

O PATIN.
OZONE PRODUCING APPARATUS.
APPLICATION FILED SEPT. 29, 1910.

992,980.

Patented May 23, 1911.

Fig. 1.

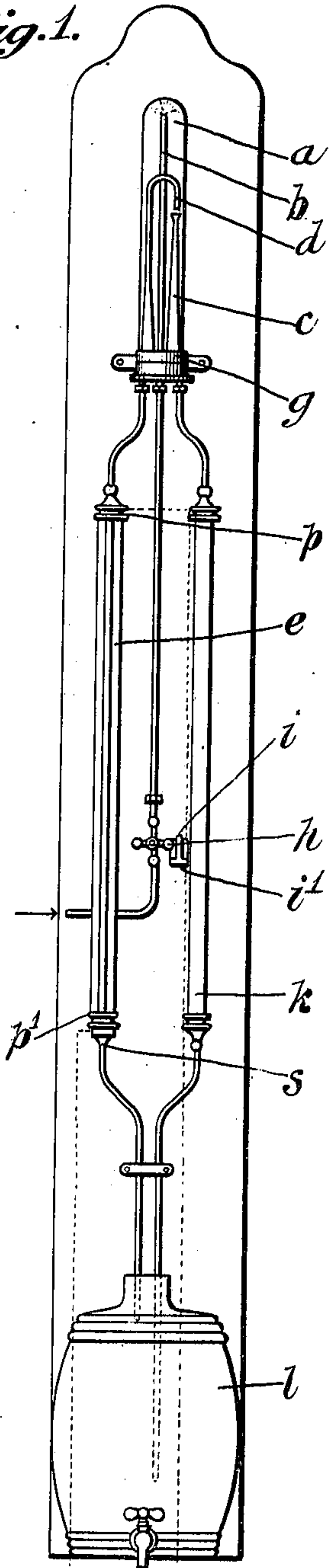


Fig. 2.

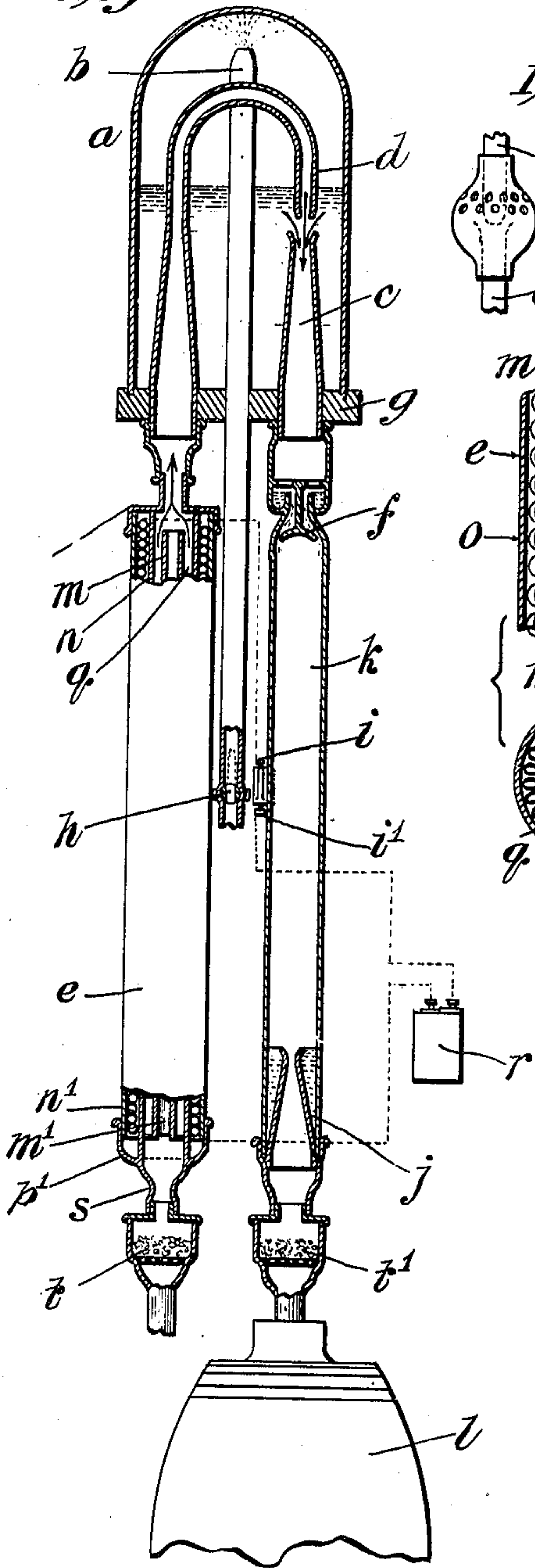


Fig. 4.

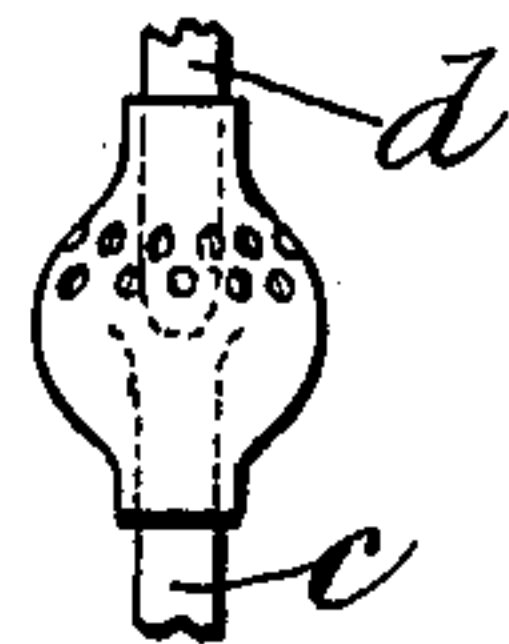
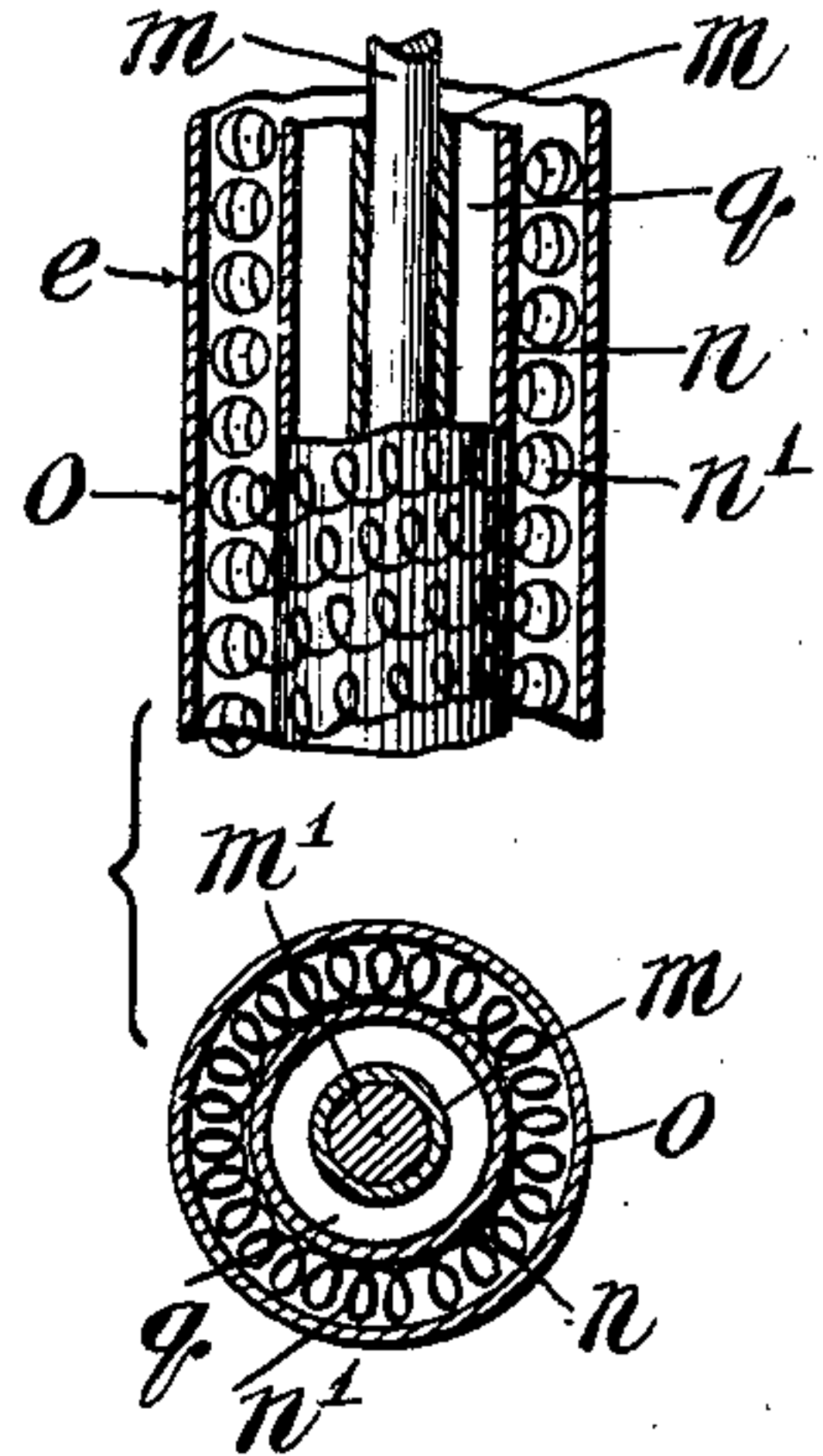


Fig. 3.



Attest:

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UNITED STATES PATENT OFFICE.

OCTAVE PATIN, OF PARIS, FRANCE.

OZONE-PRODUCING APPARATUS.

992,980.

Specification of Letters Patent.

Patented May 23, 1911.

Original application filed September 22, 1908, Serial No. 454,260. Divided and this application filed September 29, 1910. Serial No. 584,434.

To all whom it may concern:

Be it known that I, OCTAVE PATIN, a citizen of the Republic of France, residing at 15 Rue Theophile, Gautier, Paris, France, have invented new and useful Improvements in Ozone-Producing Apparatus, of which the following is a specification.

This invention relates to an improvement in ozone producing apparatus, and more particularly to ozonizers.

Ozone apparatus in which ozone is produced by means of electric effluvia in a closed space, the interior air of which is isolated from the electrodes, are known. However, the output of such apparatus is often unsatisfactory. The more uniformly the effluvia are distributed in the mass of air and the more diffusely they are spread, the greater will be this output, and numerous devices have been proposed with this result in view. When the contact between the isolating wall of the chamber of ozonization and the electrodes is arranged along a contact-line, brush discharges are formed which are evenly distributed. When the contact is obtained by means of sharp points, the brush discharges are relatively more accentuated, and they are all the more so the sharper the points are. In order to obtain, instead of brush discharges, a luminous sheet, it is necessary for the contact to take place in equally distant points which are as numerous and as close together as possible; and it is moreover necessary that the surface of the electrodes, instead of being pointed, be rounded in such a manner that its points of contact are tangential points.

It is the aim of the present invention to satisfy these conditions, providing, at the same time, a device which possesses great advantages, such as simplicity and economical establishment. It will be evident, furthermore, that the new device which produces an even and intense luminous sheet subjects the electrodes to less heat, whereby both the output and the durability of the apparatus are increased.

The accompanying drawings represent one form of the device which is shown, for purposes of illustration, applied to a sterilizing ozone apparatus, *i. e.*, to an apparatus for the ozonization of water in which the outflow of water causes at the same time the production of ozone and its mixture with the liquid, while the stopping of the circu-

lation of water interrupts the production of ozone.

Figure 1 shows the whole of the aforesaid apparatus. Fig. 2 shows in vertical section its details on a larger scale and represents especially the whole of the ozone apparatus itself together with its accessories. Fig. 3 is a detailed view of the electrodes. Fig. 4 represents a different view of the device for mixing water and ozone.

In order to accomplish the object of the invention, I use two concentric tubes, *m* and *n*, of glass or other suitable material which is at the same time insulating and resistant. The intermediate space between the two glass tubes constitutes the ozonization chamber which is provided at one of its ends, *s*, with any suitable device, for controlling the entrance of the air which is to be ozonized, and at its other end, *P*, with a device to control the outflow of the air which has been subjected to the influence of the electric effluvia. Before passing through the ozone apparatus, the air may be freed from the dust which it holds in suspension by means of a purifier, *t*, which may consist simply of a cotton plug or its equivalent, arranged in the socket which forms the extreme end of the ozone apparatus.

The inner electrode may be formed out of a simple metal rod, *m*¹, which frictionally engages the inner tube, *m*. The outer electrode is formed from a wire *n*¹ of aluminum or its equivalent, which is first rolled up as a coil, the coil being then, in its turn, rolled in spiral form around the tube *n*. The adjacent wire helices which form the coil, as well as the adjacent helices of the coils which form the spiral, are pressed so closely against each other that they touch each other. This construction provides, around the tube *n*, a metal envelop having as many points of contact with the insulating wall as there are helices and these points of contact, as is evident, lie tangential between the rounded surfaces of the wire and the cylindrical surface of the glass. The effluvia will thus produce themselves in the form of a sheet rather than in the form of brush discharges.

In order to avoid the oxidation of the outer electrode and, consequently, to increase its yield and durability, this electrode is, in its turn, preferably inclosed in an outer glass tube, *o*, which is concentric to the

tubes m and n . The tube o is provided at each end with a metal cap or socket p, p^1 .

The electrode n^1 is electrically connected with the socket p , and the electrode m^1 is similarly connected with the socket p^1 , and the sockets p, p^1 are connected respectively with the two poles of an electric circuit. The air can pass into the ozone apparatus only through the annular space q , which is traversed by the effluvia and has no direct contact whatever with the electrodes which, therefore, will not oxidize and which will retain their high yield.

The essential part of the invention consists of forming in the ozone apparatus one of the electrodes of a metal wire which is but to a small extent subject to oxidation and which is first rolled up in the shape of a coil, this coil being, in its turn, wound in the shape of a spiral around the chamber of ozonization. The result of this construction is a multitude of tangential points of contact in rounded surfaces, instead of a line of contact or points of contact in sharp points, which has for effect the diffuse spreading of the electric effluvia in much more important proportions than with the previous devices. The result is that, instead of producing brush discharges, the effluvia yield a luminous sheet, and that, at the same time, the electrodes are subject to much less heat than in the case of the hitherto employed means, whereby the output of the apparatus is considerably increased while the durability of the electrode is prolonged. Moreover, as is evident, the manufacture is most economical since manual labor has been reduced to a minimum. This new device constitutes, therefore, a notable improvement with regard to simplicity and economy of establishment as well as to that of yield and working durability.

Figs. 1 and 2 represent the application of the object of the invention to an ozone apparatus for water or any other liquid, in which the establishment or the interruption of the passage of water causes automatically the establishment or the interruption of the production of ozone and its mixture with water. For this purpose the tube K is fed by a water conduit which is under pressure and which is provided with an air valve at the upper part. I arrange, preferably at the interior of the tube K other devices for atomizing water and mixing with ozonized air, such as the conic adjustment, j , or the device illustrated in Fig. 4 formed by a ball, for example of glass, pierced by a great number of infinitely small holes, in the interior of which the water inlet pipe, d , terminates in a point a short distance above the pipe, c , which has a wider mouth-piece. The liquid is sent into the apparatus under pressure, and it passes into the same through a vertical pipe, b , which ends in a point in a

bell, a , in which the starting pipe d of the ozone apparatus ends also. The cock, h , on the other hand, which controls the introduction of water, is combined with an interrupter which controls the electric circuit furnished by a source, r , so as to establish or interrupt, by one single operation, the electric current as well as the current of liquid.

The apparatus works as follows: In order to cause the same to yield ozonized water, the cock is opened and the water streams into the chamber, a . At the same time the electric current is established between the electrodes m^1 and n^1 and traverses the annular space, q , in the form of effluvia which causes the production of ozone. The ozonized air spreads through the pipe d into the chamber a , where a first mixture with water which streams from the pipe b is effected. The outflow of water through the pipe c produces an air valve, and the ozonized air passes into the pipe c at the same time as the water. Inasmuch as the latter is considerably divided, the mixture becomes more and more intimate. The same takes place in j .

t and t^1 represent the cotton plugs or their equivalents, destined to retain the impurities of the solid particles, and to perform the mechanical filtration of air and water.

One of the principal advantages of this device results from its yield which is increased on account of the fact that there is neither any passage of non-ozonized water nor any production of non-utilized ozone.

This application is a division of my co-pending application, Serial No. 454,260, filed September 22, 1908.

Having described this invention in connection with the illustrative embodiment thereof, to the details of which disclosure it is not, of course, to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. An ozone apparatus comprising two concentrically positioned tubes having an annular space therebetween, an electrode positioned within the inner tube, and a second electrode formed of a coil of wire, said coil being wound spirally upon the outer tube.

2. An ozone producing apparatus comprising two concentrically arranged glass tubes, an inner electrode positioned within and frictionally engaging the central tube, and an outer electrode formed of wire wound to form a helix, said helix being in its turn wound in spiral form upon the outer tube.

3. An ozone producing apparatus comprising two concentrically arranged glass tubes, an inner electrode positioned within and frictionally engaging the central tube, an outer electrode formed of wire wound to form a helix, said helix being in turn wound

in spiral form upon the outer tube, and a glass tube surrounding said outer electrode.

4. An ozone producing apparatus comprising two concentrically arranged glass tubes,
5 an inner electrode positioned within the central tube and an outer electrode formed of wire wound to form a helix, said helix being in its turn wound in a spiral upon the outer tube, the coils of the helix and the
10 coils of the spiral being closely adjacent one

another whereby a metallic envelop is provided for the outer tube.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OCTAVE PATIN.

Witnesses:

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JULES BOUTIN.