

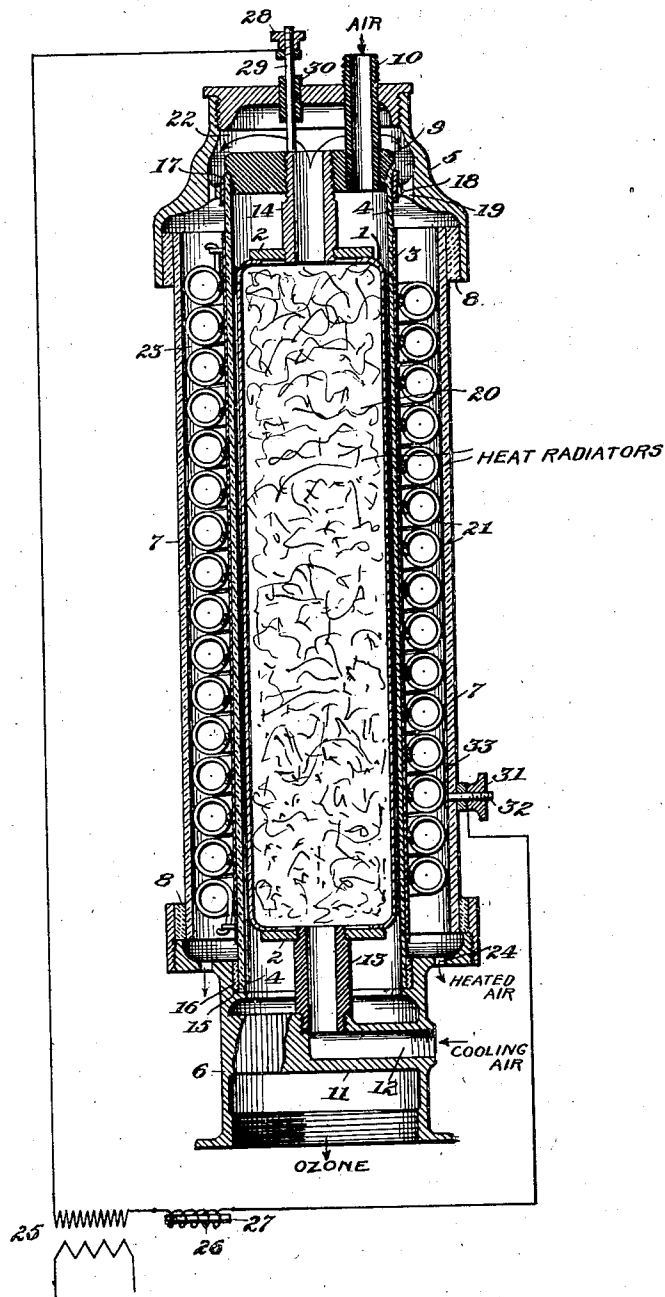
N. M. HOPKINS.

OZONIZER.

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Patented May 27, 1913.

1,062,974.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## OZONIZER.

1,062,974.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed February 26, 1912. Serial No. 750,915.

*To all whom it may concern:*

Be it known that I, NEVIL MONROE HOPKINS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Ozonizers, of which the following is a specification.

This ozonizer is designed to operate at a high current-density, and is provided with means, distinct from the current of air to be ozonized, for removing heat from both electrodes. In the preferred construction, concentric tubular electrodes are employed, each provided with heat-radiators, and a separate current of air is directed successively over the radiators of the two electrodes.

The accompanying drawing illustrates the ozonizer in axial section. It comprises an inner cylindrical electrode 1, consisting of a thin-walled tube of copper, with its ends flanged inward and closed by copper disks 2, soldered or riveted to the shell. The outer surfaces of the shell and disks are preferably lacquered with bakelite varnish. The concentric outer electrode 3 is a cylindrical shell of copper having a thickness for example of 0.75 mm., electrodeposited onto a glass cylinder 4, serving as a dielectric wall. Before depositing the copper, the outer surface of the glass is metallized, for example by coating it with a paint containing silver and heating the coating nearly to the softening point of the glass. The electrodes are inclosed in a casing consisting of upper and lower caps 5, 6, of cast aluminum, joined by a cylindrical casing 7 of glass, the ends of which enter the caps and are sealed therein gas-tight by intermediate rings 8 of cement. The upper end of the dielectric tube 4 is closed by a plug 9 of insulating material, carrying a tube 10. The air or oxygen to be ozonized is passed in either direction between the inner electrode 1 and the glass tube 4, being usually supplied through the tube 10, the product escaping from the lower cap 6. The lower cap 6 has an integral transverse member 11, the right-hand half of which has a passage 12. A short tube 13 of insulating material is screwed into the member 11, communicating with its passage 12, and serves as a support for the inner electrode 1, being screwed into a central opening in its lower disk 2. A

short brass tube 14 is screwed at its opposite ends into central openings in the upper disk 2 and in the plug 9, respectively. The lower cap 6 has a circular recess 15, which receives the lower end of glass tube 4, sealed therein by an intermediate layer of cement 16. The upper end of tube 4 is surrounded and reinforced by a metal ring 17, secured thereto. Cap 5 has a circular inwardly-extending flange 18, which bears against the ring 17 and supports and centers the glass tube and the electrode 3 carried thereby. Flange 18 has a circular series of openings 19. The inner electrode 1 is filled with a loose permeable mass of copper foil or shavings, lying in contact with and serving to receive and diffuse the heat from this electrode. The outer electrode 3 is wound helically with a coil 21 of aluminum wire, serving to receive and diffuse the heat from this electrode.

In operation, a current of air for cooling the electrodes is supplied to the passage 12 in the lower cap, is directed by the tube 13 into the inner electrode, passes over the radiating surfaces therein, receiving and carrying away the heat, is delivered through the upper tube 14 into the chamber 22 between the plug 9 and the top of cap 5, passes downward through the holes 19 into the chamber 23 between the outer electrode 3 and the glass casing 7, removes and carries away the heat transmitted from electrode 3 to coils 21 and radiated therefrom, and finally escapes through a series of holes 24 in the lower cap 6. High-potential alternating current is supplied to the electrodes from a transformer 25, through a circuit containing a choke-coil 26 having a movable iron core 27. The inductive reactance of this coil is adjusted to counterbalance the admittance of the ozonizer, as a condensive reactance. Current is supplied to the inner electrode 1 through a binding-post 28 having a pin 29 sliding through an insulating bushing 30 in cap 5, and making contact with brass tube 14. Current is supplied to the outer electrode 3 through a binding-post 31 having a pin 32 extending through a hole in the glass casing 7 and carrying a spring-contact 33 which bears on the coils 21.

The heavy shell of copper 3 constituting the outer electrode, electrodeposited on and in perfect contact with the glass, acts as an efficient means for uniformly receiving the

heat from the glass and transmitting it to the radiating coils 21. The inner electrode with its radiating filling is also an efficient means for transmitting heat to the current of cooling air passing through it. The cooling of the electrodes and dielectric is more effective by reason of the use as a cooling medium of a current of air distinct from that undergoing ozonization. Large volumes of air may be passed over the heat-radiators while a restricted amount is being subjected to the silent discharge. The closed chambers provided by the tubular construction of the inner electrode and by the outer glass casing enable a forced circulation of air to be employed, the cooling air being passed through at any desired velocity. The choke-coil adjusted to counterbalance the condenser action of the ozonizer enables the power-factor to be maintained at unity, notwithstanding the high current-density employed.

I claim:

1. In an ozonizer, an electrode consisting of a metal sheet, heat-radiators in contact with said electrode, and means for directing a cooling fluid over said radiators.

2. In an ozonizer, opposed electrodes each consisting of a metal sheet, heat-radiators in contact with said electrodes, and means

for directing a cooling fluid over said radiators.

3. In an ozonizer, opposed electrodes each consisting of a metal sheet, heat-radiators in contact with said electrodes, and means for directing a cooling fluid successively over the radiators of the two electrodes.

4. In an ozonizer, concentric tubular electrodes, a casing inclosing the outer electrode, means for passing air to be ozonized between said electrodes, and conduits for passing a separate current of cooling fluid successively through the inner electrode and said casing.

5. In an ozonizer, a dielectric layer, and an electrode consisting of a thick sheet of metal electrodeposited on said dielectric layer.

6. In an ozonizer, a dielectric layer, an electrode consisting of a thick sheet of metal electrodeposited on said dielectric layer, and heat-radiating coils in contact with said electrode.

In testimony whereof I affix my signature in presence of two witnesses.

NEVIL MONROE HOPKINS.

Witnesses:

EUGENE A. BYRNES,  
ETHEL DANIELS.