

No. 613,651.

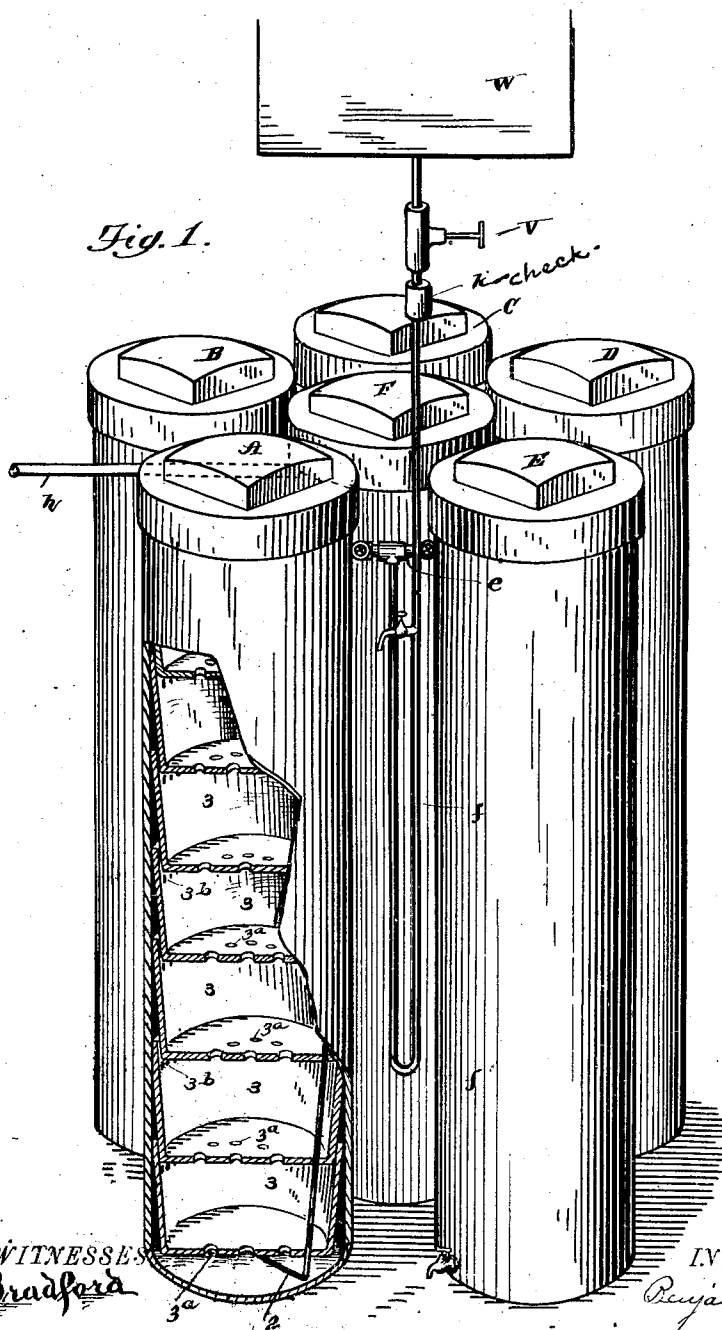
Patented Nov. 1, 1898.

B. F. BAILEY.
ACETYLENE GAS GENERATOR.

(Application filed Sept. 10, 1896.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES
J. W. Bradford

Virginia M. Clough

INVENTOR

Benjamin F. Bailey

By

Parker & Burton

Attorneys.

No. 613,651.

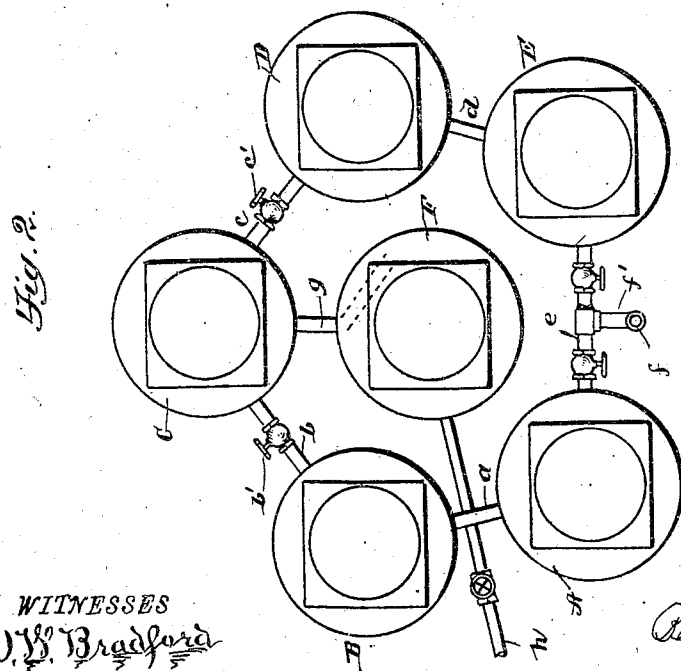
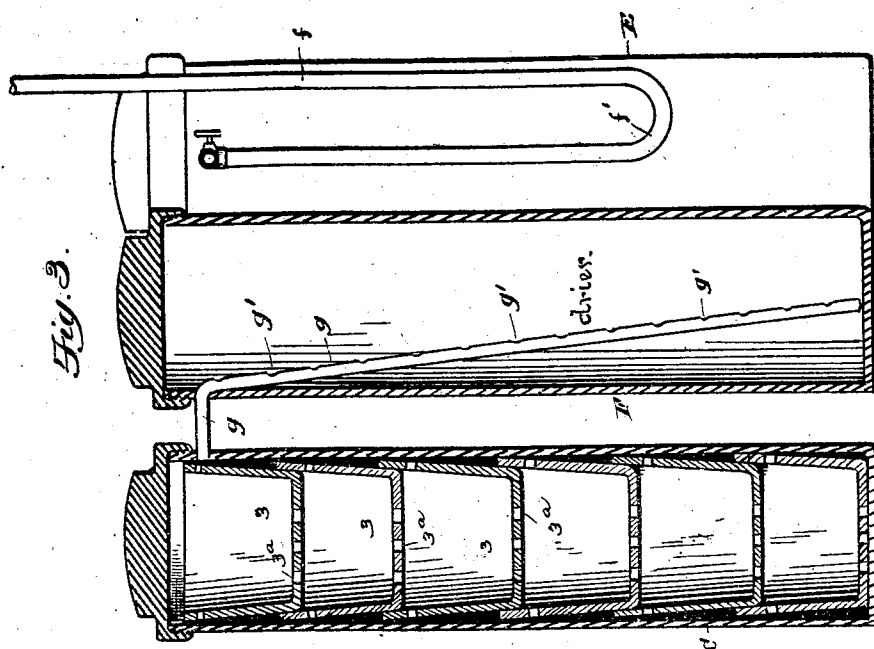
Patented Nov. 1, 1898.

B. F. BAILEY.
ACETYLENE GAS GENERATOR.

(Application filed Sept. 10, 1896.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES
D. W. Bradford

Virginia M. Clough

By

INVENTOR
Benjamin F. Bailey
Parker & Bunker

Attorneys.

UNITED STATES PATENT OFFICE.

BENJAMIN F. BAILEY, OF YPSILANTI, MICHIGAN, ASSIGNOR OF ONE-HALF
TO PETER W. SHUTE, OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 613,651, dated November 1, 1898.

Application filed September 10, 1896. Serial No. 605,455. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. BAILEY, a citizen of the United States, residing at Ypsilanti, county of Washtenaw, State of Michigan, have invented a certain new and useful Improvement in Acetylene-Gas Producers; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to generators for the production of acetylene gas, and has for its object a machine which is adapted to produce such gas continuously as fast as it is drawn off for use and no faster. It is arranged to produce gas in very small quantities if only a small quantity is used and to produce it as rapidly as may be desired for consumption, depending, of course, on the capacity of the machine, which is arranged in sizes to meet the requirements of the particular location in which it is to be used.

One object of the invention is to admit the water which is used to slack the calcium carbide only a single drop at a time and from time to time as fast as the water which has been admitted is used up and the carbide slacked and gas liberated therefrom.

Another object is to produce a machine from which the waste may be readily and quickly removed and a new supply inserted without even stopping the action of any part of the machine, except those parts that are cut out to be cleaned.

In the drawings, Figure 1 shows the machine in perspective, the casing of one tank being broken away in part. Fig. 2 shows a plan view of the several tanks. Fig. 3 shows a vertical cross-section through the central tank and one of the side tanks.

A, B, C, D, and E show several tanks, which may be more or less in number, as may be desired, and which will be called hereinafter "generator-tanks" in distinction from the middle tank F, which will be called the "drying-tank," although at times the material in the generator-tanks may be used for drying purposes and at times the material in the central tank may be used for generating purposes. These tanks are closed receptacles,

preferably cylindrical in form, with caps at the top that are readily removable and are secured to the tank by any desirable method of fastening. The generating-tanks are connected near the top by intercommunicating tubes *a b c d*, and in these tubes are suitably-disposed valves *b' c'*. The tanks A and E may be considered the first and last of the series, and to the pipe *e*, which connects these tanks A and E, is connected a supply-pipe *f*, which has a bend or trap *f'* and leads at its upper end out from an elevated water-tank W. In the pipe *f*, above the bend or trap and between the bend and the water-tank W, is a hand-actuated valve V and a check-valve in a casing *k*. The check-valve in the casing *k* opens downward by gravity and is closed by the pressure upward or backward of the water in the pipe *f*, actuated by the pressure of the gas in the generator-tank, and this check-valve is preferably of the kind known as the "float-check," light enough to float on water, but heavy enough to drop away from the seat when the pressure is removed. In the pipe *e*, on either side of the entrance thereto of the pipe *f*, is a hand-actuated valve, by means of which the water flowing from the tank W may be directed at will either into the tank A or the tank E, as may be desired.

In each of the generating-tanks is inserted a lifting-bail 2, and inside the lifting-bail is a stack of cups, each of which flares slightly, so that the upper cup sets slightly into the cup below it, or, if desired, the cups may be of the same diameter at the top and bottom, so that one will set on top of the other. The bottom of each cup is perforated with perforations 3^a, and at the side there are also, preferably, other perforations 3^b. The perforations may be omitted at the sides if suitable means are provided for the admission of water over the top of the under cup and into the space below the cup above. The water might percolate upward through the spent material; but it is desirable that as the water rises in the tank its access to the material in the cups should be unimpeded to as great an extent as possible.

The several cups 3 3 3 are partly filled with the blocks of the carbide of calcium or the material from which the gas is produced when water is admitted to it.

The connection-pipe *b* should preferably be on a slightly-lower plane than the connecting-pipe *a*, so that water will begin to run from the tank B to the tank C before the pipe *a* is filled with water, and on the reverse side of the machine the pipe *c* should be slightly lower than the pipe *d*, and the pipes *a* and *d* should be on a slightly-lower plane than the pipe *c*.

10 From the tank C a pipe *g* leads into the drying-tank F and extends to the bottom of that tank, leading from the top to the bottom on an oblique line and being provided on its upper side with perforations *g' g'*. In this
15 drying-tank F the carbid is placed in a mass, and in the first instance gas that is generated in any of the generators finds its way into this tank, from which it escapes through the pipe *h* to its place of consumption. In passing
20 through the material in the tank F any moisture that may have been carried forward with the gas is absorbed by the material, with a creation of gases from the material itself, and at a later period, when the generating-
25 tanks have been successively filled with water and water begins to run into the central tank E, it follows along the under side of the pipe *g* (that side which is removed from the holes *g'*) and goes to the bottom of the tank or to the
30 periphery of the water that has accumulated in the tank, and thus attacks the carbid on the under side, working its way slowly upward, as in the foregoing tank.

The operation of the gas-producer is as follows: The several tanks are charged with carbid, and the tank W is filled with water. The valves are all closed to prevent the escape of gas except through the pipe *h*. The valve *V* is opened and the water permitted to drop
35 down through the pipe *f* and into the generating-tanks. The valve-seat at the check-valve *k* has an opening through it so small that it permits only a small quantity of water to pass—*i. e.*, for instance, a drop at a time—
40 or this flow may be regulated at the valve *V*, if desired. It should be regulated so as to produce about the quantity of gas that is desired. The water first fills the trap *f'*. Thence it flows into the tank A and drops to the bot-
45 tom of the tank A, where it accumulates slowly and attacks the material in the tank from the bottom. Rising slowly as the material is destroyed, the carbon chemically unites with some of the hydrogen of the water, and
50 the lime remains as a residue. Inasmuch as the water flows in very slowly, that which does flow in runs down the side of the tank, leaving the top portions of the material substantially unaffected until the bottom por-
55 tions have been entirely converted. The gas rises and passes through the generators B and C into and through the drier F, and in passing through these tanks any moisture that may be held in suspension is taken out of it.
60 When the water in the generator A is raised to a level with the pipe *a*, it flows over into the generator B and continues to work through

in the same way, and so also in the generator C, and it will continue through the generators D and E and through the drying-tank F if
70 not interfered with. When, however, the generators A and B have been exhausted and it is desired to renew the charge in these two generators, the valve in the pipe *c* that closes that branch which leads into the generator A
75 is closed, the valve *b'* is closed, the valve in that branch of the pipe *c* which leads into the generator E is opened, and the valve *c'* is opened. The cups of the generators A and B may now be removed, recharged, and replaced, the caps
80 replaced, and the generators A and B are again in condition for the production of gas.

If the consumption of gas is discontinued or reduced below the ability of the machine to produce gas, the gas accumulates in the
85 generators and there is a back pressure against water in the trap *f'*. The back pressure lifts the check-valve and prevents the further flow of water until the back pressure is balanced by the weight of the water on the
90 check-valve. This weight may be made constant by having a constant supply of water in the tank W in any of several well-known ways.

In filling the cups care should be taken
95 that each cup is only filled about two-thirds or less than two-thirds full, because I have found that the carbid when it slacks and parts with its carbon leaves a residuum that is practically pure lime, but which in bulk is fifty
100 percent greater than is the carbid from which it is formed, and if the cup is filled too full there is apt to be a breaking or bursting strain on the generator or the cup. So, too, it is
105 quite desirable that there be free entrance for water to the bottom of each cup over the top of the material in the cup next below, because the refuse matter is quite tightly packed and the water does not percolate through it readily. I have found with this apparatus
110 that the refuse matter remains almost dry, even when water enough has been admitted into the first generator so that it gathers in the spaces around the cups and overflows into the next generator.

As the gas generates and accumulates in the generating-tank there is a pressure created, and this pressure acts to force the column of water in the trap *f'* backward toward the water-tank W and against the check-valve in
120 the casing *k*. The gas acts freely to produce this back pressure even from the tank C, because the pipes *a b* are not on a level and the pipe *b* is the lower, and consequently these pipes never fill full of water, the feed-water
125 being so limited in amount that it never fills any of them.

What I claim is—

1. In a generator for the production of gas by the chemical action of a liquid on a solid,
130 the combination with an inclosing tank, of a series of cups arranged in a stack stationarily supported in said tank, each of said cups being provided with openings through the bot-

tom and with means for admitting the liquid at the top thereof; a pipe adapted to deliver liquid into the tank at or near the top thereof, a valve adapted to control the inflow of the liquid into the tank through said pipe, means whereby said valve is actuated by the pressure of gas in said tank, and a gas-outlet pipe communicating with said tank at or near the top thereof, substantially as described.

2. In a machine for producing gas by the chemical action of a liquid on a solid, the combination of a series of tanks for holding the material, a liquid-supply connected to the first tank at or near its top, a single pipe connecting each tank with the next succeeding tank and constituting the gas-escape and liquid-supply pipe from each tank to the next succeeding, said pipes being arranged at or near the tops of said tanks and each succeeding pipe being on a slightly-lower level than the next preceding pipe and all being lower than the liquid-supply for the first tank, a draw-off pipe from the last tank of the series, and means in said liquid-supply adapted to be operated by back pressure of the gas to control

the supply of liquid to the tanks, substantially as described.

3. In a generator for the production of gas by the chemical action of a liquid on a solid, the combination with an inclosing tank, a series of cups adapted to be arranged in a stack, each of said cups being provided with openings through the bottom and with means for admitting liquid at the top thereof, a pipe adapted to deliver liquid into the said tank near the top thereof, a valve adapted to control the inflow of liquid to the tank and means whereby said valve is actuated by the pressure of gas in said tank, said pipe being provided with an inverted siphon between the valve and its outlet into said tank, whereby the gas-pressure on the valve is made constant.

In testimony whereof I sign this specification in the presence of two witnesses.

BENJAMIN F. BAILEY.

Witnesses:

PETER W. SHUTE,

VIRGINIA M. CLOUGH.