

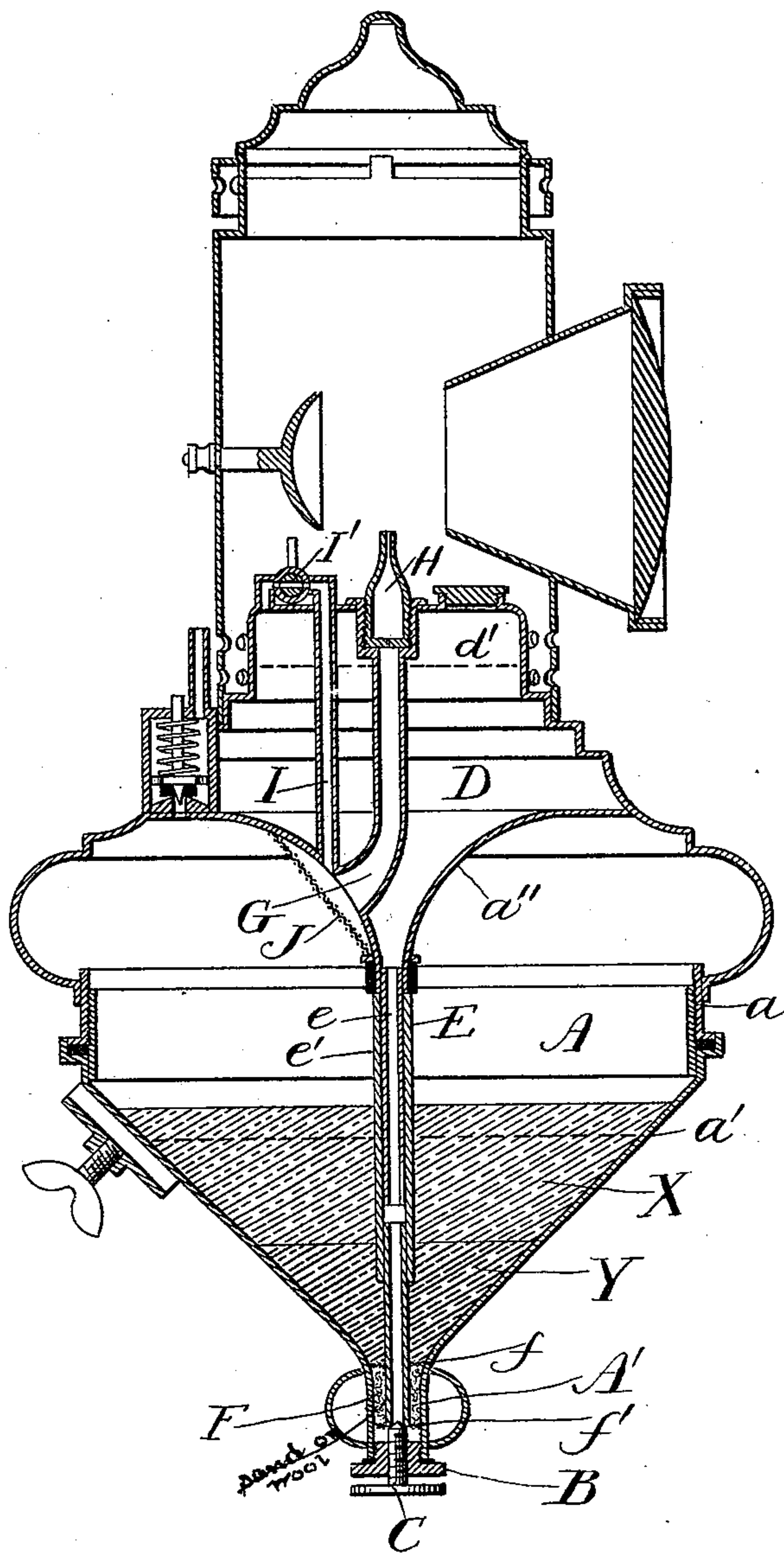
(No Model.)

C. E. RAND.

PROCESS OF GENERATING ACETYLENE GAS.

No. 582,548.

Patented May 11, 1897.



Witnesses:

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UNITED STATES PATENT OFFICE.

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PROCESS OF GENERATING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 582,548, dated May 11, 1897.

Application filed June 29, 1896. Serial No. 597,442. (No specimens.)

To all whom it may concern:

Be it known that I, CHARLES E. RAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Process of Generating Gas, of which the following is a specification.

The present invention relates to that class of processes by which gas is generated by the chemical reaction resulting from bringing together a solid and a liquid material—such, for example, as the process by which acetylene gas is generated when a metallic carbide is exposed to water.

The object of the invention is to provide an improved process by which gas may be generated continuously as it is needed for immediate use and at a substantially uniform rate.

According to the present invention the residue is not removed from the surface or area of reaction, but, on the contrary, it is confined there and made to act as a medium through which water is fed to the carbide or other solid material in the limited quantity in which it is needed for generating the required quantity of gas.

The invention consists in the features of novelty that are particularly pointed out in the claim hereinafter, and in order that it may be fully understood I will describe it with reference to the accompanying drawing, which is made a part hereof and which is a vertical section of an apparatus adapted to carry out the invention so far as it relates to the process.

For the purposes of this application I have illustrated the invention as being carried out by a lamp which is intended for outdoor use and is especially adapted for use on vehicles of all descriptions; but I desire to have it understood that the invention is not limited in this respect, and I therefore reserve to myself the exclusive right to use any or all of its several novel features in the generation of gas for any and all purposes, as, for example, for driving motors either by its expansive force or its explosion, for heating purposes, for illuminating purposes, &c. With this explanation the following description will be confined to the apparatus as shown in the drawing.

A represents a receptacle or chamber, which is preferably of conical shape and terminates at bottom in a tubular extension A', the end of which is closed by a screw-plug B, having a threaded perforation in which fits the stem of a valve C. Preferably the chamber is formed in two parts separably united by screw-threads, as shown at *a*. The top *a''* of the chamber forms also the bottom of a water-reservoir D.

E represents a tube communicating at one end with the bottom of the reservoir D and at the other end terminating within the extension A' in such position that it may be closed and opened at will by adjusting the valve C. The annular space between the extension A' and the lower portion of the tube E is filled with a body F of some pervious material, such, for example, as a wick or a body of fine sand. If sand is used, it is confined between two diaphragms *f f'*, made of very fine wire-gauze, and where a wick is used the lower diaphragm *f'* may be dispensed with. Preferably the tube E is formed in two telescopic sections *e e'*, the former of which is permanently united to the bottom of the reservoir D and the latter of which is permanently united to the lower part of the chamber A through the medium of the diaphragms *f f'*.

G is a tube communicating at its lower end with the upper portion of the chamber A, passing upward through the reservoir D, and having at its upper end a burner H. The upper portions of the chamber A and reservoir D are in communication through a tube I, provided with a valve I', by which it may be closed when desired, the ends of both of the tubes G and I that are in communication with the chamber A being covered by a fine wire-gauze diaphragm J.

The apparatus thus constructed is charged and used as follows: The conical portion of the chamber A is filled with metallic carbide X (or whatever other solid material is to be used) to, say, the level of the dotted line *a'*, the carbide being preferably pulverized or granulated and used in a loose mass, and the reservoir D is filled with water to, say, the level of the dotted line *d'*. Upon opening the tube I and the lower end of the tube E water will flow by gravity into the lower por-

tion of the tubular extension A', whence it will percolate upward through the pervious body F and come in contact with the bottom surface of the body of carbid, whereupon
5 reaction will set in. The gas generated will pass upward through the body of carbid and in doing so will be perfectly dried. From the upper part of the generating-chamber it will pass through the tube G to the burner.
10 As the reaction proceeds the residue will accumulate between the feeder F and the carbid X, as shown at Y, and the quantity of residue will of course continuously increase as the quantity of carbid decreases. This
15 residue is of a pervious nature, and while it somewhat retards the passage of water it does not prevent it, albeit the extent of the retardation is proportional to the thickness or depth of the body of residue. This being so,
20 it will be seen that if the bodies of carbid and residue had parallel sides and the water were compelled to percolate upward through the body of residue, being resisted both by the residue and by gravity, the resistance
25 would increase as the thickness or depth of the body of residue increased. This being so, the supply of water reaching the carbid would continuously lessen throughout the entire period of generation, and as a result
30 of this the quantity of gas generated would correspondingly lessen. In order to prevent this variation in the quantity of gas generated, where the arrangement is such that the passage of the water through the residue is
35 resisted by gravity, I arrange the carbid in a body the cross-sectional area of which, proceeding from the surface that is exposed to the water, gradually increases, and the preferred and simplest manner of accomplishing
40 this is to place the carbid in a tapering or conical receptacle such as shown. With this arrangement the areas of the opposing surfaces of the residue and carbid gradually increase throughout the entire period of generation, and the ratio of increase is such that
45 the rate of generation will be kept practically uniform. In other words, as its feeding capacity per square inch of surface decreases the total area of its surface opposed to the surface of the carbid increases, and by properly
50 graduating the body of carbid the quantity of gas generated may be kept practically constant throughout the period of generation. I believe myself to be the first to confine the
55 residue resulting from the reaction in contact with the body of carbid and make it serve as a medium and the only medium through which the water is fed to the carbid, and to

supply this residue with such a quantity of water that the quantity of water reaching the
60 carbid, and consequently the quantity of gas generated, will be kept practically constant, and while I prefer to arrange the carbid in a receptacle having flaring sides and introduce
65 the water to the body of carbid at the bottom thereof, still I desire to have it understood that in its broadest aspect my invention is not limited to these details. The described arrangement is simple and has been found to be
70 effective. A peculiarity of the process of generating gas in this way is that the residue resulting from the reaction of water on a body of carbid of a given volume is of greater volume than that of the carbid used, and by arranging the carbid in the manner described
75 this increase in the bulk is provided for, its only effect being to continuously raise the level of the carbid in the chamber.

It will be seen that, as shown in the drawing, the taper of the chamber A varies in the
80 vicinity of the diaphragm *f*. This is for the purpose of preventing the generation of an excessive quantity of gas at the instant the water first comes in contact with the carbid and before any residue is formed, but this
85 variation in the shape of the chamber is really not material and performs no function after the level of the residue has passed it.

I do not claim as my invention the specific form of apparatus herein shown for carrying
90 out my improved process.

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

The process of generating gas at a substantially uniform rate which consists in confining
95 metallic carbid in a body or mass, continually exposing it at one of its surfaces to contact with a liquid, confining the continually-increasing body of residue, where it
100 forms, in contact with the continually-decreasing body of carbid, so that it may serve as a medium through which the liquid may be fed to the carbid, and feeding the liquid
105 to the carbid through said medium, the shape of the body of carbid being such that the superficial area of the body of residue which is exposed to the carbid gradually increases throughout the period of generation and the
110 ratio of said increase is such that the rate of generation will be kept practically uniform, substantially as set forth.

CHARLES E. RAND.

Witnesses:

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