

W. O. FREET.
 OZONE GENERATOR.
 APPLICATION FILED SEPT. 9, 1912.

1,157,859.

FIG. 3

Patented Oct. 26, 1915.

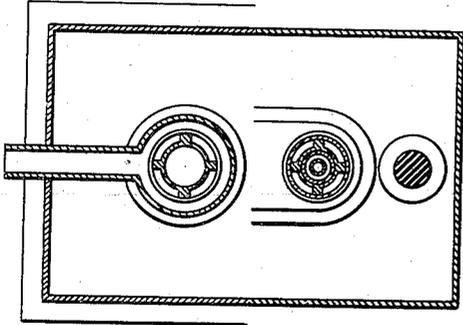
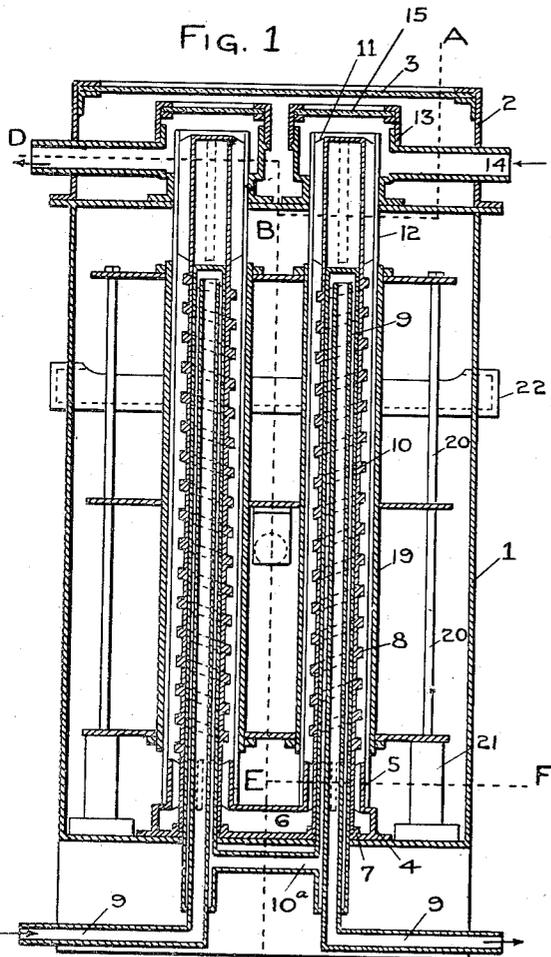
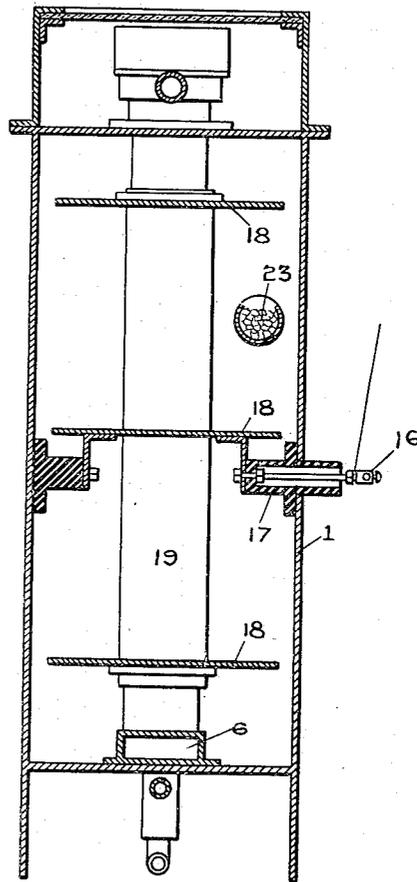


FIG. 2



WITNESSES: C

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UNITED STATES PATENT OFFICE.

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OZONE-GENERATOR.

1,157,859.

Specification of Letters Patent.

Patented Oct. 26, 1915.

Application filed September 9, 1912. Serial No. 719,295.

To all whom it may concern:

Be it known that I, WILLIAM O. FREET, a citizen of the United States, residing in Hackensack, county of Bergen, State of New Jersey, have invented certain new and useful Improvements in Ozone-Generators, of which the following is a description.

My invention relates to ozone generators in which ozone is generated by streaming discharges of high potential electricity between electrodes cooled by means of ammonia, brine or other suitable cooling fluid.

One of the objects of my invention is to provide a generator of this kind which shall be strong and durable and from which a high degree of efficiency may be obtained by certain improvements in the cooling means and in the electrodes.

A further object of my invention is to prevent the short-circuiting of the apparatus by moisture.

Other objects are to simplify the construction, render it less liable to derangement and safer to use.

In the drawings accompanying my specification I have shown at Figure 1 a vertical section of my improved ozone generator; at Fig. 2 a vertical section taken at right angles to Fig. 1 through the line A B C. In Fig. 3 I have shown a horizontal cross-section taken on the line D E F.

Referring to the drawings in which I have shown the preferred form of my improved ozone generator, it will be seen that it consists of an outer shell or box 1, which box is as nearly air-tight as practicable, and is electrically grounded.

At the top of box 1 is located a cover 2 having a glass top 3 to permit inspection of the parts without opening the box. Cover 2 is attached to box 1 by any suitable means.

Resting upon the bottom of box 1 is a supporting member 4 having formed therein supporting tubes 5 and pipe 6 connecting tubes 5 in any desired order. Supporting member 4 also is provided with flanges 7 to support the electrode 8.

Passing through supporting member 4 and located within the hollow electrode 8 are pipes 9 and 10 carrying the cooling fluid. Pipe 10 fits closely within the electrode 8. Pipe 9 is mounted concentrically with pipe 10 and is of smaller diameter, thus forming a duct between pipes 9 and 10 through

which the cooling fluid may circulate. Electrode 8 is preferably formed with a spiral groove so as to produce a large area of discharge throughout its length and extends from supporting member 4 upward to a spider 11 located at its top.

Supported by supporting member 4 and surrounding electrode 8, but slightly removed from it, is the dielectric tube 12, preferably of mica or similar material, which also extends from supporting member 4 upward to meet the spider 11 located at the top of electrode 8. The distance between dielectric tube 12 and electrode 8 is determined by the supporting tubes 5, flanges 7 and spider 11. Dielectric tube 12 passes through the upper end of box 1 into a dielectric holder 13 which rests upon the top of box 1 and closely encircles dielectric tube 12. Dielectric holder 13 is formed with pipe 14 for allowing air to be supplied to the generator, or ozone to be drawn off therefrom and with a glass sight cap 15 for permitting the operator to view the interior of the generator while it is in operation.

When it becomes necessary to clean my apparatus this may easily be done by removing the cover 2 and sight cap holder 15. Spider 11 may then be taken out and dielectric tube 12 and electrode 8 removed and cleaned. Electrodes 19 are held in place by their supporting frame so that the parts may be easily replaced.

The high-tension current is brought into the generator through an inlet plug 16 which passes through an insulating bushing 17 held in the wall of box 1 and is connected to a frame composed of a plurality of flat plates 18 in which the tubes 19, which constitute the other electrodes and which surround the dielectric tube 12, are mounted. Plates 18 are held together by means of rods 20, and the entire structure is supported upon insulators 21 which may be made flexible if desired, so that it may readily move within box 1 or expand with the heat generated without exerting any strain upon the dielectric tube 12, which, being constructed of mica or similar material, is relatively weak.

In prior ozone generators a great deal of trouble has been experienced through the collection of moisture at the bottom of the apparatus, causing short-circuits, and to ob-

viate this I have inclosed the entire apparatus in the air-tight box 1, and have provided a drying element consisting of a tube 22 which is tightly fitted in box 1. This tube has a portion of its walls cut away and contains chlorid of calcium or a similar drying material 23 which absorbs any moisture which may be present in box 1. Short-circuiting through moisture is also obviated by the arrangement of the air inlet whereby the air is admitted to the space between the dielectric and electrode 8 and not outside of the electrodes as in prior generators.

The operation of my improved device is as follows: It will be understood that the high-tension current is brought through plug 16 so that tubes 19 constitute one end of the circuit. Box 1 is grounded, and electrodes 8, being connected thereto, constitute the other end of the circuit. It will be noted that the dielectric 12 intervenes between these two electrodes and is located outside of the spirally-grooved electrode 8. Air enters the apparatus through inlet port 14 as indicated by the arrow and passes downward through spider 11 between electrode 8 and dielectric 12 of the right hand system of electrodes. It then passes through passage 6 formed in supporting member 4 and upward between the inner electrode and dielectric of the left hand system of electrodes, and out through the left hand orifice, as indicated by the arrow. While passing between the electrodes it is subjected to the effect of the discharge across the gap, the electrodes being spirally grooved, producing an extremely large discharge area, and is therefore changed into ozone and leaves the apparatus as such.

The cooling fluid is fed to the machine in the opposite direction from the air so that the hottest air or ozone will come in contact with the cooling fluid first. The cooling fluid enters through left-hand pipe 9 as indicated by the arrow and flows upward through the inner tube located in the left-hand system of electrodes, out over its top, and downward between the inner tube 9 and the outer tube 10. The cooling fluid is thus brought into direct contact with the electrode and is therefore in position to exert its maximum effect. Placing the cooling tubes inside the electrodes permits the outside of electrode 8 to be used as the discharge area, which greatly increases the discharge area for an electrode of a given size. The cooling fluid then passes down and through passage 10^a, upward in the space between the right-hand tube 9 and the tube 10 of the right-hand system of electrodes, thence downward through tube 9 and out, as indicated by the arrow.

While I have shown two systems of electrodes and cooling pipes only, it should be understood that the number of such systems may be multiplied indefinitely and that they

may be connected together in different manners. I am aware that many modifications may be made in the device I have shown and described, and I therefore do not desire to be confined to that exact form.

What I claim and desire to secure by Letters Patent is:

1. In an apparatus for the production of ozone, a discharge electrode having a spirally-grooved surface.

2. In an apparatus for the production of ozone, an air-tight box inclosing the entire apparatus, a tube removably inserted in said box and having a portion of its walls cut away, and a substance adapted to absorb moisture in said tube.

3. In an apparatus for the production of ozone, an air-tight box inclosing the entire apparatus, a stationary electrode and a removable electrode surrounding the stationary electrode.

4. In an apparatus for the production of ozone, an air-tight box containing a stationary electrode having a spirally-grooved surface and a removable electrode surrounding the stationary electrode.

5. In an apparatus for the production of ozone, a dielectric tube and a cap closely surrounding said tube, said cap being provided with an orifice and a transparent cover.

6. In an apparatus for the production of ozone, an outer electrode in the form of a tube, an inner electrode concentrically arranged with the outer electrode, said inner electrode having a spirally-grooved surface, a dielectric interposed between the electrodes, and a tube for the introduction of cooling fluid concentrically mounted within the inner electrode and of a sufficiently small diameter to allow a space between it and the walls of the inner electrode.

7. In an apparatus for the production of ozone, a plurality of sets of concentrically mounted electrodes each in the form of a tube, a cooling fluid pipe concentrically mounted within each set of electrodes and of a sufficiently small diameter to allow a space between the inner electrode and the pipe, a member adapted to connect the spaces between the outer and inner electrodes of the various sets and a member adapted to connect the spaces between the cooling fluid pipes and the inner electrodes of the various sets.

8. In an apparatus for the production of ozone, a plurality of electrodes each in the form of a tube, a plurality of dielectric tubes concentrically mounted within said electrodes, and means for holding said electrodes in a fixed position with respect to each other while permitting movement thereof relatively to the dielectric tubes.

9. In an apparatus for the production of ozone, a plurality of electrodes each in the

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form of a tube, a plurality of dielectric tubes concentrically mounted within said electrodes, a plurality of plates through which said electrodes pass and by which they are supported, and a plurality of rods passing through said plates.

In witness whereof I have hereunto signed

my name in the presence of two witnesses this 7th day of September, 1912.

WILLIAM O. FREET.

Witnesses:

MARGARET MACINTYRE,

WALTER S. JONES.