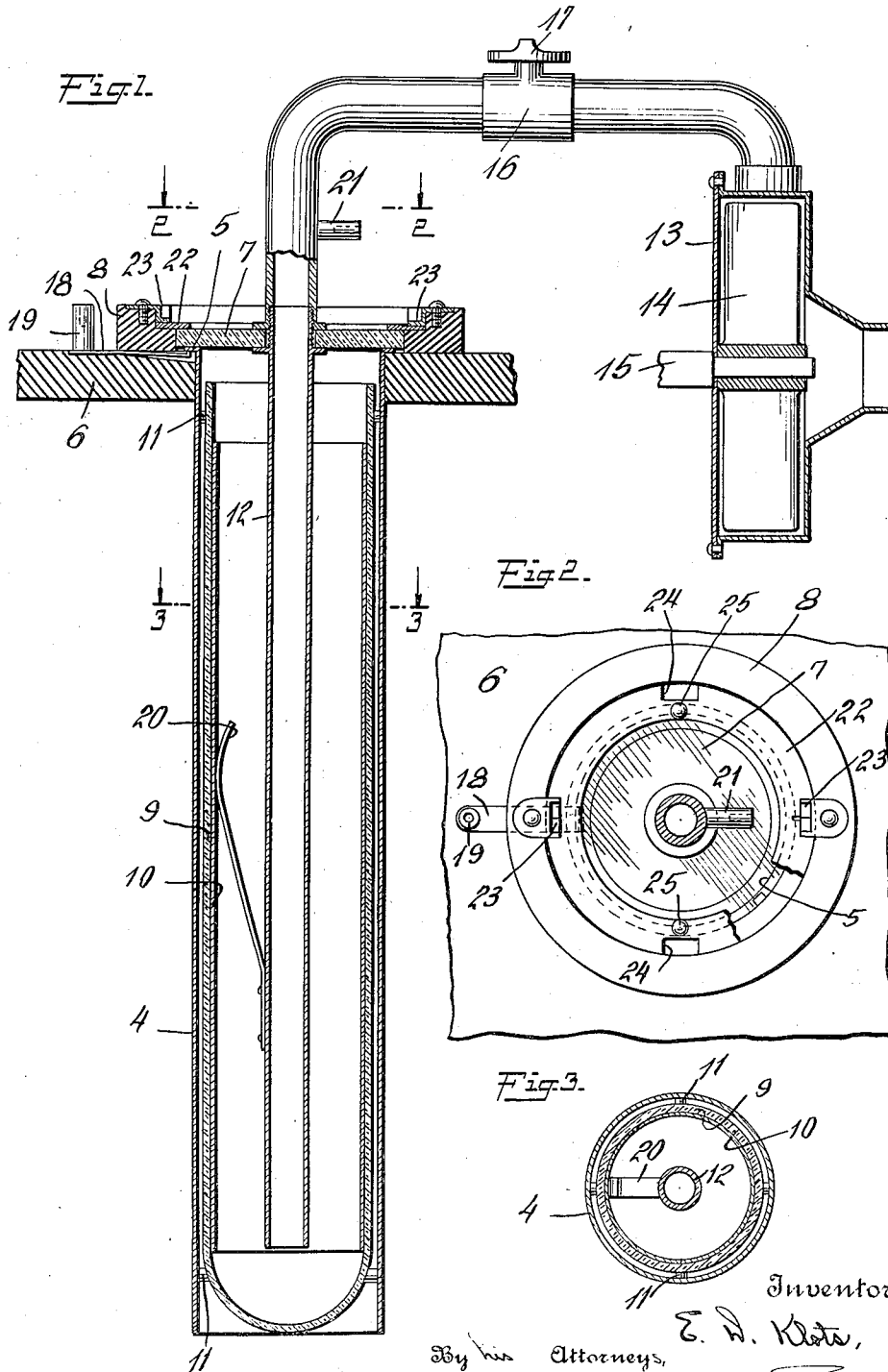


E. D. KLOTS.
OZONIZER.
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UNITED STATES PATENT OFFICE.

EPHRAIM D. KLOTS, OF NEW YORK, N. Y.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EPHRAIM D. KLOTS, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Ozonizers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to ozonizers of the type employing a discharge of a high tension, electric current across a narrow gap between two electrodes. The object of the invention is to provide an improved construction for an ozonizer of this type whereby simplicity of construction, ease of assembly and low cost of manufacture are attained, and in which provision is made for the circulation of air in such a way as to guard against over-heating of the apparatus. The invention is useful in ozonizers for various purposes, but is of special utility in medicinal apparatus, including an ozonizer and a receptacle for a substance like pinene, with which ozone combines to form a pinene ozonid vapor.

I have illustrated the preferred embodiment of the invention in the accompanying drawings, in which Figure 1 is a central, vertical section of the ozonizer; Fig. 2 is a plan view, and Fig. 3 is a transverse section on line 3—3 of Fig. 1.

Referring to these drawings, the ozonizer is built up upon a tube 4 which may be a tube of metal such as aluminum serving as one of the electrodes of the ozonizer. If desired, however, this tube may be made of some moldable, insulating material such as bakelite and may have a sheet of metal applied to the interior thereof. The tube, whether of metal or of insulating material, is provided with a flange 5 at its upper end which rests upon a support 6 to sustain the entire ozonizer in position. The lower end of the tube is open but the upper end is closed by a disk 7 of insulating material, preferably glass. This disk bears upon the upper surface of the flange 5 on tube 4, which flange bears upon the upper surface of the support 6. Preferably, a ring 8 of insulating material is mounted upon the support 6 as shown, and the glass disk 7 is of such size that it fits snugly within the ring 8.

Within the tube 4 is a glass cylinder 9, on the interior of which is a metallic film or

coating 10. This cylinder or bottle is mounted within the tube 4 with its cylindrical wall separated from the wall of the tube by a narrow space which may be about one-sixteenth of an inch wide. To facilitate accurately positioning the cylinder 9 within the tube 4, the latter is provided with a plurality of internal projections or spacers 11. The lower series of spacers 11 coact with the lower closed end of the cylinder 9 so as to limit the downward movement of the cylinder through the tube 4 and both series of projections 11 serve to position the cylinder accurately so that it is concentric with the tube 4. The narrow space between the cylinder and tube is therefore of the same width at all points and the projections 11 of the two series are spaced apart so that they do not restrict the flow of air through this narrow space between the tube and cylinder.

The glass disk 7 serves as a closure for the upper end of the tube 4. The end of the cylinder 9 adjacent to this closed end of the tube is open, as shown in the drawing. The opposite end of the cylinder is closed, as stated above, and the end of the tube adjacent to this closed end of the cylinder is open. Provision is made for supplying air to the interior of the cylinder at a point adjacent to the closed lower end of the cylinder. For this purpose a metallic tube 12 is provided passing through a central opening in the glass disk 7 and extending down entirely through the cylinder 9 to a point adjacent to the closed lower end thereof. Provision is made for guarding against the escape of air around the tube 12 at the point where it passes through the disk 7. This is preferably done by making the tube 12 in two parts which are joined together by coacting threads at the disk 7, flanges being provided upon the two parts of the tube for coaction upon opposite sides of the disk as shown. The tube 12 leads into the ozonizer from a blower, shown diagrammatically as consisting of a casing 13 having a wheel 14 therein which is mounted upon the motor-driven shaft 15. In the tube is a valve 16 for regulating the freedom of flow of air, this valve being provided with an operating handle 17. The tube 4, preferably made of aluminum, constitutes one electrode of the ozonizer. Electrical connection is made to it preferably by providing a leaf spring 18 in a recess in the support 6 so that the end of the spring will be engaged by the flange 5

on the tube 4 when the tube is inserted in position. This spring 18 has a stud 19 on it adapted to be engaged by a suitable connecting device on the end of the wires extending from the source of supply. The other electrode consists of the film or coating 10 of metal upon the interior of the glass cylinder or bottle 9. This film may be a film of metal applied to the interior of the cylinder in the form of a paint. Preferably, however, the film consists of a thin sheet of metal, as aluminum, rolled to a cylindrical form and then inserted within the open end of the cylinder 9. The spring tension of the metal will serve to hold the sheet in position within the cylinder 9 closely against the glass wall of the cylinder. Electrical connection is made to this film or sheet 10 through the metal tube 12. For this purpose a spring arm 20 is secured upon the tube 12 and bears upon the inner surface of the coating or sheet 10. On the tube 12 above the disk 7 is a stud 21 to receive a connector on the other lead wire of the circuit. In order to hold the parts rigidly in position and prevent escape of air around the disk 7, a clamp is provided for holding the disk securely and pressing it down upon the flange 5 of the tube 4. This clamp may be in the form of a metallic ring 22, which, when not under restraint, assumes a position in which two diametrically opposite points thereon are displaced in the direction of the action of the ring from two other diametrically opposite points equally distant therefrom. The ring 8 has two brackets 23 secured thereto at diametrically opposite points and the ring 22 has notches 24 therein through which the ends of the brackets 23 may pass when inserting the clamping ring in position. These notches 24 are located at the low points of the clamping ring and adjacent to them are handles 25 by which the ring may be rotated about its axis.

When assembling the parts, the tube 4 is lowered through the opening in the support 6 until its flange 5 engages the contact 18, depresses the latter, and then settles upon the upper surface of the support 6. The cylinder 9 with its electrode 10 is then lowered into the tube 4 until its lower end is arrested and positioned by the spaced projections 11. The two sections of the tube 12 are then secured together in coaction with the disk 7 and the tube is then inserted within the cylinder 10 until the disk 7 enters within the ring 8 and bears upon the surface of the flange 5. The dished clamping ring 22 is then lowered within the ring 8 until the notches 24 pass over the ends of the brackets 23 and then the ring is turned by means of the handles 25 until the high points on the ring are carried under the ends of the brackets 23 and are

depressed thereby, thus causing the clamping ring to press upon the upper surface of the disk 7 and force the latter into hard contact with the flange 5. The connectors on the ends of the lead wires are then applied to the ends of the studs 19 and 21 and the apparatus is in condition for operation. It will be appreciated that the apparatus may be disassembled for cleaning very readily by merely disconnecting the wires, turning the clamping ring 22 through 90° so as to permit its withdrawal upwardly around the tube 12 and then withdrawing one or more of the parts 12, 9, and 4.

When the apparatus is in operation, air is supplied by the blower 13 through the tube 12, its flow being regulated by the valve 16. The air so supplied takes a tortuous path in flowing through the ozonizer. It passes downwardly through the tube 12 to the lower closed end of the cylinder 9 and then flows upwardly through the cylinder to the upper open end thereof. Then it passes downwardly through the narrow space between the cylinder and the tube 4 to the lower open end of the tube 4. This end of tube 4 leads to the point of use of the ozone and it may be contracted as may be desired for the purpose of establishing and maintaining a pressure. While the air is flowing through this passage, high tension alternating current is supplied to the wires connected to the studs 19 and 21. The current flows from the stud 21 through tube 12 and arm 20 to the film 10 on the interior of the cylinder 9 and then passes across the gap between the electrodes 10 and 4 and then out through the contact 18 and stud 19. The high tension passage across the gap between the electrodes 10 and 4 results in the generation of ozone and the current of air through this space carries the ozone generated out through the discharge outlet of the apparatus and continually renews the supply of air for the generation of ozone. Furthermore, the current of air passing back and forth through the ozonizer through the tortuous passage provided to direct its flow, takes up the heat developed during the generation of ozone and carries it off at such a rate as to prevent overheating of the apparatus.

It will be noted that the ozonizer as a whole is of simple construction and consists of but few parts which may be readily assembled. When assembled, all of the parts are held rigidly in position and are protected by the tube within which all of the delicate parts are mounted.

I claim:

1. An ozonizer comprising a tube the interior of which is of metal constituting one electrode, a cylinder of insulating material detachably supported entirely upon the tube concentrically within the same but spaced

therefrom, a metallic coating upon the interior of the cylinder constituting a second electrode, the tube being closed at one end and open at the other and the cylinder being closed at the end thereof adjacent to the open end of the tube and open at its opposite end, means for making electrical connection to the two electrodes and means passing through the closed end of the tube and the open end of the cylinder for supplying air to the interior of the cylinder; substantially as described.

2. An ozonizer comprising a tube closed at one end and open at the other and having the interior thereof of metal which constitutes one electrode, a cylinder of insulating material within and detachably supported entirely upon the tube and closed at the end adjacent to the open end of the tube and open at its opposite end, a coating of metal on the interior of the cylinder constituting the second electrode, a second tube passing through the closed end of the first tube and the open end of the cylinder and extending through the cylinder to a point adjacent to the closed end thereof, means for supplying air through the second tube, and means for making electrical connection to the two electrodes; substantially as described.

3. An ozonizer comprising a tube closed at one end and open at the other and having the interior thereof of metal which constitutes one electrode, a plurality of spaced projections upon the interior of the tube near both ends thereof, a cylinder of insulating material within the tube and having a closed end which engages the projections at the lower end of the tube to support the cylinder within the tube, the projections at the lower end and those at the upper end of the tube serving also to position the cylinder concentrically within the tube, a coating of metal on the interior of the cylinder constituting a second electrode, a second tube passing through the closed end of the first tube and the open end of the cylinder and extending through the cylinder to a point adjacent to the closed end thereof, means for supplying air to the second tube, and means for making electrical connection to the two electrodes; substantially as described.

4. An ozonizer comprising a tube, the interior of which is of metal constituting one electrode, a cylinder of insulating material detachably supported entirely upon the tube

concentrically within the same but spaced therefrom, a metallic coating upon the interior of the cylinder and constituting a second electrode, the tube being closed at one end and open at the other end and the cylinder being closed at the end thereof adjacent to the open end of the tube and open at its opposite end, a metallic tube passing through the closed end of said tube and the open end of the cylinder to a point adjacent to the closed end of the cylinder, a sliding contact piece for establishing electrical connection from said metallic tube to the second electrode, means for making electrical connection to the metallic tube and to the first electrode, and means for supplying air through said metallic tube; substantially as described.

5. An ozonizer comprising a tube open at its ends and having the interior thereof of metal which constitutes one electrode, a closure for one end of the tube, means for clamping the closure to the end of the tube, a cylinder of insulating material mounted concentrically within the tube and closed at the end adjacent to the open end of the tube and open at its opposite end, a coating of metal on the interior of the cylinder constituting the second electrode, a second tube passing through said closure for the first tube and the open end of the cylinder and extending through the cylinder to a point adjacent to the closed end thereof, means for making electrical connection to the two electrodes, and means for supplying air through said second tube; substantially as described.

6. An ozonizer comprising a tube open at its ends and having the interior thereof of metal which constitutes one electrode, a disk closing one end of the tube, a dished clamping ring for holding the disk in position upon one end of the tube, members with which the clamping ring coacts, a cylinder of insulating material mounted concentrically within the tube and open at its end adjacent to said disk but closed at the other end, a coating of metal on the interior of the cylinder constituting the second electrode, means for making electrical connection to the two electrodes, and means for supplying air to the interior of the cylinder at a point adjacent to the closed end thereof; substantially as described.

In testimony whereof I affix my signature.
EPHRAIM D. KLOTS.