

No. 777,989.

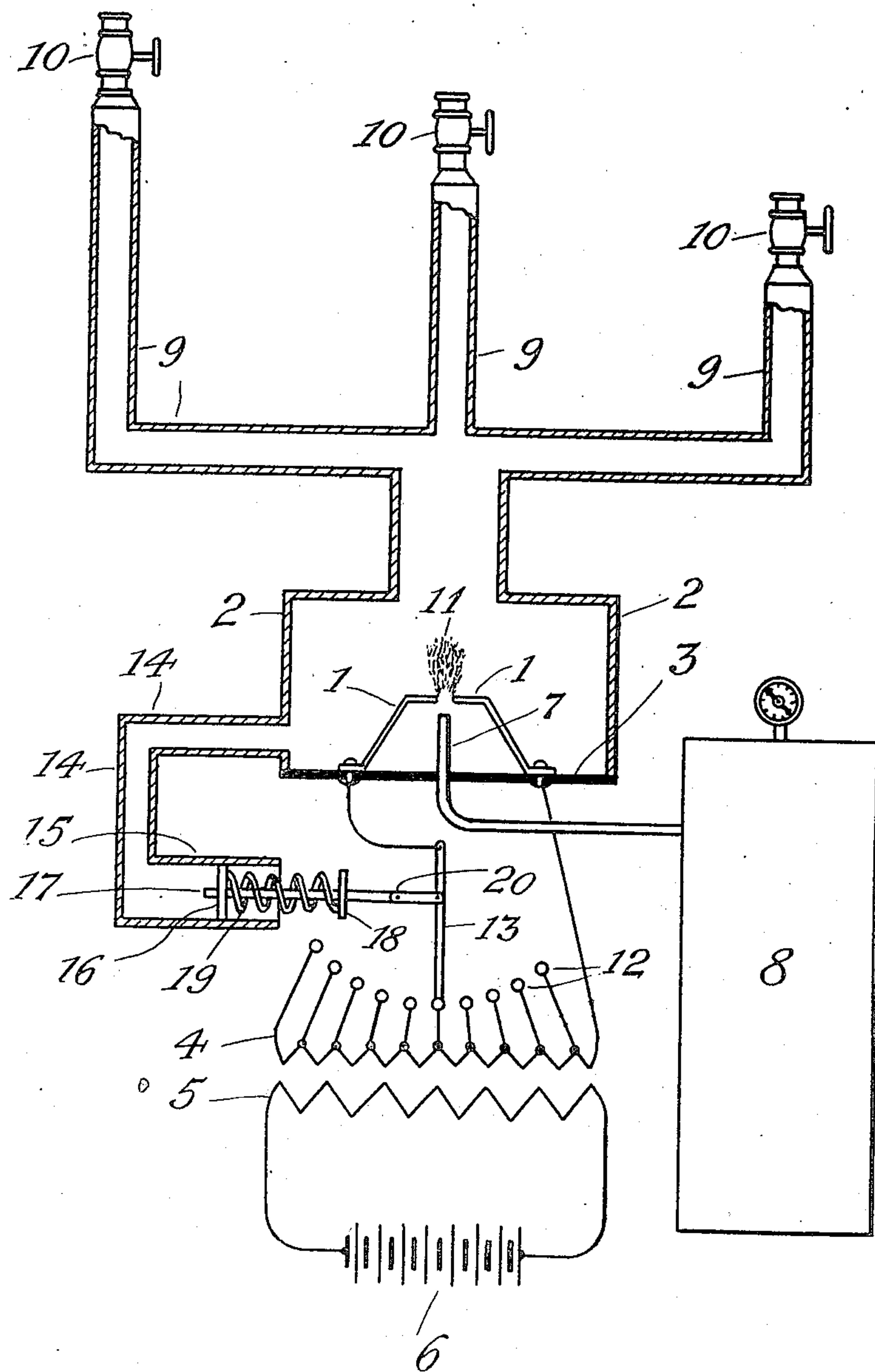
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E. E. WERNER.

APPARATUS FOR THE TREATMENT OF GASES.

APPLICATION FILED AUG. 11, 1904.

NO MODEL.



Witnesses
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE TREATMENT OF GASES.

SPECIFICATION forming part of Letters Patent No. 777,989, dated December 20, 1904.

Original application filed June 13, 1904, Serial No. 212,316. Divided and this application filed August 11, 1904. Serial No. 220,302.

To all whom it may concern:

Be it known that I, ERNEST E. WERNER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Apparatus for the Treatment of Gases, of which the following is a specification.

My invention relates to apparatus used for the treatment of gases by subjecting them to the action of electrical discharges, and the general purpose of my invention is to provide means whereby gases under various pressures, and therefore at different rates of flux, may be brought to an absolutely uniform degree of saturation.

The special purpose of the present invention is improvement of the apparatus disclosed in my pending application, Serial No. 212,316, filed June 13, 1904, of which this application is a division.

It is a well-known fact that the external or non-inductive resistance in the secondary circuit of a transformer having a large factor of self-induction is practically negligible. This property of an air-gap I desire to utilize by establishing across the same an arc of some form of disruptive electrical discharge and then by injecting gas under pressure into the gap transversely to and against the arc deflect the arc from its normal course and elongate it laterally and by varying the pressure of the gas so injected correspondingly vary the extent of such deflection and elongation of the arc.

One object of my invention is to automatically vary the arc in proportion to the amount of gas subjected thereto, so that the gas will be uniformly treated whether a large or small volume of the gas is presented to the arc in a given time; and the special object of my present improvement is to automatically vary the amount of current supplied to the arc in proportion to the amount of gas subjected to the action of the arc.

In the accompanying drawing, which diagrammatically illustrates apparatus for carrying out my invention, the figure is a view

showing apparatus for carrying out the general plan of my invention and also showing means for automatically controlling the amount of current supplied to the terminals to form the arc.

In such drawing, 1 designates the terminals between which the arc is formed, and they are preferably formed of thin strips of metal having their ends arranged a short distance apart, so that the arc will be formed between them. They are inclosed in a chamber or casing 2 and are preferably supported by the insulating-bottom 3 of the casing, and they are connected to the secondary 4 of a transformer in the manner hereinafter described. The primary 5 of the transformer is supplied by means of a battery 6 or any other suitable source of electrical energy. The transformer may be of any suitable form, and in practice I use the form commonly known as an "induction-coil."

Situated adjacent to the ends of the terminals and preferably directly below them is a supply-pipe 7 for supplying the gas to the arc formed between the terminals. This supply-pipe leads from a supply-tank 8, in which the gas to be subjected to the action of the arc is contained under pressure. The chamber 2, in which the terminals are situated, is gas-tight, and leading therefrom are a number of conduits 9, which conduct the gas after it has been acted upon by the arc to various points where it is to be utilized. The outlet of each of the conduits is provided with a valve 10 or other suitable means for controlling the flow of the gas.

If the valves 10 are opened to a considerable extent, the treated gas will pass quite freely therefrom, and consequently there will be but little back pressure in the chamber 2. Under such conditions the flow through the pipe 7 from the compressed gas within the tank 8 will be forced against the arc, so as to lengthen it, as shown at 11 in the drawing, and the gas will be thoroughly treated. In case the valves 10 are partially closed, so that little gas can escape, the back pressure in the cham-

ber 2 will become greater, so that the gas from the tank 8 will enter the chamber with less force, and consequently the arc will not be drawn out, but will be reduced in size until it passes practically straight across from one terminal to the other. In this way the size of the arc is automatically regulated by and proportioned to the quantity of gas injected against and subjected to it, thereby effecting uniform treatment of the gas, whether its volume be increased or diminished. For example, I find in practice that atmospheric air treated in this manner will contain substantially the same amount of compounds of oxygen and nitrogen when the apparatus is working at its full capacity as when only a very small quantity of air is allowed to pass through the apparatus. Furthermore, the air or other gas being under pressure when injected into the gap its expansion upon being freed will serve to bring its body into more intimate and thorough contact with the arc and also cause it to have a cooling effect.

One of the terminals 1 in the construction shown is connected to one end of the secondary 4 of the transformer; but the secondary is divided into a number of sections, which are connected with contacts 12. These contacts are arranged in the path of a switch-arm 13, which switch-arm is connected to the other terminal 1. A conduit 14 leads from the chamber 2 and opens into a cylinder 15, in which is a piston-rod 17, extending through a fixed guide 18, and between the piston and guide is a coil-spring 19, that tends to force the piston away from the guide and toward the rear end of the cylinder. The forward end of the piston-rod is connected, by means of a link 20, to the switch-arm 13 for causing movements of the latter to be produced by the piston reciprocations to regulate the position of the switch-arm relative to the contacts 12.

When there is little gas-pressure in the chamber 2, as when the valves 10 are open, the spring 19 will force the piston toward the rear of the cylinder 15, and thereby swing the switch-arm on its fulcrum to cut in more of the secondary 4 of the transformer, and thus increase the amount of current supplied to the arc; but when some or all of the valves 10 are closed the back pressure in the chamber will be increased, and this pressure acting upon the piston 16 will force it outward against the resistance of the spring and move the switch-arm to position to cut out more of the secondary, and thereby correspondingly lessen the amount of current supplied to the arc.

As the amount of current supplied to the arc from the transformer is dependent upon the relative proportions of the secondary 4 cut in and cut out by the switch-arm, and as the position of the latter relative to the contacts 12 is regulated by the reciprocation of the piston 16, and as the latter movement is ef-

fectured by the difference between the outward pressure of the gas in the cylinder 15 and the inward pressure of the spring 18 upon the piston, it is obvious that the quantity of current supplied and hence the size of the arc produced are controlled by the degree of back pressure in the chamber 2 and that the inflow of gas through the pipe 7 is likewise affected by the back pressure in the generating-chamber. In this way not only is the size of the arc regulated by regulating the amount of current supplied to it, but by the same means the quantity of air or other gas introduced to it for treatment is correspondingly regulated. I have found in practice that if the escape of the gases from the chamber is entirely prevented the arc will entirely disappear as soon as the gases in the chamber have been thoroughly treated by the arc.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for treating gases, the combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, means for supplying current to said terminals, and means controlled by the pressure of the gas in said chamber for varying said current-supply.

2. In an apparatus for treating gases, the combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, means for supplying current to said terminals, means for supplying gas under pressure to the arc between the terminals, and means controlled by the pressure of the gas in said chamber for varying said current-supply.

3. In an apparatus for treating gases, the combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, an induction-coil having its secondary connected with said terminals, and means controlled by the pressure of the gas in said chamber for varying the amount of said secondary in circuit.

4. In an apparatus for treating gases, the combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, means for supplying current to said terminals, means for supplying gas under pressure to the action of the arc between the terminals, means for regulating the escape of gas from said chamber, and means controlled by the pressure of the gas in said chamber for varying said current-supply.

5. In an apparatus for treating gases, the combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, an induction-coil having its secondary in circuit with said terminals, means for supplying gas under pressure to the arc between said terminals, a cylinder communicating with said chamber, a piston in

said cylinder, and connections between said piston and said secondary for varying the amount of said secondary in circuit.

6. In an apparatus for treating gases, the
5 combination with an inclosed chamber having suitable inlets and outlets, of electric terminals in said chamber, means for supplying current to said terminals, means controlled by
10 the pressure of the gas in said chamber for varying said current-supply, means for supplying gas under pressure to the arc between the terminals, and means for regulating the

discharge of gas from said outlets to vary the pressure of gas in said chamber and thereby vary both the supply of current to the terminals and the supply of gas to the arc. 15

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of August, 1904.

ERNEST E. WERNER.

Witnesses:

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