No. 639,046. Patented Dec. 12, 1899.

W. J. HOLDEN & A. F. FIELDER.

ACETYLENE GAS GENERATOR.

(Application filed Mar. 4, 1899.)

(No Model.) 2 Sheets—Sheet 1.

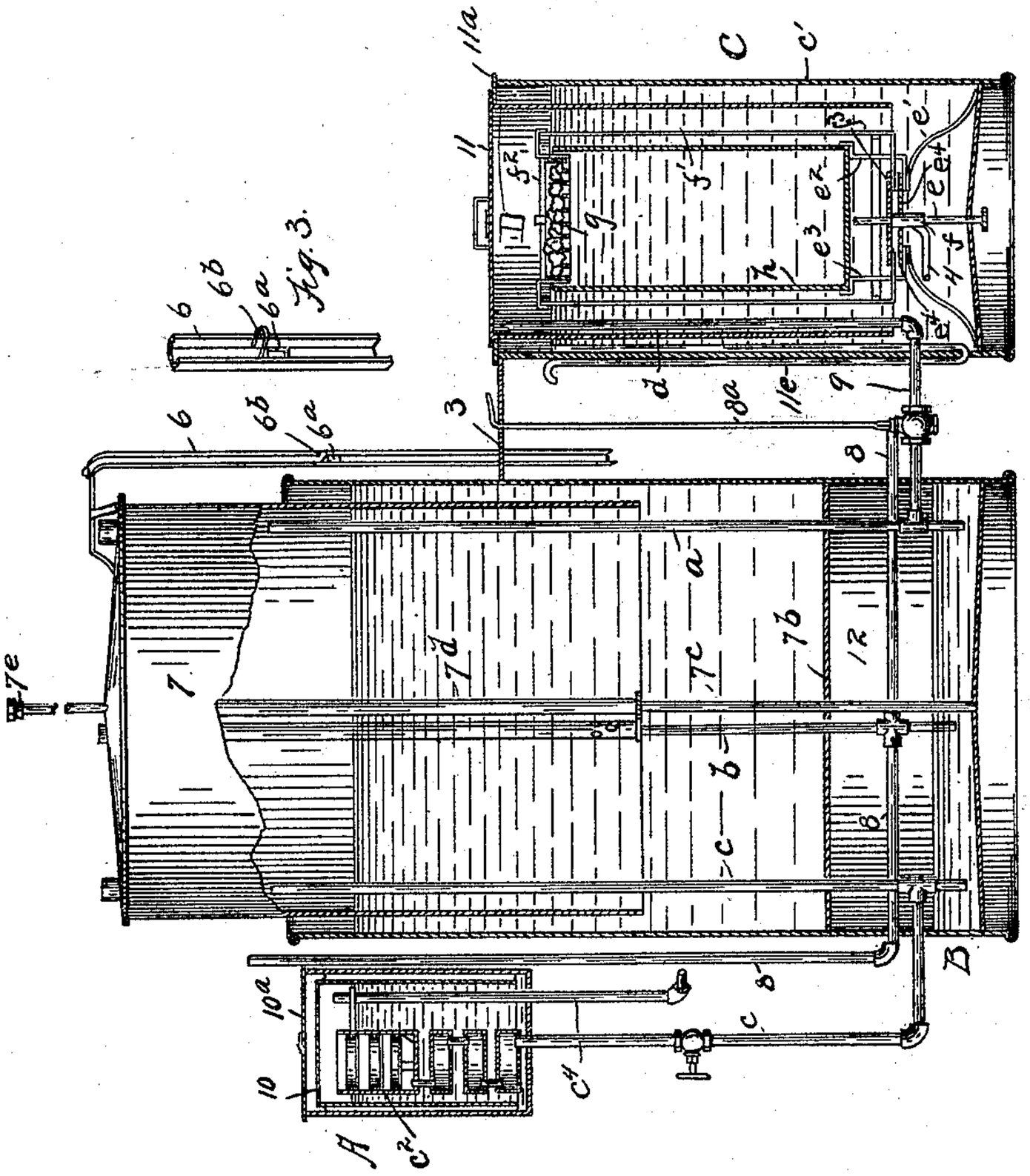

Fig. 3.

Fig. 1.

WITNESSES
Chas. Wisner
John N. Goodrich

By

INVENTORS
William J. Holden
Alfred F. Fielder
Parker & Burton
Attorneys.

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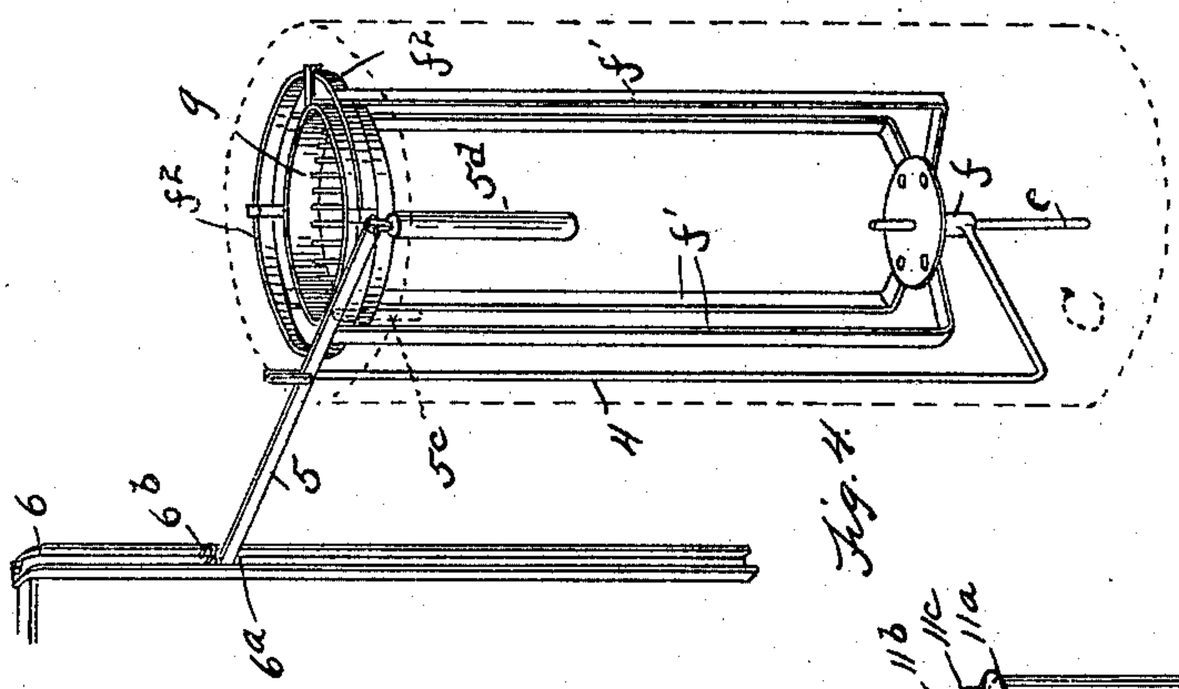

Fig. 4.

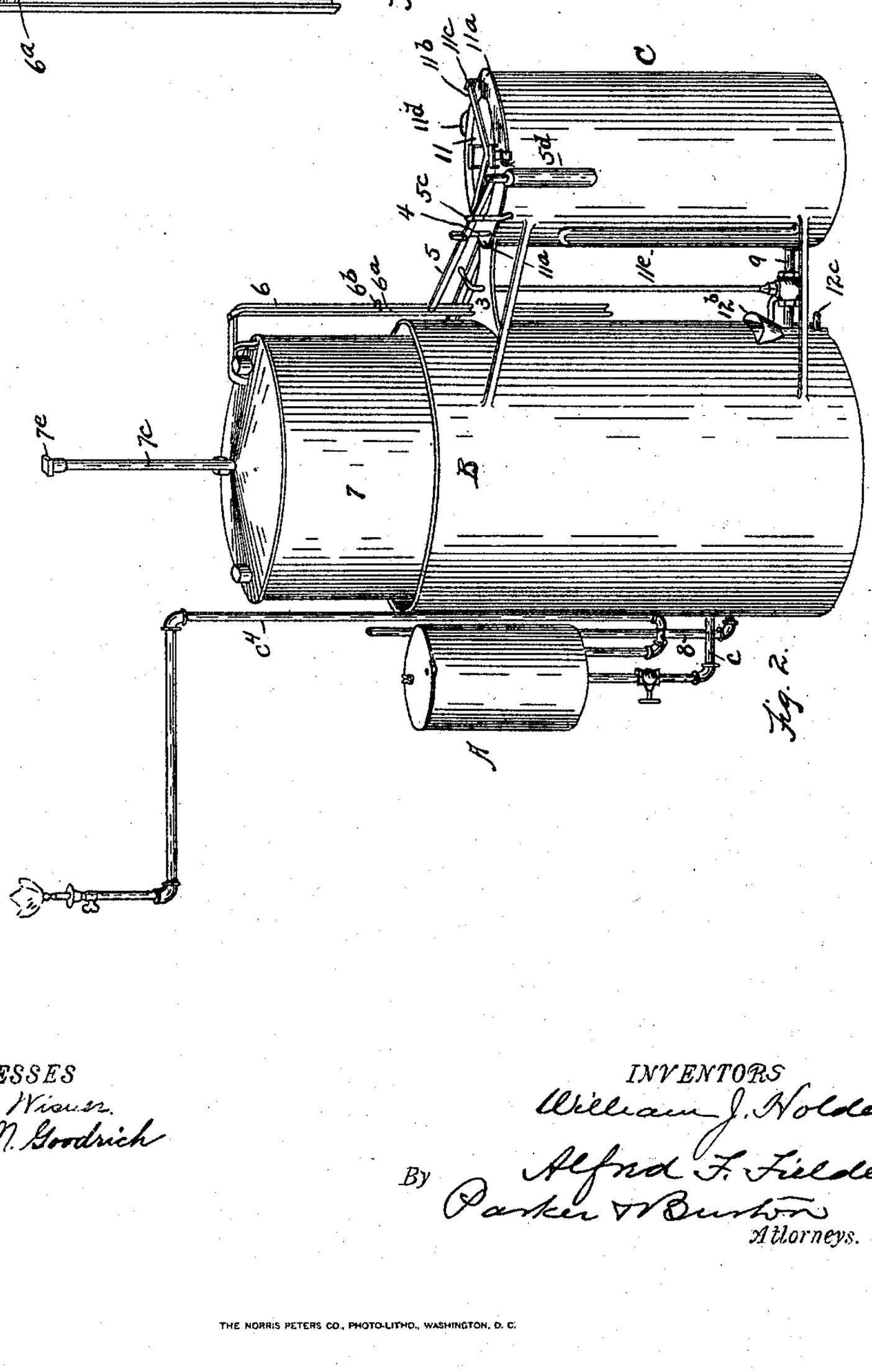

Fig. 2.

WITNESSES
Chas. Wisner.
John N. Goodrich

INVENTORS
William J. Holden
Alfred F. Fielder
By Parker & Burton
Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM J. HOLDEN AND ALFRED F. FIELDER, OF BELLEVUE, MICHIGAN, ASSIGNORS OF ONE-HALF TO ALBERT J. SAWYER AND ALLEN HAVENS, OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 639,046, dated December 12, 1899.

Application filed March 4, 1899. Serial No. 707,820. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. HOLDEN and ALFRED F. FIELDER, citizens of the United States, residing at Bellevue, county of Eaton, State of Michigan, have invented a certain new and useful Improvement in Acetylene-Gas Generators, Coolers, and Purifiers; and we 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 acetylene-gas generators, and has for its object an improved generator which is automatic in its action, safe in use, and economical, because it is arranged to generate gas only as fast as the gas shall be consumed. It may be adjusted so that the generation of the gas will cease because the storage-tank is filled and so that the generation of gas will recommence as soon as the tank has been emptied or partly emptied—emptied to the point where the adjustment provides for the recommencement of generation—and during the interval no carbid will have been subjected to or been in contact with the water used to produce the gas from the carbid.

The generator is simple in form and easily handled and attended to. It does not require the attendant to lift vessels containing large quantities of water or to move heavy parts of the machine, and the fact of subjecting the carbid to the water is accomplished without danger, as the water or the gas holding or containing parts of the generator are sealed in, so that there is no liability that gas will accidentally escape either during the charge of the machine or after the machine has been charged.

In the drawings, Figure 1 is a sectional elevation. Fig. 2 is a perspective. Fig. 3 is a detail of a lever guide or actuator. Fig. 4 is a detail showing in perspective the means for immersing the carbid or lifting it from the water.

The generator consists, essentially, of three tanks, on one of which the gas is generated, the second of which is an expansible gas-holder, and the third is a cooling-chamber and purifier combined. The gas is intended to be used as fast as it is generated and would not become sufficiently cooled for use if it were taken directly through the expansible gas-holder to which it is first conducted from the generating-tank. It is well known that acetylene gas must be cooled before it is burned, or the flame from it will be dull and smoky, and consequently after it is generated and while it still contains the heat produced by the chemical action of generation it must be subjected to some cooling process or the results will not be satisfactory, and therefore in this machine arrangements are made for passing gas through chambers that have a large radiating-surface in contact with water.

In the drawings the generating-tank is indicated at C, and this consists of an outer receptacle c', closed by a cover 11. The cover 11 is provided with a bell D, of which the side walls dip deeply toward the bottom of the tank. Said cover may be secured in position on the tank C by radial arms 11^b, which project beyond the edge of the upper face of the cover 11 and engage under hooks 11^c on the top of the tank C. d is a pipe connecting the upper part of the interior of said bell with the gasometer or expansible tank B. All the parts for holding the carbid are under the cover of this bell, and consequently whatever gas is generated is confined in the bell and can only escape therefrom through the pipe d.

In the tank C is a spider e', which supports above the bottom of said tank the frame-stepped bracket e^2 e^3, arranged to hold a pail or similar receptacle h.

e is a post rigidly secured to and rising vertically upward from the center of the bottom of the tank C upon a plate e^4.

f is a sleeve extending through an aperture in the plate e^4 and adapted to slide upon the post e.

4 is a bent link secured to the lower end of the nipple f, extending horizontally toward the periphery of the tank C, then bending upward and extending between the bell D and tank C upward and through an aperture in the cover 11 and terminating on the out-

side of the tank, with means by which it may be pivotally connected to a lever 5.

The sleeve f carries at its upper end, upon a plate f^3, a cage f'. The frame of the cage f' extends first horizontally from the plate f^3, beyond the frame e^2 e^3, then vertically upward above the normal level of the generating-water, and is provided at its upper end with a ring f^2, upon which can rest a flange of a carbid-holding basket g. The frame f' is capable of considerable vertical motion, limited by the plate e^4 and the bottom of the pail h.

g is a basket for containing the carbid. The basket g rests upon the movable frame f' above the pail h and in a position such that the lime produced by the decomposition of the carbid drops into the pail; but the basket can be raised so as to be filled with its contents out of the water.

It is not necessary to pack the link where it passes through the flange on the top of the tank C, nor is it necessary that any special arrangement for packing the bell D and the tank C be made, because the water seal prevents the gas from rising into the space between the bell D and the outer wall of the tank C. The bell is held in place by any suitable fastening—as, for example, by radial arms 11^b, which project beyond the edge of the upper face of the bell D and engage under hooks 11^c on the top of the tank C. The tank C is fitted with a receiving-spout 11^d, into which water may be poured and which leads into the annular space between the outer casings of the tank C and the bell 11. It is also fitted with any suitable indicator to indicate when the proper amount of water has been poured into it.

11^e is a tube communicating with the interior of the tank C, near the level of the water in said tank, extending downward then through the walls of said tank and rising on the outside of said tank to a position at the height of said level. When the tank C has been filled with water to a point a little above its normal line, that fact will be indicated by the water appearing at the upper end of the tube 11^e.

A pipe 9 enters the tank C and rises inside the tank and inside the bell 11 and terminates near the top of the tank C, just below the upper end of the bell, its terminal being above the outleading branch of the tube 11^e, so that its terminal will always be above the water-line. The pipe 9 leads into the reservoir or the expansible tank B and rises in that tank into the space above the water. On that part of the pipe 9 which crosses from the tank C to the tank A is a three-way valve, and into one of the ways of the three-way valve leads a waste-pipe or safety-pipe 8. The passage into the safety-pipe 8 through the three-way valve is normally closed by a plug which may be turned by means of a long stem 8^a, the valve being arranged to control the passage-ways between the two tanks to open or close such passage-ways or to close the way from the tank B to the tank C and open, if desired, at the same time a passage from the tank C into and through the waste-pipe 8.

The gas is conducted from the tank B, through the pipe c, into a system of coolers that are located in the tank A. These coolers consist of a number of small chambers that are shallow, but broad, and are closed entirely in, except that into each one there leads a pipe, so that in fact the several chambers constitute a continuation of the pipe c, having arrangement made for a large radiating-surface compared with the volume of the pipe. The uppermost of these chambers c^2 is open, so that the gas may escape from it freely into that portion of the tank A which is reserved for gas and above that portion which is reserved for water. At this point there is stretched across the chamber a sieve or strainer, preferably of textile material, which will stop any dust or dirt that may by any chance have been carried thus far by the gas. The service-pipe c^4 leads from the gas-chamber of the tank A, and both the radiating-chambers and the top of the service-pipes are covered in by a sealing-bell 10, which is placed in the tank A, beneath the cover 10^a, and the cover need not be provided with a gasket or other appliance to prevent the escape of gas, as no gas can pass the seal in either this tank or tank B or C.

The pipe a, which is a continuation of the pipe 9, and pipe c, which reaches up into the expansible tank B, enter through the bottom of that part of the tank which is to contain the seal-water into which the bell 7 extends. Those parts of these pipes which are below the bottom 7^b extend into a chamber 12, which contains seal-water. Each of the vertical pipes is open at its lower end and dips at its lower end into the seal-water in the chamber 12. Above the seal-water are branches. The branch from the pipe a leads to the generating-tank, and the branch from the pipe c leads to the cooling-tank. The waste or safety pipe 8 also has a vertical branch b, with an open terminal at the bottom and with an open terminal at the top, but it is covered by an independent telescoping or bell cover that extends nearly as low down as the sides of the bell 7, so that under ordinary positions there is no passage for gas from the bell 7 into and through the waste-pipe 8; but should the bell 7 rise too high there will be a passage-way opened into the escape-pipe 8, and the gas will escape through that pipe without lifting the bell out of the seal-water.

The bell 7 is guided by means of a post 7^c, upon which there is a telescoping cap $7^{d'}$. Accidental displacement of the bell from the post is prevented by a stop 7^e at the top of the post.

From the top of the bell 7 hangs a guide 6, and this guide is in the form of a channel-bar. The lower end of it passes through a

perforation in the plate 3, which reaches from the tank B to the tank C and serves as a part of the framework by which the two tanks are bound together. The channel-bar 6 is provided at a proper point with a hole 6^a through the web of the bar, and above the hole 6^a is a stop 6^b. The location of the hole and the stop depends on the size of the parts, and the arrangement is such that the end of the lever 5 will slip into the hole when the gas-holder has been expanded to nearly the extent desired. The lever 5 is fulcrumed to a post 5^c, that rises from the tank C. It is pivoted to the link 4, between the fulcrum and that end of the lever which engages in the groove of the channeled guide 6, and on the opposite or free end there is a weight 5^d. When the basket *g* is above the water in the tank C, the end of the lever 5 which is toward the guide 6 is much higher than the other end. The weight 5^d acts to raise said end of said lever, and thereby said basket, and to hold them in their raised position. When there is no gas in the holder, the bell 7 drops, and the guide 6 drops with it, and the end of the lever 5 is in engagement with the guide, but is not carried down by it until the stop 6^b engages over the end of the lever. The end of the lever then slips through the hole 6^a and is carried down against the counteracting weight 5^d. This serves to lower the link 4 and the basket *g*, and the carbid in the basket is lowered into the water in the generating-tank. The generation of gas commences, and the gas entering the receiver lifts the bell 7 and the guide 6 and soon begins to lift the lever and the basket by the lower bounding edge of the hole 6^a contacting the end of the lever 5 and forcing it upward. Said lever and basket rise by reason of the force of the gas, aided by the counterweight. As soon as the basket is lifted, however, the carbid is out of the water, and gas no longer generates after the water which adhered to the carbid of the basket has been used up. As soon as the gas is consumed the process is repeated. The continued lifting and dropping of the basket tends to wash out the lime from the spent carbid, and the lime drops into the pail *h*, which may be readily lifted out of the tank C when the tank is again charged or preparatory to again charging the tank.

Provision is made for either pouring water into the sealing-chamber 12 or allowing any excess of water that may gather to escape therefrom by means of the spout 12^b and the spigot-hole 12^c. The hole 12^c is generally left open, and it is located at such a height that there will be proper depth of seal-water in the chamber 12; but the water will not collect beyond the proper depth in that chamber. There is always a tendency for water to collect in the chamber 12, because all the pipes that lead through this chamber are provided with open mouths at their lower ends for the purpose of affording an escape for water of condensation from any of the pipes of the generator.

What we claim is—

1. In an acetylene-gas generator, in combination with a generating-tank and an expansible receiver-tank, a vertically-movable carbid-supporter in the generating-tank, a lever adapted to actuate the movable supporter, said lever being normally in a position inclined to the horizontal, a lever-actuator attached to the movable part of the receiver, said lever-actuator consisting in a grooved guideway for the end of the lever, a hole through said guideway a lug upon said guideway adapted to contact said lever and force said lever toward a horizontal position thereby forcing its end through said hole, whereby the rising of said actuator again raises the end of said lever, substantially as described.

2. In an acetylene-gas generator, the combination of a generating-tank provided with a bell, D, having its lower open end submerged in the sealing-water in said tank, its upper closed end extending above said water, a pail-supporting frame, e^2 e^3, beneath said bell, a pail in said frame, a frame, f', adapted to support and to reciprocate a carbid-receptacle above said pail, a carbid-receptacle supported by the frame, f', a link, 4, secured to the frame, f', and extending below the lower edge of said bell and between the bell, D, and tank, C, to and above the surface of the water in said tank, a pipe leading from said bell to said storage-tank, and means whereby the movable portion of said storage-tank actuates said link and thereby moves the frame, *f*, substantially as and for the purpose described.

3. In an acetylene-gas generator, the combination of a generating-tank, provided with a central open-work frame, e^2 e^3, adapted to support a lime-receptacle, a second open-work frame, f', independent of the frame, e^2 e^3, an open-work, or basket carbid-holder supported on the frame, f', directly above the lime-receptacle, and means for reciprocating the frame, f', vertically to bring the carbid-holder into and out of the generating-water, substantially as described.

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

WILLIAM J. HOLDEN.
ALFRED F. FIELDER.

Witnesses:
HUGHES SYKES,
A. J. SAWYER.