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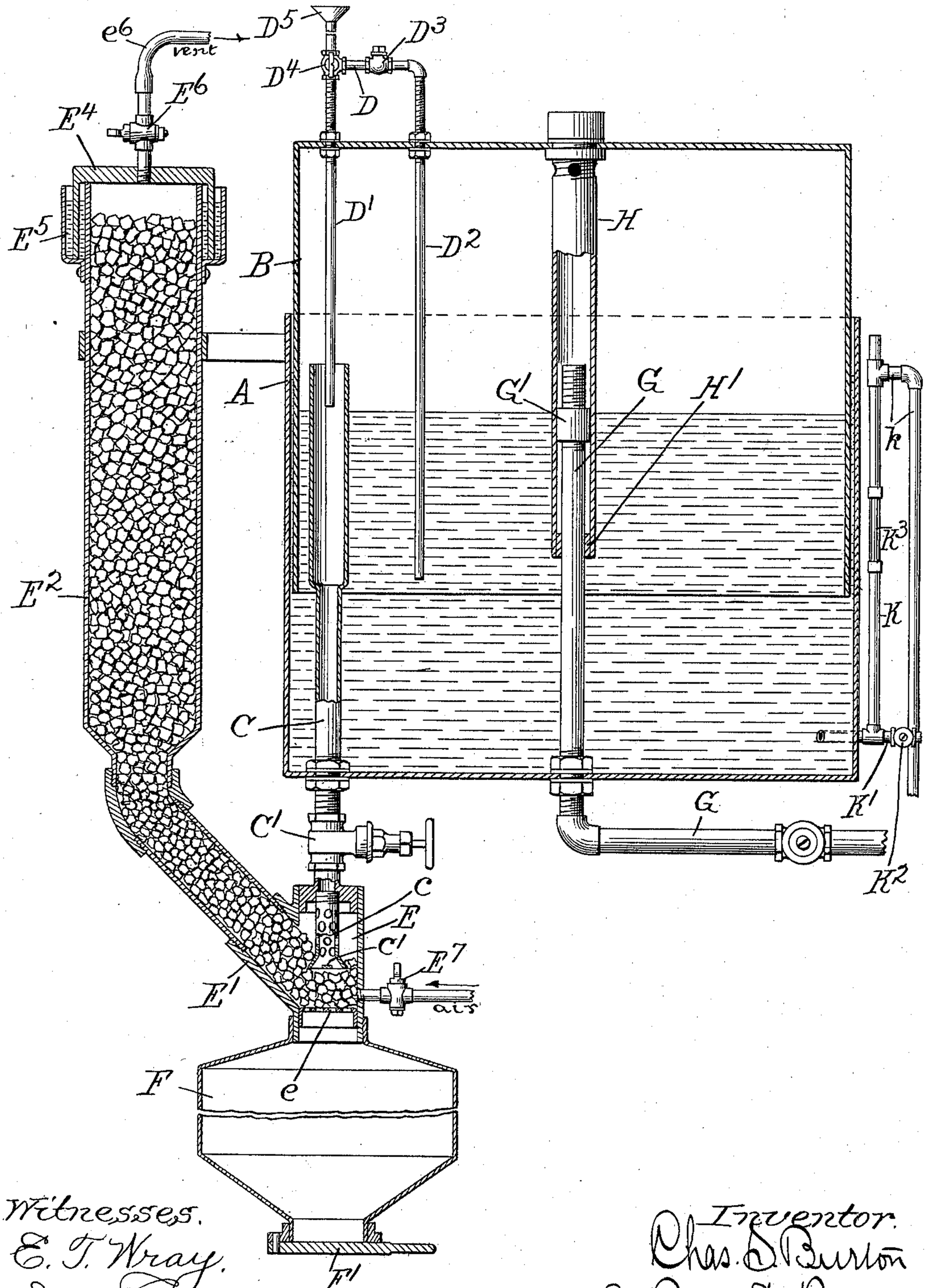
C. S. BURTON.

AUTOMATIC ACETYLENE GAS MACHINE.

(Application filed Nov. 23, 1896.)

(No Model.)



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CHARLES S. BURTON, OF OAK PARK, ILLINOIS.

AUTOMATIC ACETYLENE-GAS MACHINE.

SPECIFICATION forming part of Letters Patent No. 609,226, dated August 16, 1898.

Application filed November 23, 1896. Serial No. 613,051. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. BURTON, a citizen of the United States, residing at Oak Park, county of Cook, and State of Illinois, have invented certain new and useful Improvements in an Automatic Gas-Machine, which are fully set forth in the following specification, reference being had to the accompanying drawing, forming a part thereof.

In the drawing the figure is a vertical section of my improved gas-machine.

This invention relates to machines in and by means of which gas is generated by means of a union of a liquid and solid. The most familiar instance of this sort is acetylene gas made by the use of calcic carbid and water as the solid and liquid, respectively; and in the following specification I describe my invention with reference specifically to this gas and these elements as a means of making it; but I do not intend thereby to be limited to the use of the machine with water and carbid of calcium, although these elements are used in the description for convenience.

This machine comprises an ordinary telescoping gas-holder with water seal, A being the lower or fixed section and B the upper or moving section.

A pipe C extends up through the bottom of the fixed section, terminating above the water-line.

A siphon D is mounted on and carried by the moving section, having a limb D′ protruding down within the upper open mouth of the pipe C, the other limb D^2 extending to any convenient depth in the water, and for maximum utility it may extend substantially or nearly to the level of the lower open mouth of the moving section.

A check-valve D^3 is necessary at some point in the siphon, opening in a direction to permit the water to pass through the siphon into the limb D^2 and out through the limb D′. It is most conveniently located at the top of the siphon, as illustrated. Preferably the siphon is made to extend both limbs through the top of the section B, so that all necessary valves can be locked outside the holder.

A three-way cock D^4 is located at the top of the limb D′ and adapted to be set so as to form part of the siphon-passage and not open otherwise or so as to close the siphon-passage and also a passage upward to the funnel D^5. The purpose of this valve is to afford means for shutting off the siphon-passage entirely or opening it for priming through the funnel D^5.

The pipe C below the holder is provided with a gate-valve C′, and below said valve it opens into a pocket E, which constitutes the generating-chamber. This pocket E is the vertical limb of a Y, whose oblique limb E′ constitutes the discharge from the carbid-magazine E^2, which, as illustrated, is a vertical cylinder extending up alongside the holder and provided at the top with a cover E^4, which is set in the annular pocket E^5, surrounding the top of the magazine, said pocket being filled with liquid and constituting a liquid seal for the cover.

At the bottom of the generating-chamber E is a grate or perforated plate *e*, and below said chamber E is an ash-receiver F, provided with a shut-off gate or valve F′ at the bottom. The pipe C may have a perforated terminal *c* below the valve C′ and protruding centrally within the chamber E for a purpose which will be hereinafter fully explained.

E^6 is a vent-cock attached to the cover E^4 and connected by a flexible pipe e^6 to any convenient flue. E^7 is an inlet ventilator or draft cock controlling an inlet for air into the lower part of the generating-chamber E. The use of these cocks E^6 and E^7 will be hereinafter explained.

G is the service-pipe, which leads from the gas-space of the holder, and H is a guide-pipe made rigid with the top of the section B of the holder, the pipe G entering said guide-pipe and having a collar G′, which fits the latter, a bushing H′ being also provided at the lower end of the pipe H, fitting the pipe G, so that the two pipes telescope one within the other as the section B rises and falls, the collar G′ and the bushing H′ constituting stops whose engagement limits the expansion of the holder. The pipe H is perforated near the top to admit the gas, which passes out through the pipe G.

The operation of this machine is that upon the sections of the holder being properly telescoped and supplied with water, the air being allowed to escape through the pipe G until the section B descends far enough to bring

the lower mouth of the branch D′ of the siphon below the water-level in the holder, the siphon being primed through the funnel D^5, and the valve D^4 being then set so as to shut off the funnel, but open the siphon-passage, water will pass through the siphon and be discharged from the mouth of the branch D′, falling through the pipe C into the chamber E, the valve C′ being opened. If there be carbid of calcium in the chamber, gas will be immediately generated by the contact of the water with the carbid of calcium and will pass back through the pipe C, the water falling therein in drops or a slender stream, offering no essential obstruction, and will first displace the air in the holder and then pass out through the service-pipe G for consumption. So long as the consumption equals the supply generated the holder will remain expanded to the point which will cause the siphon to discharge the amount of water which is necessary to generate the amount of gas which is being consumed. If the amount of gas generated exceeds the consumption, the holder will expand and the siphon be lifted and immediately cease to discharge water into the generating-chamber, thus causing the production of gas to cease until the consumption overtakes the supply and the holder collapses enough to bring the siphon discharge-mouth again below the water-level. Thus in practice the holder will stand expanded to an extent which will cause the discharge-mouth of the siphon to vibrate slightly past the water-line, passing below it and rising above it only sufficiently to discharge water and interrupt the discharge, as required.

The perforated terminal *c* of the pipe C, within the chamber E, prevents the carbid descending through the branch E′ from piling up through the top of the chamber, making the carbid below the end of the perforated terminal and directly upon which the water falls of less depth than it would otherwise be and leaving a gas-space above it around the terminal, so that the gas escapes more freely, passing through the perforations of said terminal. The terminal is not essential, however, and may be omitted. In order to increase the generating capacity of the device, it may be important that the water, which for rapid generation will be delivered in a continuous slender stream, shall be dispersed over as large a quantity of carbid as possible, and so have opportunity to act upon the carbid to generate gas therefrom before it can escape through the grate. For this purpose a bar *c′* may be extended across the mouth of the terminal *c*, onto which the water will fall and into which it will be dispersed in a spray over the carbid.

As the calcic carbid is dissolved by the action of the water in generating gas the residuum passes through the grate *e*, mingled with an excess of water sufficient to make it moderately fluid, and the place vacated above the grate is taken by a fresh supply of carbid sliding down the branch E of the Y from the carbid-magazine, operating somewhat after the manner of a self-feeding coal-stove. The residuum can be removed from the residuum-receptacle F at any time without permitting the escape of gas by merely first closing the valve D^4 and then the valve C′, said valve C′ cutting off all gas communication with the holder and the valve D^4 preventing the discharge of water into the pipe C while the valve C′ is shut. This leaves only the gas which may be in the magazine to be provided for, and this is cleared out by opening a valve E^6 and the vent or draft valve E^7, which controls a passage leading into the lower part of the generating-chamber E. The gas in the magazine being lighter than air, the opening of these two valves will permit the air to force the gas out upwardly into the ventilating-flue, which will be accomplished in a few seconds, after which, the gate or valve F′ being opened, the residuum may be drawn out in a semiliquid condition without the escape of any troublesome quantity of gas. The same method will be followed when it is desired to replenish the supply of carbid in the magazine, the cover E^4 being removed for the purpose.

The whole process of withdrawing the ash or replenishing the carbid will occupy but a few seconds, so that the interruption of the process of generation during that time causes no inconvenience, the supply in the holder being ample for a very much longer time.

Suitable means for maintaining the water-supply in the holder may be added to avoid the necessity of replenishing that supply by hand or otherwise periodically—for example, a stand-pipe K on a supply-pipe K′, which latter leads into the holder, the stand-pipe having an overflow *k* at the level necessary to maintain the desired level in the holder—that is, as much higher than the inner liquid-level of the holder as necessary to measure the desired pressure to be maintained on the gas. The valve K^2, which controls the supply, will in such case be set so as to admit continuously, as nearly as can be calculated, the amount of water which can be taken out by the siphon to produce gas.

A few experiments will determine in each instance the proper adjustment of the valve, and a gage-glass K^3 on the stand-pipe will show at all times the height that the valve may be adjusted according to the requirements.

Some of the advantages of this construction are that the water is discharged always upon a fresh quantity of carbid, so that the response is at all times prompt and at all times substantially equally prompt. Also, to the full extent of the capacity of the pipe C gas may be generated in the holder, the quantity of water discharged determining the rate of generation and this quantity in turn being determined by the rate of consumption, the more rapid consumption permitting the holder to collapse a little more

and remain collapsed longer or continuously if the consumption continuously equals the product of gas with a continuous discharge of water. From this it results that a very much smaller holder can be employed for furnishing a large quantity of gas than in the case of machines in which the rate of production or generation of the gas decreases as the original charge of carbid becomes weakened. The advantage because of being able to remove the residuum or replenish the carbid at any time without either interrupting the supply of gas or waiting for the exhaustion of the previous charge will be obvious.

I claim—

1. In a gas-machine in which an expansible holder is supplied with gas from a generating-chamber; a passage leading from the gas-space of the holder downward and terminating in the generating-chamber; a siphon which is raised and lowered by expansion and collapse of the holder, one end of such siphon being immersed and open in the liquid throughout all the fluctuations of the holder, and the other end terminating in said passage; and suitable means to prevent the flow of liquid through said siphon toward the immersed end.

2. In a gas-machine, in which an expansible liquid-sealed gas-holder is supplied with gas from a generating-chamber, in combination with such holder and chamber, a siphon which is raised and lowered by the expansion and collapse of the holder, having one end immersed and open in the seal liquid of the holder throughout all the expanding and collapsing movements of the latter, the other end being adapted to discharge into the duct or port of gas communication between the generating-chamber and the holder.

3. In a gas-machine in which an expansible holder is supplied with gas from the generating-chamber; such holder and chamber and a source of liquid, combined with a siphon which is raised and lowered by the expansion and collapse of the holder, one end of the siphon being immersed and open in the liquid throughout all the expanding and collapsing movements of the holder, the other end being adapted to discharge through the port or passage of gas communication between the generator and the holder.

4. In a gas-machine in which an expansible liquid-sealed holder is supplied with gas from a generating-chamber, such holder and chamber combined with a duct or passage which is open at its upper end in the gas-space of the holder, and which terminates at the other end in the generating-chamber; and a siphon which is raised and lowered by the expanding and collapsing movements of the holder having one end immersed in the seal liquid of the holder throughout all the expanding and collapsing movements of said holder, and having the other end open and adapted to discharge into said passage.

5. In a gas-machine, an expansible holder constructed to contain liquid and gas-space above the liquid; a generating-chamber communicating with the gas-space of the holder, and a siphon having one limb extending into the liquid of the holder and the other limb extending within the gas-communicating passage from the generating-chamber to the holder and adapted to be lowered therein by the collapse of the holder; and means for preventing backflow toward the limb which is immersed in the liquid.

6. In a gas-machine, an expansible holder constructed to contain liquid and gas-space above the liquid; a generating-chamber communicating with the gas-space of the holder; a siphon attached to the moving element of the holder having one limb immersed in the liquid and the other limb protruding within the gas-communicating passage leading from the generator, and a check-valve in said siphon arranged to prevent backflow therethrough into the liquid-immersed end.

7. In combination with a telescoping gas-holder, a gas-duct leading up through the water-space thereof and open in the gas-space above the same, and a generating-chamber into which said gas-duct opens at the lower end; a magazine exterior to the holder and a passage leading from the magazine to the generating-chamber adapted to conduct by gravity fragmentary solid matter from the magazine to the generating-chamber, and suitable means by which the collapse of the holder causes water to be delivered into said gas-duct.

8. In a gas-machine for making gas by the action of liquid upon a solid, in combination with a gas-holder, a magazine for the solid located out of the path of the gas to and from the holder; a generating-chamber and a conduit leading laterally thereinto, through which conduit the solid in fragments is delivered by gravity from the magazine to the generating-chamber; a grate which restrains the movement of the solid into the generating-chamber; a source of liquid, and a duct by which such liquid may reach the generating-chamber and act upon the solid stopped by the grate; a receptacle into which the liquid and residuum of the solid may flow upon passing the grate, and a gas-duct leading from a point in the generating-chamber at which the liquid encounters the solid on the grate into the gas-holder.

9. In a gas-machine, in combination with the gas-holder, a magazine for solid matter from which the gas is to be generated wholly exterior to the gas-holder; a generating-chamber connected with the magazine and with the gas-space of the holder; and suitable means for delivering water to such generator, the magazine having an air-vent at the top, and the generator having an air-inlet near the bottom, and a valve in the duct which connects the generator with the holder, whereby said last-mentioned valve being closed, the generator and magazine may be venti-

lated by the circulation of air from the bottom of the generating-chamber up through the same and through the magazine.

10. In a gas-machine, in combination with the gas-holder, a magazine exterior thereto; a generator which receives fragmentary solid matter from the magazine by gravity, a gas-duct from the generator to the holder, and the valve which controls such duct; the magazine having a liquid-sealed cover; a ventilating-cock mounted on such cover and a draft or lower air-inlet cock controlling an air-passage into the generator.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 21st day of November, 1896.

CHAS. S. BURTON.

Witnesses:
JEAN ELLIOTT,
BERTHA C. SIMS.