

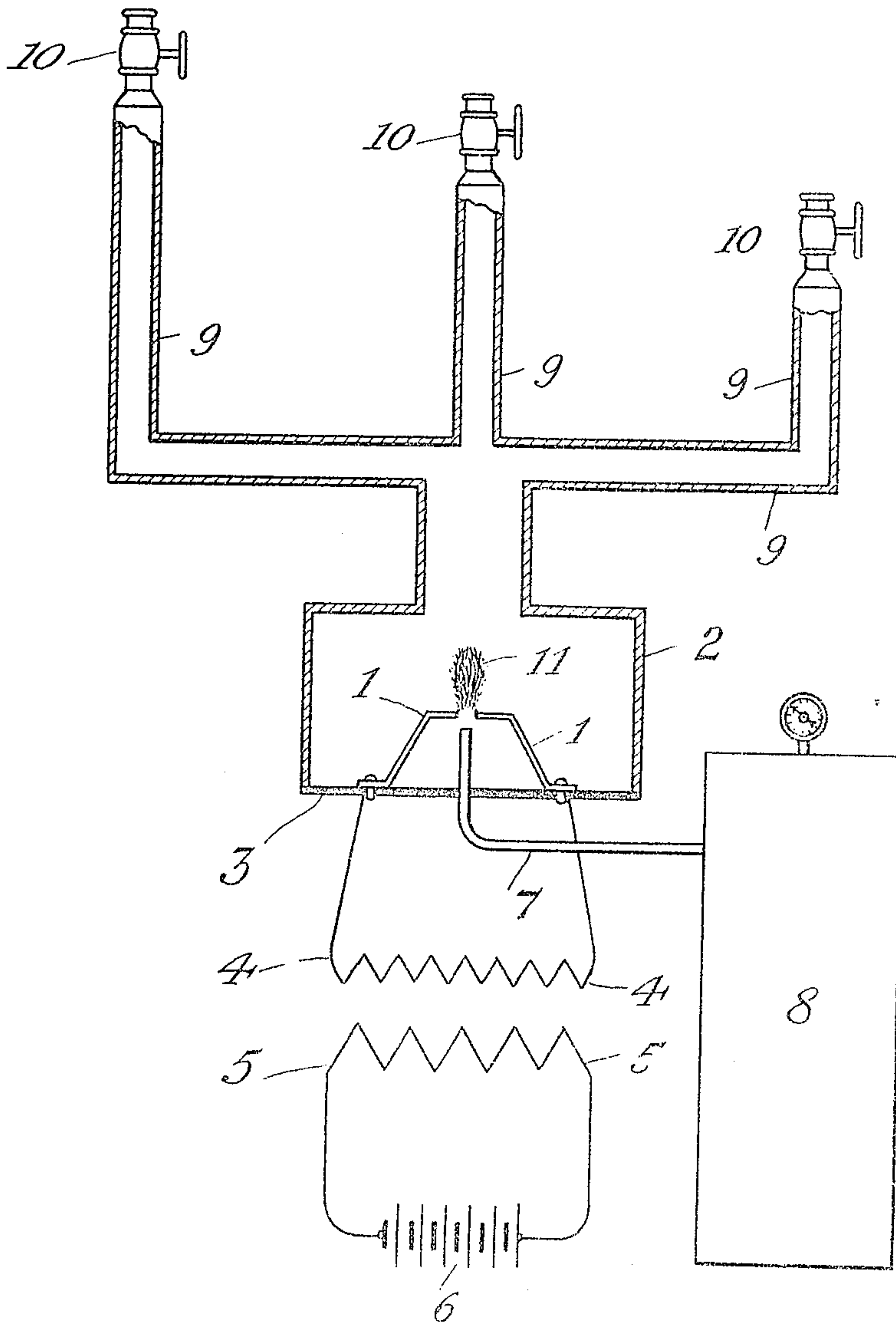
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E. E. WERNER.  
APPARATUS FOR THE TREATMENT OF GASES.

APPLICATION FILED JUNE 13, 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. 777,987, dated December 20, 1904.

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*To all whom it may concern:*

Be it known that I, ERNEST E. WERNER, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented a certain new and useful Apparatus for the Treatment of Gases, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to improvements in apparatus used for the treatment of gases by subjecting them to the action of electrical discharges; and the special object of my invention is to provide means whereby gases under various pressures, and therefore at different rates of flux, may be brought to a practically uniform degree of saturation.

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 the normal or direct course of the arc deflect the discharge from such course and elongate it in lateral direction and by varying the pressure of the gas so injected correspondingly vary the extent of such deflection and elongation of the arc, and thereby regulate the volume or surface of the discharge to which the gas is exposed.

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 another object of my invention is to utilize the expansive and cooling effects of the gas as it is being freed from compression to cool the terminals and the treated gases.

In the accompanying drawing the figure is a view diagrammatically illustrating appara-

tus for carrying out the general plan of my invention.

In the drawing, 1 designates the terminals between which the arc is formed. These terminals are preferably formed of thin strips of metal and have their ends arranged a short distance apart, so that the arc is formed between them, and they are inclosed in a chamber or casing 2 and are preferably supported by the insulating-bottom 3 of said casing. The terminals 1 are connected to the ends of the secondary 4 of a transformer. The primary 5 of the said 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 1 and preferably directly below them is a supply-pipe 7 for supplying the gas to the arc formed between the said 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 1 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 9 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 from the said valves, 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 the said arc, as shown at 11 in the drawing, and the gas will be thoroughly treated. In case the valves 10 are closed so that little gas can escape the back pressure in the chamber 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. I have found in practice that if the escape of the gases is entirely prevented the arc between the terminals will be broken as soon as the gas within the chamber 2 has been properly treated, and thus the action of the arc will be entirely stopped. 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 it will also have a cooling effect.

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 electric terminals, of means for causing compressed gas to be released and permitted to expand in the gap between the terminals.

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, and means for freeing and permitting the expansion of compressed gas in the gap between the terminals.

3. 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, and means for regulating the escape of gas from said chamber.

4. In an apparatus for treating gases, the combination with electric terminals, of means for establishing an arc between the terminals, and means for projecting compressed air against the arc to deflect its course without breaking it.

5. In an apparatus for treating gases, the

combination with electric terminals, of means for establishing an arc between the terminals, and means for projecting compressed air against the arc to deflect its course and elongate it in transverse direction without breaking it. 60

6. In an apparatus for treating gases, the combination with electric terminals, of means for establishing an arc between the terminals, means for causing the arc to be deflected and elongated transversely without being broken, and subjecting expanding air to the action of such deflected and elongated arc. 65

7. In an apparatus for treating gases, the combination with an inclosed chamber having a suitable inlet and outlets, of a pair of electric terminals in said chamber, means for supplying current to establish an arc between said terminals, means for conducting compressed air through said inlet and releasing it in the presence of the arc to deflect and elongate it transversely without breaking it, and means for regulating the discharge of gases through said outlets. 75

8. In an apparatus for treating gases, the combination with an inclosed chamber having a suitable inlet and outlets, of a pair of electric terminals in said chamber, means for supplying current to establish an arc between said terminals, means for conducting compressed air through said inlet and releasing it in the presence of the arc to deflect and elongate it transversely without breaking it, and means for regulating the volume of compressed air introduced by regulating the escape of the gases from said chamber. 85 90

9. In an apparatus for treating gases, the combination with an inclosed chamber having a suitable inlet and outlets, of a pair of electric terminals in said chamber, means for supplying current to establish an arc between said terminals, means for conducting compressed air through said inlet and releasing it in the presence of the arc to deflect and elongate it transversely without breaking it, and means for regulating the extent of such deflection and elongation of the arc by regulating the escape of the gases from said chamber. 95 100

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses. 105

E. E. WERNER. [L. s.]

Witnesses:

FRED HENKE,

D. C. BETHEMAN.