T. FRIEDLANDER.

OZONE GENERATOR.

APPLICATION FILED JULY 24, 1908.

927,519. Patented July 13, 1909.

Fig. 1

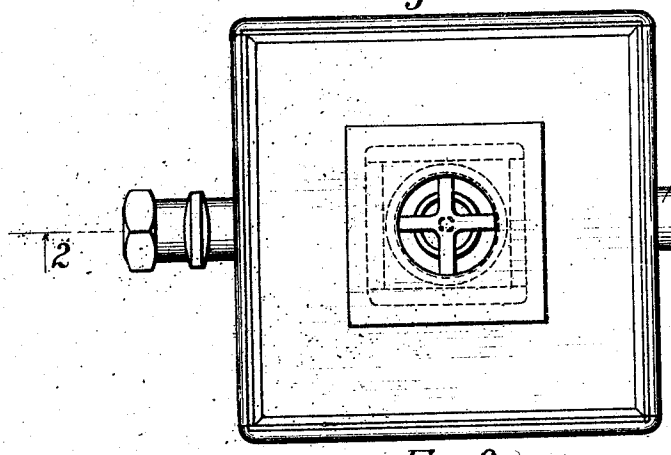


Fig. 8

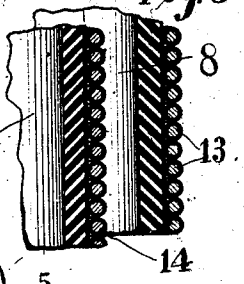


Fig. 2

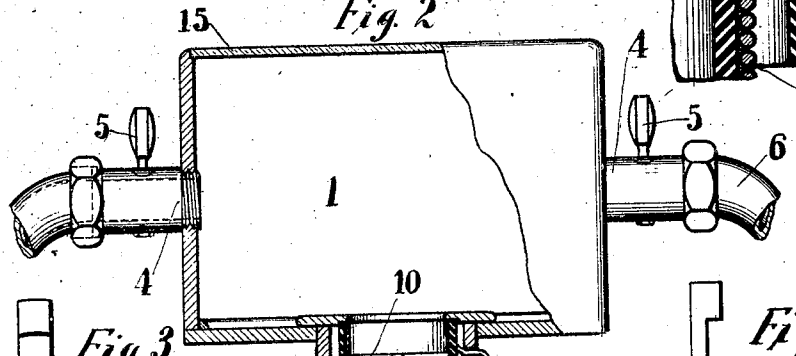


Fig. 3

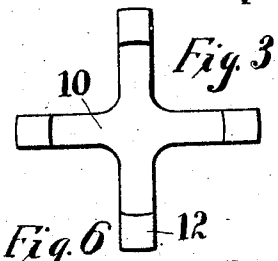


Fig. 4

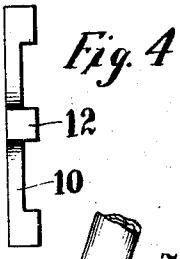


Fig. 6

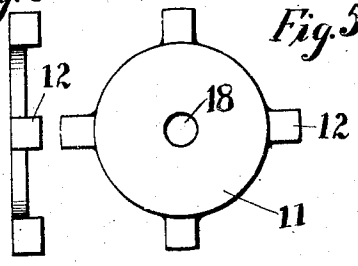


Fig. 5

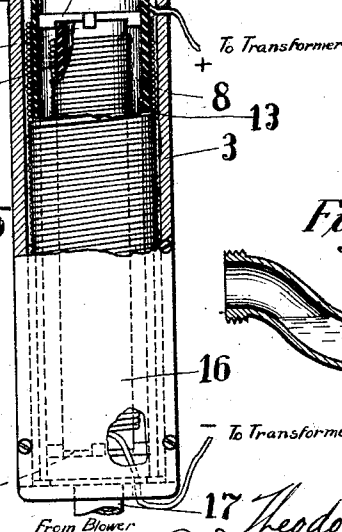
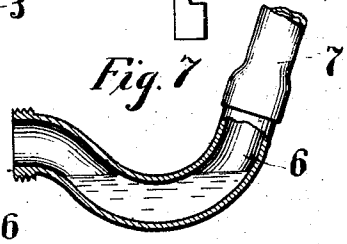


Fig. 7



Witnesses:
Edwin Phelps
Mary M. Willman

Inventor:
Theodore Friedlander,
By Lummus & Lummus
Attorneys.

UNITED STATES PATENT OFFICE.

THEODORE FRIEDLANDER, OF CHICAGO, ILLINOIS, ASSIGNOR TO LOUIS GOLDBERG, OF CHICAGO, ILLINOIS.

OZONE-GENERATOR.

No. 927,519. Specification of Letters Patent. Patented July 13, 1909.

Application filed July 24, 1908. Serial No. 445,147.

To all whom it may concern:

Be it known that I, THEODORE FRIEDLANDER, a citizen of the United States of America, and a resident of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Ozone-Generators, of which the following is a specification.

The main object of this invention is to provide an improved and efficient form of ozone generator which is simple and inexpensive in construction. This object is accomplished by the device shown in the accompanying drawings, in which:

Figure 1 is a top plan of an electric ozone generating apparatus constructed according to this invention; Fig. 2 is a side elevation of the same, partly sectional, the section being taken on the line 2—2 of Fig. 1; Figs. 3 and 4 are details of the upper spider for supporting the inner electrode; Figs. 5 and 6 are details of the disk which supports the lower end of the inner electrode; Fig. 7 is a sectional detail of one of the traps at the outlets of the casing; Fig. 8 is an enlarged fragmentary section illustrating the relation of the electrodes.

In the form shown in the drawings, the casing comprises a storage reservoir 1 and a generating chamber 3 communicating therewith. The chamber 3 contains the electrodes between which the ozone is generated by silent electrical discharge. The reservoir 1 is of considerably greater internal capacity than the unoccupied air space in the chamber 3, and is provided with one or more contracted discharge pipes 4, each controlled by an individual pet-cock 5 and each communicating with a delivery pipe 7 and an interposed receptacle 6 containing liquid through which the ozone is forced. The receptacle 6 comprises a tube dipped downward to provide a U-shaped part adapted to hold a liquid in such manner that the gas will pass through the liquid on its way to the pipe 7.

The ozone generator comprises a pair of concentrically arranged tubes 8 and 9, each of dielectric or insulating material, as, for instance, a mica compound. Both of these tubes are open at each end, and the inner tube 9 is supported within the outer tube 8 by means of a spider 10 at the top and a disk 11 at the bottom, which spider and disk are provided with lugs 12 so as to space the tube 9 concentrically within the tube 8. The tube 9 is of considerably less diameter than the tube 8, so as to provide an annular air space between them.

Electrodes 13 and 14 are respectively carried by the tubes 8 and 9. Each of these electrodes preferably consists of a helical coil of insulated wire, being wound around its respective tube in a single layer. Each of said coils has one of its ends connected to a transformer, but they are otherwise insulated from each other so that they may be oppositely charged, the electric circuit being completed through the "effluve" or silent discharge of electricity between the electrodes.

The casing is preferably formed of non-conducting material, such as wood, with a glass panel 15 at the top. The part 3 of the casing is rectangular and of such diameter as to loosely fit around the outer tube 8 and its coil of wire. One side of the part 3 is in the form of a removable cover 16 adapted to permit the tubes and the electrodes to be readily withdrawn from the casing for the purpose of examining or repairing the generating apparatus.

A tube 17 at the end of the chamber 3 which is distant from the reservoir 1 connects with a blower which supplies air to the apparatus. The disk 11 is provided with a central aperture 18 which is suitably proportioned with respect to the air space between the edges of the disk 11 and the tube 8 so as to direct a certain portion of the air from the tube 17 through the interior of the tube 9 while a certain other portion passes through the space between the tubes 8 and 9. The air passing through the tube 9 tends to cool said tube. The spider 10 is so formed as to permit the free passage of the ozone and air both through and around the tube 9.

The coils of wire which form the two electrodes are wound upon the concentric cylindrical tubes with their convolutions uniformly spaced. The coils may therefore be regarded as concentric cylindrical electrodes having spiral ridges on their contiguous surfaces, and the ridges on one being substantially parallel with those on the other. This form of electrode is particularly adapted for the purpose, since it is the silent discharge through the air between the electrodes which changes the oxygen (O_2) to ozone (O_3), and such silent discharge takes place most readily at places where there are points or sur-

faces of sharp curvature on the electrodes. The part of each electrode which faces the other electrode is a ridge having a crest of sharp transverse curvature, and, as the ridges are parallel, the discharge takes place uniformly throughout the extent of the contiguous surfaces of the electrodes.

The electrodes are connected with a transformer or other source of alternating current, as indicated in Fig. 1.

The operation of the device shown is as follows:—When a high-tension alternating current is put in circuit with the electrodes 13 and 14, a silent discharge or "effluve" takes place through the material of the tube 8 and through the air space between the electrodes, converting the oxygen in said space to ozone. On account of the construction of the electrodes, the field of discharge extends throughout the entire space between the two electrodes. The air current from the blower causes a continuous flow of air through said field of discharge. Other air passes unaltered through the tube 9 and serves to cool the inner tube and electrode. The proportion of air entering each passage is determined by the relative area of the inlet 18 with respect to the transverse area of the air passage between the tubes 8 and 9. The discharge of ozone from the reservoir 1 is controlled by the pet-cocks 5.

The specific construction of the casing and the arrangement and proportioning of the generating and storage chambers does not form a part of the invention claimed in this application, but is the invention of Louis Goldberg and forms the subject matter of his co-pending application executed of even date herewith.

What I claim as my invention and desire to secure by Letters Patent is.

1. An ozone generator, comprising a pair of concentrically arranged tubes of insulating material, a pair of electrodes comprising coils of wire wound on the respective tubes, said electrodes being spaced apart sufficiently to provide an air space between them, means for oppositely charging said electrodes, and means for causing air to flow through said air space.

2. An ozone generator, comprising a pair of concentrically arranged tubes of insulating material, a pair of electrodes comprising coils of wire wound on the respective tubes, said electrodes being spaced apart sufficiently to provide an air space between them, means for oppositely charging said electrodes, the inner tube being open at each end, and means for causing air to flow through said air space and through said inner tube.

3. An ozone generator, comprising a pair of concentrically arranged cylindrical electrodes spaced apart, one within the other, to provide an air passage between them, each electrode having thereon a spiral ridge opposed to the other electrode, said ridges being parallel throughout, and means for causing air to flow through said passage.

Signed at Chicago this 22nd day of July 1908.

THEODORE FRIEDLANDER.

Witnesses:

EUGENE A. RUMMLER,

MARY M. DILLMAN.