

SPECIFICATION

Ozone generator

This invention relates to an improved ozone generator in which ozone is produced by passing oxygen or an oxygen-containing gas such as air between opposed electrodes while such electrodes are oppositely charged so as to create an electric field between them.

The use of ozone as a powerful oxidizing sterilizing and purifying agent is well known but its use is not as widespread as it might be, due partly to the hitherto high cost of producing it. The ozone generator of the present invention is a relatively low cost, easily used and easily installed unit.

According to the present invention I provide an ozone generator comprising a housing provided with a gas flow channel along which oxygen, or an oxygen containing gas is arranged to flow and first and second electrodes positioned respectively on opposite sides of the gas flow channel, wherein the first electrode is of a multi-finned construction, the fins extending towards the second electrode, and the second electrode is in the form of a flat plate or a coil, the plate or coil being covered by an insulating partition between the electrodes, and wherein the oxygen or oxygen containing gas is caused to flow in a direction perpendicular to the direction in which the fins extend. Each individual fin together with the opposing electrode may then be considered as constituting an ionisation curtain so that as the gas flows along the gas flow channel it is subject to ionisation by a multiplicity of such curtains and complete ionisation occurs.

There should be at least two fins or coils constituting the multi-finned electrode; the greater the number of fins the more complete is the degree of ionisation. Preferably there are from 5 to 31 such fins.

Preferably also the gap between the free end of each fin and the opposing electrode is no more than one inch, most preferably less than 0.5 inch.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings.

Figure 1 is a diagrammatic representation of apparatus to be used in the production of ozone;

Figure 2 is a longitudinal cross-section of an ozonizer,

Figure 3 is a transverse cross-section of the ozonizer shown in Figure 1;

Figure 4 is a perspective view of the electrode used in the ozonizer shown in Figures 2 and 3; and

Figure 5 is a diagrammatic view of the electrode configuration showing the ionisation curtain concept in more detail.

Ozone is produced when oxygen, or gas such as air containing oxygen, is subjected to an electric discharge which ionizes the O_2 molecules which on recombination form a proportion of O_3 molecules. This procedure is used in the apparatus of the present invention.

As shown in Figure 1, air enters the apparatus 'A' by way of a pump 5 through an inlet 1, passes through a filter 2, a heat exchanger 3 and a

moisture removal unit 4. The outlet of the pump 5 passes the pressurized air through an ozonizer 6 where it is subjected to an electric discharge. The ozonizer 6 is supplied with a high voltage from a power supply unit 7, which incorporates a transformer which steps the mains voltage of 110 to 240 volts up to 35,000 to 45,000 volts. The details of the construction of the ozonizer 6 will be described later.

Gas containing the ozone produced in the ozonizer 6 is expanded into an expansion chamber 8 by way of a pressure reduction nozzle 9. The gas now passes through the heat exchanger 3 in which the now cooled ozone containing gas acts to cool the incoming gas. This cooling of the incoming gas acts to condense any moisture contained in the gas which is removed in the unit 4. At the downstream side 10 of the heat exchanger 3, the ozone containing gas is passed to an outlet pipe 11 from where it is collected for use.

As shown in Figures 2 to 4, the ozonizer 6 includes electrodes 12 and 13 mounted on opposite sides of a flow channel 14 along which the air passes. Each electrode is mounted in an insulated support member 16 and 15 respectively which are interconnected by screws 17. The electrode 13 consists of a copper block 18 which is slotted on one face to receive a series of fins 19 (see Figure 5). The other electrode 12 consists of a flat plate (or a coil) covered by an insulating partition 20. The partition prevents arcing between the electrodes 12 and 13. Springs (not shown) act to hold the partition 20 in place when the two support members are interconnected.

Terminals 21 and 22 are connected to the electrodes 13 and 12 respectively and are connected to opposite terminals of the power supply 7.

The support member 16 is formed with air inlet and outlet nozzles 23 and 24 respectively which are connected by appropriate pipes to pump 5 and pressure-reduction nozzle 9 respectively. The sizes of the nozzle 23 and 24 can be adjusted to provide the appropriate gas flow rate.

It will be seen that air or other oxygen-containing gas entering gas flow channel 14 from inlet 23 passes along the channel in a direction at right angles to the fins 19 extending into the channel. The effect of this is illustrated in greater detail in Figure 5, which is of a diagrammatic nature. The fins shown therein for explanatory purposes are designated a_1 — a_n and in practice they are slotted into slots 30 in block 18. Each fin forms with opposing electrode 12 a notional ionization curtain, designated abcd in respect of the first one shown in the Figure. This "curtain" has a length of $3/8$ " and is suitably spaced $1/16$ " from the adjacent "curtain", i.e. the fins 19 are suitably $1/16$ " apart.

Ionization of the inflowing gas occurs with passage through each ionization "curtain".

It will therefore be appreciated that the present invention provides an efficient, cheap and constructionally relatively simple ozone generator.

By virtue of its multiplicity of electrode fins total ionization is achieved. It is possible to manufacture the entire apparatus on a large scale, with the attendant economic advantages, and the apparatus is easy to maintain and provide spare parts for. It is of safe construction, since it operates on a low voltage (110 or 220 v) and consumes little electricity (1.5 A, 0.3 KVA/hr). The entire ozone generator can occupy as little as 1.3 cubic feet and even the largest model will occupy only 7.6 cubic feet.

CLAIMS

1. An ozone generator comprising a housing provided with a gas flow channel along which oxygen, or an oxygen containing gas is arranged to flow and first and second electrodes positioned respectively on opposite sides of the gas flow channel, wherein the first electrode is of a multi-finned construction, the fins extending towards the second electrode, and the second electrode is in the form of a flat plate or a coil, the plate or coil being covered by an insulating partition between the electrodes, and wherein the oxygen or oxygen containing gas is caused to flow in a direction

25 perpendicular to the direction in which the fins extend.

2. An ozone generator as claimed in claim 1 wherein the housing is separable into a first and second part, the first part supporting one of said electrodes and the second part supporting the other electrode.

3. An ozone generator as claimed in claim 1 or claim 2 wherein a heat exchanger is provided through opposite sides of which the gas entering and exiting from said flow channel are passed.

4. An ozone generator as claimed in any of claims 1 to 3 wherein means are provided for filtering and removing any moisture from the gas before it enters said housing.

5. An ozone generator as claimed in any of claims 1 to 4 wherein there are between 5 and 31 fins constituting the multi-finned electrode.

6. An ozone generator as claimed in any of claims 1 to 5 wherein the gap between the free end of each fin and the said other electrode is at most one inch.

7. An ozone generator substantially as described herein with reference to the accompanying drawings.



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