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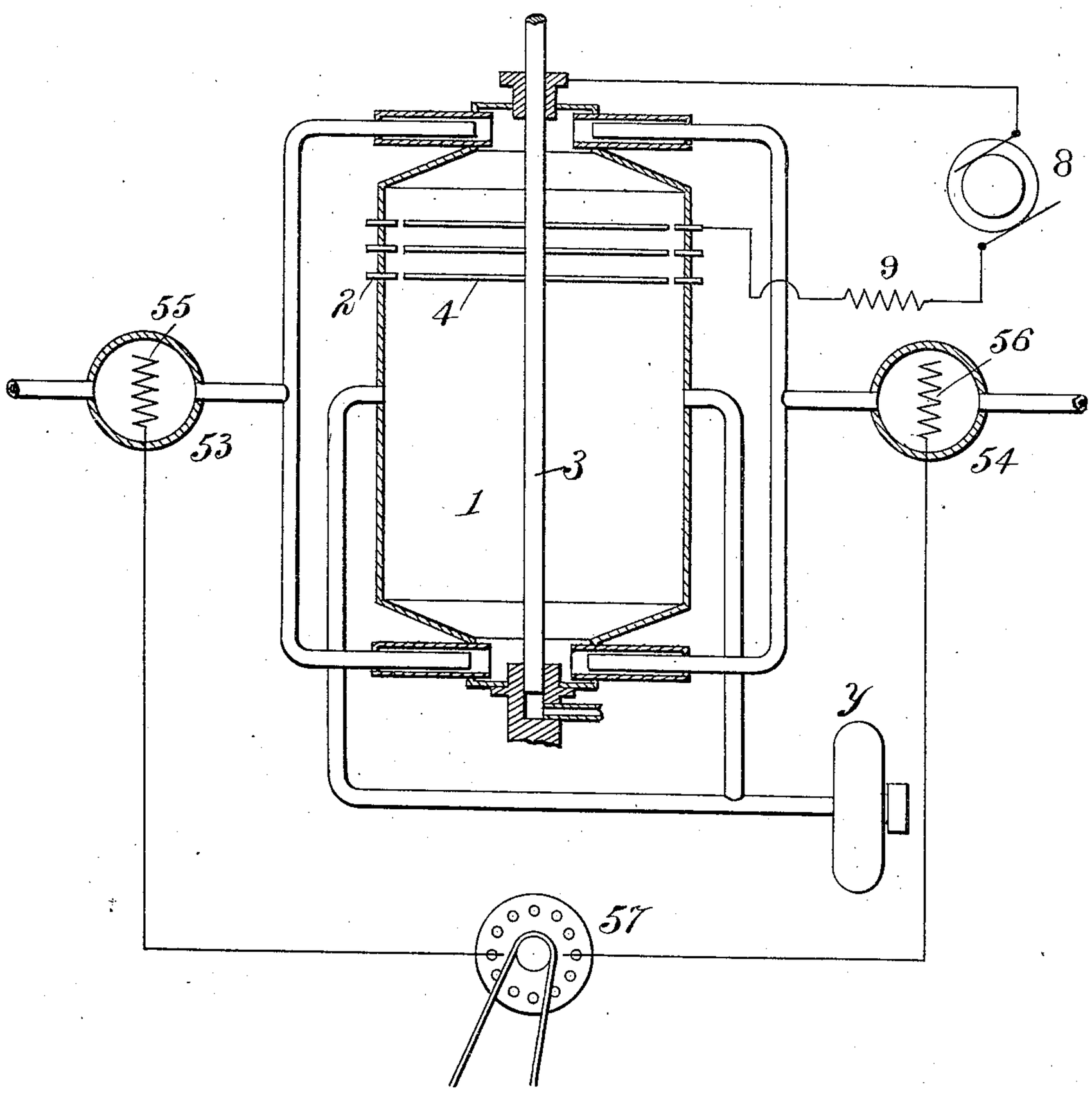
D. R. LOVEJOY.

PROCESS FOR EFFECTING CHEMICAL ACTION IN GASES.

APPLICATION FILED JAN. 27, 1903. RENEWED JULY 5, 1906.



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UNITED STATES PATENT OFFICE.

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PROCESS FOR EFFECTING CHEMICAL ACTION IN GASES.

No. 829,876. Specification of Letters Patent. Patented Aug. 28, 1906.

Application filed January 27, 1903. Renewed July 5, 1906. Serial No. 324,830.

To all whom it may concern:

Be it known that I, DIMMITT ROSS LOVEJOY, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Processes for Effecting Chemical Action in Gases, of which the following is a full, clear, and exact description.

This invention relates to improvements in processes for effecting the union or chemical action of gases by the agency of electric arcs formed within or in connection with a chamber in which are contained the mixed gases to be chemically combined.

In United States Patent No. 709,867, granted to C. S. Bradley and D. R. Lovejoy September 30, 1902, and my application Serial No. 109,443, filed May 29, 1902, apparatus for this purpose is described, in which cases a series of electrodes is moved past another series of electrodes oppositely charged to a high tension, so as to successively form, elongate, and break arcs between such electrodes within a chamber in which the mixed gases to be united are confined.

I have discovered that the desired effect may be more successfully produced by subjecting the gases individually to the action of electrodes charged to a high degree of electrical potential in such a manner that the respective molecules of the two gases shall be given an electrostatic charge of high potential, the molecules of one gas being given a positive charge and the molecules of the other gas a negative charge previous to subjecting the gases, after mixing the same, to the action of electric arcs.

In the accompanying drawing I have shown diagrammatically the apparatus for carrying this invention into effect, in which the chamber 1 is provided with two distinct sets of inlet-ducts, which are preferably of insulating material, and included in the path in each gas is an electrifying-chamber 53 and 54, these containing electrodes 55 and 56, which are adapted to electrostatically charge the molecules of the gases in contact therewith and which are connected to the source of high unidirectional potential 57. The two gases after being electrified are mixed in the chamber 1 in the presence of the arcs or just previously to coming into the presence of said arcs. The chamber 1, above referred to and in which the electrical arcs are formed, may be essentially the same as that set forth in the patent granted to C. S. Bradley and D. R. Lovejoy, No. 709,867, in which the apparatus consists of a cylindrical chamber 1, fixed electrodes 2, mounted around the inner periphery of said chamber; a shaft 3, mounted to rotate within the said chamber, and movable electrodes 4, mounted mechanically upon the said shaft and connected electrically thereto; an exhaust-fan *y* or other means connected to the outlet duct or ducts for causing flow of gases through the chamber; a source 8 of high-tension electrical currents, either unidirectional or alternating; a series of inductances or choke-coils 9, each having one terminal connected individually to one of the fixed electrodes 2 and having their remaining terminals grouped together and connected to one pole of the generator 8, the circuit being completed by connecting the shaft 3 to the remaining pole of the generator.

As an illustrative example of the invention, it may be stated that equal volumes of nitrogen and oxygen gases may be conducted into the chamber 1, these gases being first caused to pass in contact with the charged electrodes 55 56, respectively, by which the respective gases are separately electrostatically charged to a difference of potential of about fifty thousand volts. The limits of voltage maintained between the arc-terminals 2 and 4 may in this case be about ten thousand volts, for instance, with a current of .01 of an ampere. It has been found that with the above conditions chemical combination is effected and satisfactory yields are obtained.

It is to be understood that the invention is not limited to any definite or fixed potential difference between the molecules of the respective gases or that the current values given with respect to the arc-terminals are in any way definite or fixed. The data given are merely illustrative quantities. The skilled operator will determine the most advantageous conditions of current and potential to be employed, having regard for the character of gases it is desired to combine, &c.

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

1. The process of effecting the combination of gases which consists in separately charging the molecules of said gases electrostatically and leading said separately-charged gases into a common chamber and subjecting them to the action of the electric arc.

2. The process of effecting chemical combination of gases which consists in separately charging the gases electrostatically to opposite potentials, mixing said oppositely-charged gases, and subjecting the mixture to the action of attenuated electric arcs.

3. The process of effecting chemical combination of gases which consists in separately charging the gases electrostatically to opposite potentials, mixing said oppositely-charged gases, subjecting the mixture to the action of the electric current in the form of an arc of minimum volume, and maintaining such arc at a minimum volume sufficient to prevent its breaking.

4. The process of effecting chemical combination of gases which consists in separately charging the gases electrostatically to opposite potentials, mixing said oppositely-charged gases, subjecting the mixture to the action of an electric arc, and successively and repeatedly elongating, interrupting and re-establishing said arc.

5. The process of effecting chemical combination of nitrogen and oxygen gases, which consists in separately charging said gases electrostatically to opposite potentials, mixing said oppositely-charged gases, and subjecting the mixture to the action of electric arcs.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

D. R. LOVEJOY.

Witnesses:

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