J. FITZPATRICK.

OZONE GENERATOR.

APPLICATION FILED FEB. 27, 1920.

1,403,759.

Patented Jan. 17, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

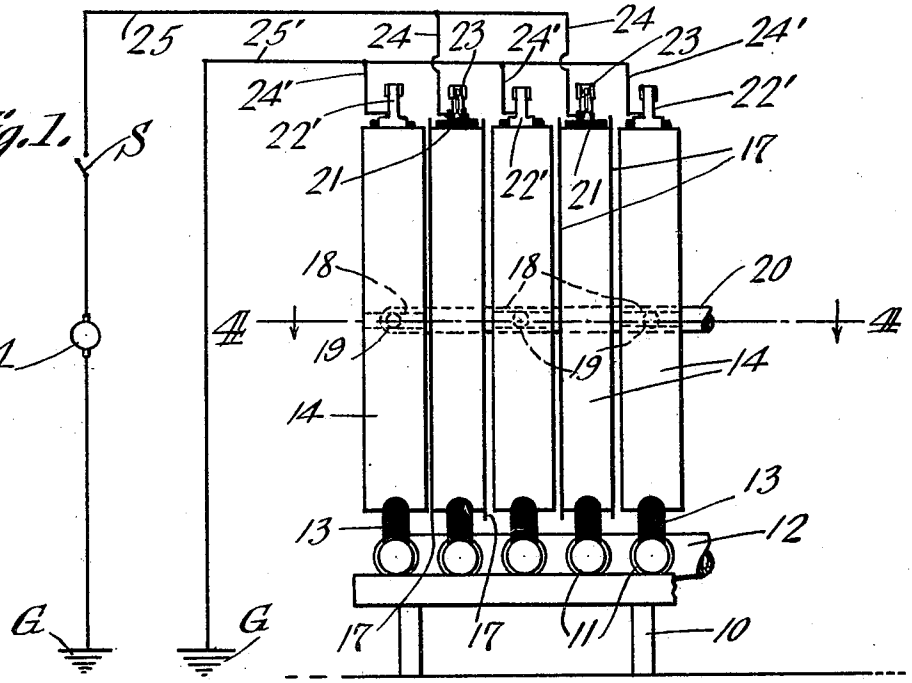


Fig. 2.

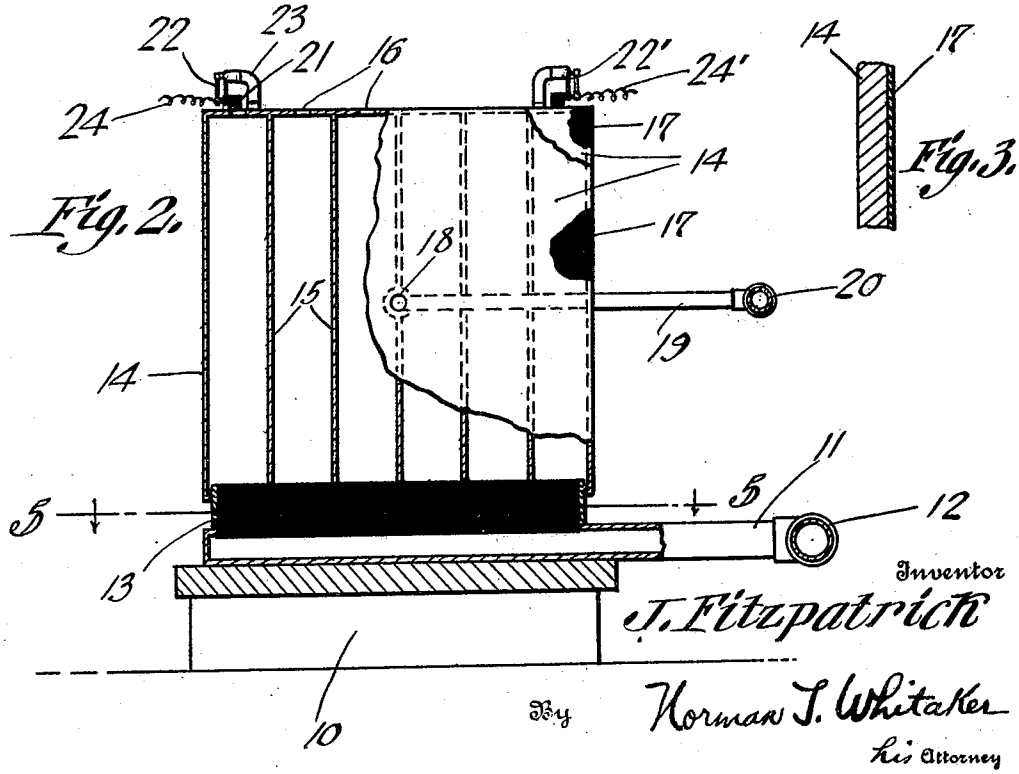


Fig. 3.

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2 SHEETS—SHEET 2.

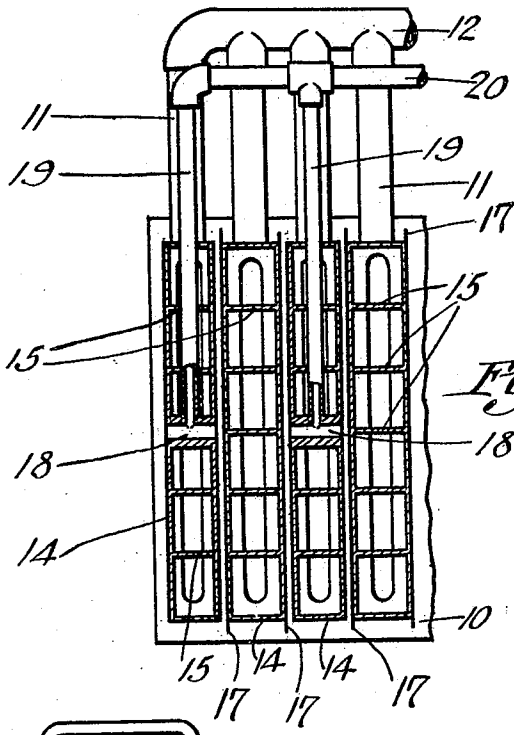


Fig. 4.

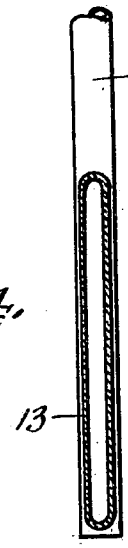


Fig. 5.

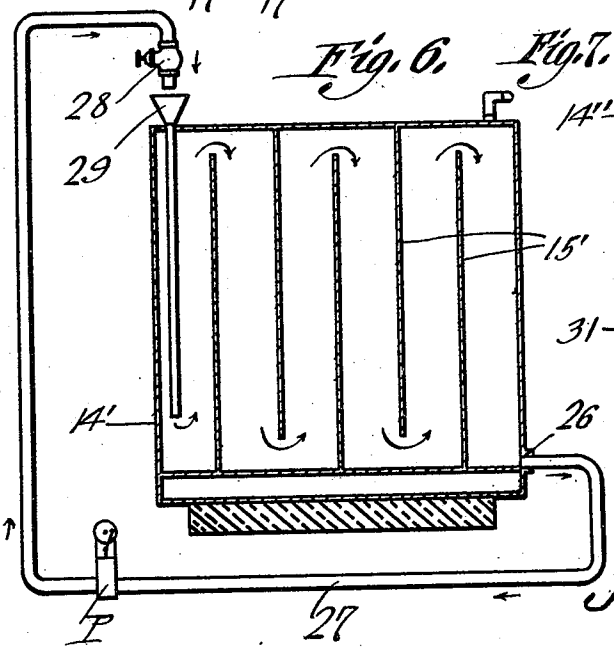


Fig. 6.

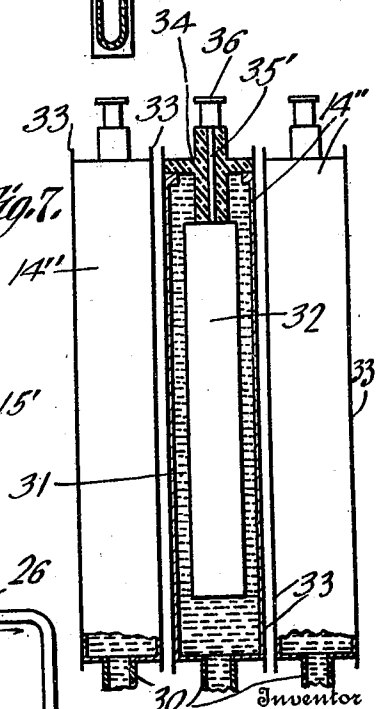


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN FITZPATRICK, OF NIAGARA FALLS, NEW YORK.

OZONE GENERATOR.

1,403,759. Specification of Letters Patent. Patented Jan. 17, 1922.

Application filed February 27, 1920. Serial No. 361,853.

To all whom it may concern:

Be it known that I, JOHN FITZPATRICK, a citizen of the United States, and a resident of Niagara Falls, in the county of Niagara and State of New York, have invented new and useful Improvements in Ozone Generators, of which the following is a specification.

This invention relates to ozone generators and has for its object the provision of a simple effective and reliable means for producing and collecting ozone.

A further object of the invention is to provide in an apparatus of the above mentioned character a novel means for neutralizing the heat generated by the electric current employed.

A further object of the invention is to provide in an apparatus of the above mentioned character a means whereby any one of the several units employed may be replaced without affecting the operation of the several remaining units.

Other objects and advantages of the invention will be apparent during the course of the following description taken in connection with the accompanying drawings.

In the drawings, forming a part of this specification and wherein like numerals are employed to designate like parts throughout the same,

Figure 1 is an end elevation of the apparatus embodying my invention,

Figure 2 is a side elevation of a unit of the apparatus, the unit being shown partly in section,

Figure 3 is an enlarged fragmental sectional view of a wall of a unit,

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 1,

Figure 5 is a horizontal sectional view taken on line 5—5 of Figure 2,

Figure 6 is a modified form of a cooling system, and,

Figure 7 is a modified form of a unit.

In the drawings, attention being called to Figures 1 to 5 inclusive wherein is shown one form of my invention the numeral 10 indicates a base or supporting means for the apparatus as a whole. Upon the base 10 there is arranged a plurality of pipes 11 having connection with a common pipe 12 through which air is forced by any suitable means, not shown, into the apparatus as a whole, the function of which air will be more elaborately discussed hereinafter. Upon each of the pipes 11 there is arranged an elongated hollow support 13 formed from a suitable insulating material. These supports, as clearly shown in Figure 2, communicate with the pipes 11 and are each adapted to support and communicate with the interior of a hollow rectangular unit 14. The units 14 are each provided with walls 15 and are further provided at the top with a plurality of openings 16. These units are constructed from electrical conducting material but are provided upon their walls with a coating of suitable insulating material 17 which coating acts as a suitable dielectric. The units carrying the insulating coating 17 are provided substantially centrally with conduits 18 which extend transversely through the units as clearly shown in Figure 4 and therefore directly communicate with the space afforded between their respective units and their adjacent units. These conduits are each connected with ozone conducting pipes 19 which extend horizontally through the units as clearly shown in Figure 4 and connect with an ozone collecting pipe 20 through which the ozone is conducted to a suitable container, not shown. Upon each of the units provided with the insulating material 17 there is arranged an insulating block 21 to which is pivotally connected a fuse switch 22, the upper end of which is adapted to be removably retained in engagement with an arm 23 suitably connected to the top wall of the unit. To the switch 22 at its pivotal end there is connected an electrical conductor 24 which in turn is connected to a main line 25, the main line being in circuit with a generator indicated diagrammatically at M and grounded as shown at G. Within the main line 25 there is interposed a suitable manually operated switch diagrammatically indicated at S. Upon each of the units adjacent those units which are provided with insulating material 17 there is disposed a switch 22′ connected to the unit identically with the switch 22 hereinbefore described. The switches 22′ are in turn connected by means of conductors 24′ to a main line 25′ which is grounded as shown at G′.

In considering Figure 6 wherein is shown a modified form of a unit cooling means it is to be understood that the electrical connections employed and the principal of operation of the unit electrically is the same as that of the units, the construction of which is hereinbefore described but instead, how-

ever, of employing the air supply pipe 12 together with its various co-operating elements I desire to employ a local means and to this end I provide a plurality of walls 15′ which are arranged within the unit 14′ and spaced alternately from the top and bottom of the unit. To one end of the unit as shown at 26 there is connected a pipe 27 through which oil may be forced by means of a pump as shown at P, which oil is elevated to a suitable point above the unit and deposited through a nozzle 28 into a funnel 29 which extends downwardly an appreciable distance into the unit as clearly shown. By this arrangement I dispense with the use of air as a cooling medium for the several units and substitute therefor a unique system whereby oil may be employed to accomplish this end.

In considering Figure 7 wherein is shown a modified form of the invention, I desire to mount each of the units 14″ upon an insulating base 30. I find, however, that by employing oil as shown at 31 together with electrodes 32 I attain a highly satisfactory result in that the oil being of a nonconducting character serves as a means to retard the passage of the electric current, thus enabling me to employ a very thin coat of insulating material 33 as compared with the coat of insulating material as shown at 17. In this instance I prefer to use insulating material such as a nonconducting varnish or enamel having as one of its constituents such material as bakelite, condensite, etc. I find further that the discharge between the units 14 is not so likely to flow locally but rather on the other hand, tends to discharge evenly over the total area of a side of the unit. The electrode 32 is connected with a suitable insulating cap 34 which is mounted upon the unit 14′ as clearly shown. The electrodes 32 are further connected with a stem 35 which in turn is connected with a terminal 36, the terminal being adapted for connection with a fuse switch identical with the switch 22 hereinbefore described. It is to be understood that the same system of wiring as shown in Figure 1 may be incorporated and used in connection with the modified form of my device shown in Figure 7. It is to be further understood that I do not wish to limit myself to any specific means such as I have described in connection with Figure 6 for supplying the oil indicated by the numeral 31 to the various units 14″. But on the other hand, it is to be understood that any system suitable may be employed for conducting the oil to the units 14′, which oil is intended to serve not only as a means for cooling the various units but also as a means for retarding the flow of current through the device as a whole and further as a means for evenly distributing the electrical energy over the entire area of a given side of a given unit.

The operation of the device as shown in Figures 1 to 5 inclusive is as follows: Air is forced into the various units 14 through the pipe 12 and expelled at the top through the various openings 16 which tend to keep the apparatus at a normal or substantially uniform temperature during its operation. By closing the switch shown at S current is supplied through conductors 24 and their respective units whereupon the electric energy is transmitted to the sides of the units. The electric current then, due to its excessive E. M. F., passes through the insulating material 17 to the adjacent units 14 passing onwardly through the conductors 24′ and 25′ as is apparent. Due to the passage of the electricity from one unit to another ozone is formed between the units, which ozone is drawn off through the pipe 20 by means of a suitable vacuum pump or the like not shown, the ozone being in turn stored or confined within a suitable container also not shown. Due to the fact that the pipes 19, connecting the pipe 20 with the conduits 18, are confined within the units 14 the ozone passing through these pipes is necessarily cooled by the air currents forced into the apparatus through pipe 12.

In considering the modified form of the invention shown in Figure 6 it is to be understood that the operation of the device electrically is substantially the same as that described in connection with Figures 1 to 5. Instead, however, of employing air currents forced through pipes 12 as a means for cooling the apparatus I desire to use a suitable oil which is continuously passed through each of the units 14′ in the direction of the arrows by means of a suitable pump as indicated at P, the oil being used over and over as a cooling medium.

In considering the modified form shown in Figure 7 it is to be understood in this connection that the operation electrically of the device is substantially the same as that hereinbefore described in connection with Figures 1 to 5 inclusive. Instead of using a comparatively thick sheet of insulating material as shown at 17 I am able to employ a relatively thin sheet of insulating varnish the principal constituents of which have hereinbefore been mentioned. This is made possible due to the fact that the oil 31, through which the electrical energy must necessarily pass to reach an adjacent unit, retards the flow of electricity and at the same time tends to and does evenly distribute the discharge over the entire area of a side of the unit, thus eliminating the objectionable feature of localization of a discharge.

In both of the forms of my invention shown in Figures 1 and 7 I desire to employ a fuse switch 22 which may be of any conventional type in order to open the circuit

automatically of any given unit should a short circuit for any reason take place.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, what I claim as new and desire to secure and protect by Letters Patent of the United States, is:

1. An ozone generator comprising a plurality of spaced vertically arranged hollow electricity conducting units, a source of electrical energy having its positive terminal electrically connected with the alternate units and its negative terminal electrically connected with the remaining units, means for circulating a cooling agent through all the units, the alternate units having communication with the atmosphere, and communicating conduits communicating with the last mentioned units, said conduits being adapted to collect the ozone generated between the positive and negative units.

2. An ozone generator comprising a plurality of supported hollow rectangular electricity conducting units arranged in spaced relation and alternately connected with the positive and negative pole of a source of electrical energy, the alternate units being provided with transverse openings communicating with the atmosphere, and a conduit extending in each of the alternate units and having communication with the transverse openings whereby to collect the ozone generated by the positive and negative units.

3. In an apparatus of the character described, a base, a plurality of conduits arranged on the base and having communication with a cooling fluid supply, an insulating block arranged upon each of the conduits, a hollow electricity conducting generator unit supported on each of the insulating blocks and communicating with the conduits, a source of electrical energy having its positive and negative poles alternately connected with the units, and means communicating with alternate units for collecting ozone generated by the positive and negative units.

4. An apparatus of the character described comprising a plurality of horizontally arranged cooling fluid conducting conduits, a plurality of vertically arranged hollow electricity conducting units arranged in spaced relation and having communication with the cooling fluid conduits and supported thereby, insulating elements disposed between the conduits and units, a source of electrical energy having its positive and negative terminals alternately connected with the units, the alternate units having transverse openings communicating with the atmosphere, and ozone collecting pipes extending within the last mentioned units and communicating with the openings whereby to collect the ozone generated by the electrical action of the positive and negative units.

JOHN FITZPATRICK.