

C. S. PIESTRAK.
 APPARATUS FOR THE STERILIZATION OF WATER OR OTHER LIQUIDS.
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979,999.

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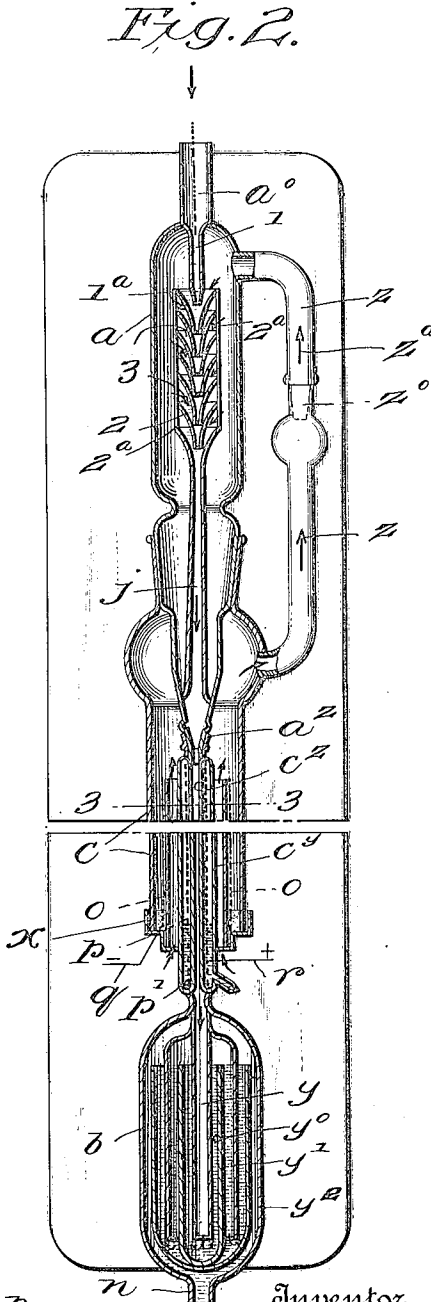
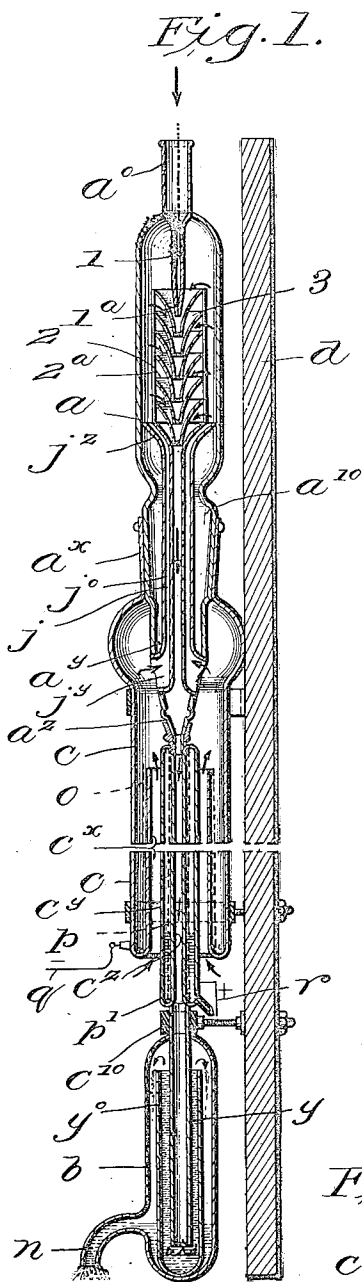
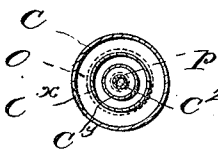


Fig. 3.



Witnesses
Edwin J. Beller.
Gas. E. Dodge.

Inventor
C. S. Piestrak, by
Williamson Fish & Williamson
 Attorneys

UNITED STATES PATENT OFFICE.

CASIMIR STANISLAS PIESTRAK, OF PARIS, FRANCE.

APPARATUS FOR THE STERILIZATION OF WATER OR OTHER LIQUIDS.

979,999.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CASIMIR STANISLAS PIESTRAK, a subject of His Majesty the Emperor of Austria-Hungary, residing at 45 Rue Lévis, in the city of Paris and Republic of France, have invented new and useful Improvements in Apparatus for the Sterilization of Water or other Liquids by Means of Ozone, of which the following is a specification.

The present invention relates to certain improvements in apparatus of the type described in my French Patent No. 408317 of January 20, 1909, which are designed for the purpose of purifying or sterilizing water or other liquids by means of ozonization.

My new apparatus which is based on the same principle and has the same essential characteristics as that of my French Patent 408317 presents certain advantages over this latter from the point of view of ease in construction, operation and simplicity, which advantages will be evident from the following description together with the drawings. In the drawings: Figure 1 is a vertical section through the axis of an apparatus constructed according to my invention. Fig. 2 is a similar view showing a slightly different arrangement. Fig. 3 is a horizontal section on line 3—3 of Fig. 2.

a represents the upper portion or receptacle, *b* the lower receptacle and *c* the intermediate portion or ozonizer proper, the whole being similarly mounted fixed or supported on a bracket, frame or support *d* which can be fixed to a wall or erected in any convenient position.

The upper portion *a* is fitted with a ground-joint at *a*^x into the intermediate portion *c* within which extends a descending portion *a*^y which is also fitted by means of a ground-joint at *a*^z into the flaring upper portion of the central tube *c*^z of the said intermediate member *c* of the apparatus. By this means the different parts of the apparatus can easily be assembled or dismounted.

The top of the upper receptacle *a* is formed into a tube *a*^o through which is admitted the water or other liquid to be sterilized. This tube extends downward into the receptacle *a* as shown at 1, terminating at its lower extremity in a conical outlet 1^a which dips into the upper end of an injector formed by a

series of funnels or converging cones 2. These latter fit one into the other as shown and are kept apart by suitable glass rods 2^a welded to the rims, or in any other suitable manner.

The lower cone or element of the injector 2 is continued downwardly by a diverging tube *j* concentric with tube *c* and surrounded by a second tube *j*^o so as to leave an annular space between the two, to which the ozonized air can have access through the holes *j*^y at the bottom. The upper mouth of tube *j*^o is flared as at *j*^z, the rim of which is slightly higher than the rim of the lowest cone of the injector. The object of this arrangement is to prevent moisture from penetrating within the ozonizer proper (member *c*), for supposing that water fell for some reason into space *a*¹⁰ it would accumulate there until it reached the level of the flaring mouth *j*^z whereupon it would be sucked in by the last cone of the injector.

The intermediate member *c* consists of an outer tube within which a second tube *c*^x is fitted concentric with the former. Tube *c*^x is open at the bottom and is joined by its lower end to tube *c* either by welding (Fig. 1) or by a metallic or other fitting luted or joined by putty, as shown at *x* in Fig. 2. Around tube *c*^x is wound one of the electrodes *o* which may consist either of an aluminium wire wound spirally, or of a network or gauze of aluminium or other suitable metal, being connected to the current terminal *q*. A third tube *c*^y is mounted concentrically within tube *c*^x and is suitably supported by a ring *c*¹⁰ screwed on the frame or bracket *d*.

Tube *c*^y is welded at top and bottom to a fourth concentric tube *c*^z around which is wound the second electrode *p*, and between which and tube *c*^y is formed an annular space wherein a vacuum is maintained. A small quantity of mercury *p*¹ is placed within this space in order to insure transmission of the current. The lower end of electrode *p* which can be constructed in the same way as electrode *o*, or in any other suitable manner, dips into the mercury bath *p*¹, which is connected by terminal *r* passing through the tube *c*^y to the source of electricity not shown. The tube *c*^z is prolonged downwardly by a descending tube *y* which extends into a tubular member *y*^o which is open at the top and

closed at the bottom and arranged concentrically in the interior of the lower receptacle *b* of the apparatus. The latter is fitted with an outlet pipe *n* which may be provided

5 or not with a cock.

The apparatus works similarly to that described in my French Patent 408317 that is to say as follows: The water or other liquid to be sterilized enters at 1 and passing through the extension 1^a into the injector produces a suction in the latter, at 3, of ozone or air strongly charged with ozone, resulting from the ozonization of the atmospheric air. This air is drawn in by the suction produced at 3, enters through the bottom of tube *c*^x the annular space between this tube and tube *c*^y, where it is ozonized by the action of the electric discharges which (terminals *q* and *r* being suitably connected) take place between the electrodes *o* *p* across the vacuum and across the space existing between tubes *c*^y and *c*^x. From there the ozone, or air charged with ozone produced in this manner rises through holes *j*^y, annular space *j*^x and the flaring mouth *j*^z into the upper receptacle *a*. The ozone or air strongly impregnated with ozone drawn in in this way at 3 is sucked in by the liquid into the injector 2 and tube *j* where it mixes intimately with the liquid and sterilizes it. The water or other liquid being thus sterilized falls through tube *y* into the lower receptacle *b* where, owing to the sinuous path it is forced to travel by the baffles or partitions *y*^o it is again agitated and intimately mixed with the ozone and thus insuring its perfect sterilization before arriving at the outlet pipe *n*.

40 Instead of using the arrangement shown in Fig. 1 for the passage of the air laden with ozone from receptacle *c* to receptacle *a*, a "shunt" or by-pass could be arranged between the two, as shown in Fig. 2, consisting of a tube *z*, made in two parts, with a ground joint at *z*^o. In the same way instead of only a single baffle or partition *y*^o as shown in Fig. 1, a number of such baffles could be arranged within the lower receptacle *b* for the sterilized liquid, as shown at *y*^o, *y*¹, *y*²; Fig. 2 so that the liquid is forced to travel a longer distance, during which it is brought into intimate contact with the ozone, before reaching the outlet *n*. The operation is evidently exactly the same in other respects as in the preceding case.

It will be obvious that my invention is not limited to the exact details of construction shown, for it is evident that they can be altered to a certain extent as necessitated by practical requirements or as may be considered expedient.

I claim:

1. An apparatus for sterilizing water and other liquids by means of ozone comprising 65 a vacuum tube, said vacuum tube containing mercury, an electrode mounted within said vacuum tube, an outer electrode arranged concentrically with and surrounding said inner electrode, an air passage between said electrodes and means for aspirating air through said air passage and into contact with the liquid to be sterilized. 70

2. An apparatus for sterilizing water and other liquids by means of ozone, comprising 75 a liquid inlet tube, a series of cones forming an injector, said inlet tube dipping into the uppermost cone of said injector, two electrodes, said electrodes being arranged concentrically one within the other, a vacuum tube within which said inner electrode is mounted and an air passage between said electrodes communicating with said injector and the atmosphere. 80

3. An apparatus for sterilizing water and other liquids by means of ozone, comprising 85 a liquid-inlet tube, a series of cones forming an injector, rings welded to said cones and holding them superposed, said inlet tube dipping into said injector, two electrodes, said electrodes being arranged concentrically one within the other, a vacuum within which said inner electrode is mounted and an air passage between said electrodes communicating with said injector and the atmosphere. 90

4. An apparatus for sterilizing water and other liquids by means of ozone comprising 95 an upper portion, an inlet tube communicating therewith, an injector arranged in said upper portion, said injector consisting of concentric superposed cones, a tube for the passage of the liquid to be sterilized, said tube being arranged below and concentric with said cones, an air passage concentric with and surrounding said liquid-passage tube, said air passage communicating with the atmosphere and the injector, a lower portion comprising a central tube forming a continuation of said upper liquid-passage tube, a vacuum tube surrounding 100 said central tube, said vacuum tube containing mercury, an electrode in said vacuum tube, an air passage surrounding said vacuum tube, a second electrode surrounding said air passage, said second electrode being inclosed by the outer wall of said lower portion. 105

In witness whereof I have hereunto set my hand in presence of two subscribing witnesses this 9th day of August 1910.

CASIMIR STANISLAS PIESTRAK.

Witnesses:

R. H. BRANDON,
M. H. PIGNET.