

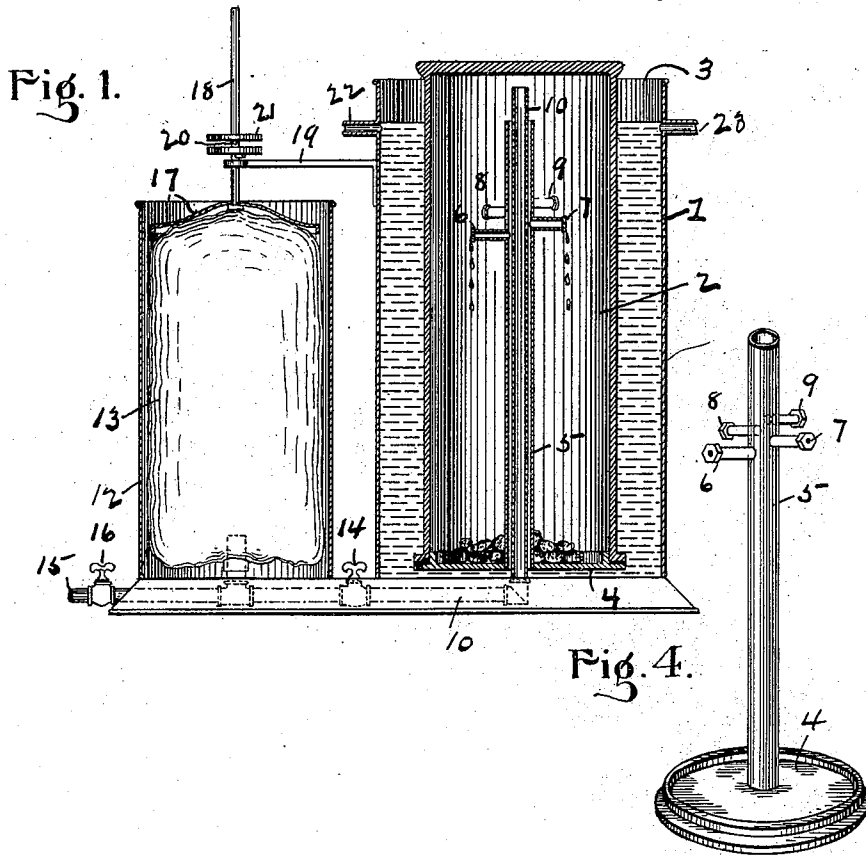
(No Model.)

2 Sheets—Sheet 1.

J. H. MORLEY.
ACETYLENE GAS GENERATOR.

No. 563,981.

Patented July 14, 1896.



Witnesses.
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Fig. 2.

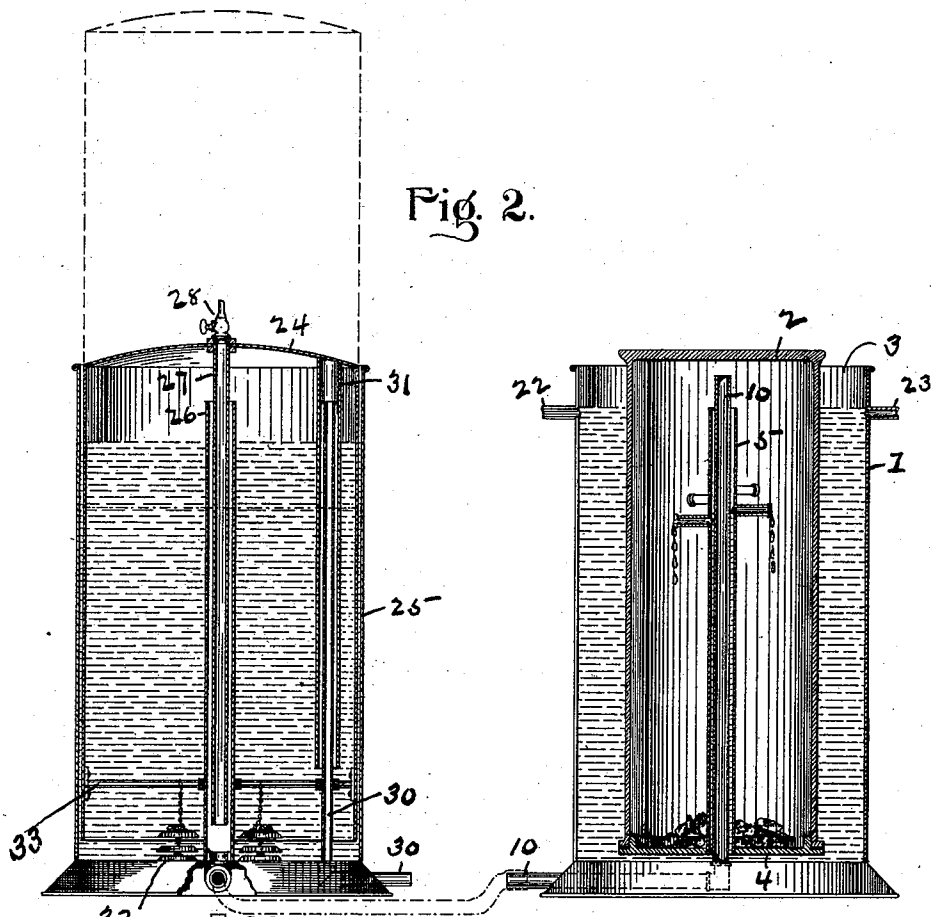
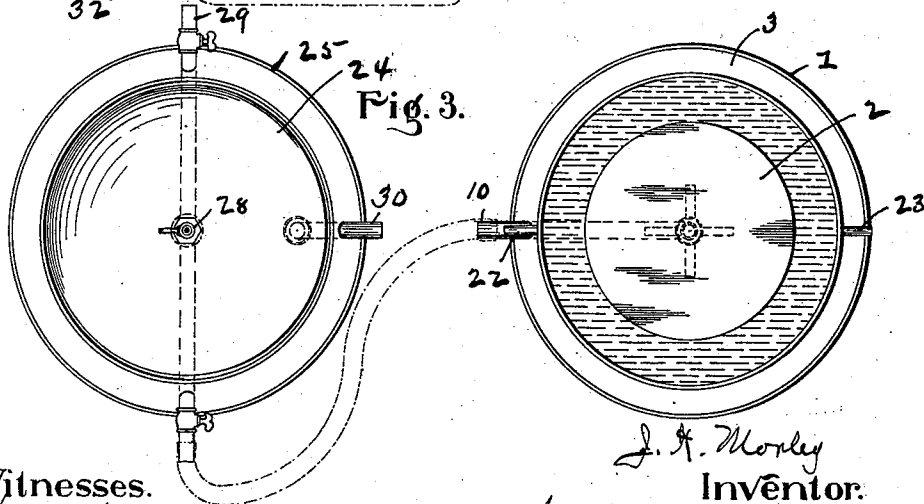


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 563,981, dated July 14, 1896.

Application filed October 29, 1895. Serial No. 567,259. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. MORLEY, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Gas-Generators, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

My invention relates to the generation of acetylene gas from carbide of calcium by the application of water to the latter; and it has for its object to provide a very simple and inexpensive form of apparatus by means of which the quantity of gas generated can be regulated to correspond to the quantity consumed, automatically, without the use of mechanical devices, such as regulating-valves, &c.

To this end my invention consists in the generating apparatus in which the difference between the pressure of the gas and the weight of the column of water which supplies the generator is utilized to automatically govern the generation of the gas, hereinafter fully described, and particularly pointed out in the claims.

Referring to the drawings, in which like numerals designate like parts in the several views, Figure 1 is a view in vertical section of one form of apparatus embodying the invention. Fig. 2 is a similar view of a second form thereof. Fig. 3 is a plan view of the form shown in Fig. 2. Fig. 4 is a detail view of the water-supply pipe shown in Figs. 1 and 2.

Referring to Fig. 1, the numeral 1 designates an open receptacle or reservoir, and 2 designates a generating-chamber centrally located within said receptacle in such manner as to afford the annular space 3 for holding water. The chamber 2 is closed at its upper end, and at its lower end is provided with the removable bottom 4, through which bottom extends the water-supply pipe 5. (Shown in detail in Fig. 5.) Said pipe 5 extends nearly to the top of said chamber, is open at both ends, and near its upper end is provided with a plurality of outlet-openings located in varying horizontal planes, said outlet-openings preferably having the form of short

branch pipes 6 7 8 9, as shown. Within said pipe 5 is located the outlet-pipe 10 for gas, which pipe extends downwardly through the bottom of the receptacle 1, and passes thence to and through the bottom of a receptacle 12, located adjacent to said receptacle 1, and thence into a holder 13, located within said receptacle 12, said holder being preferably composed of elastic material, a valve 14 being located in said pipe between said receptacles to govern the passage of gas to said holder. A service-pipe 15, herein shown as constituting a continuation of pipe 10 beyond the open communication of the latter with holder 13, serves to conduct the gas from said holder to the point where it is utilized, said pipe containing a valve 16. A head 17, loosely mounted within the receptacle 12, rests by gravity upon the elastic holder 13, from which head projects a rod 18, which passes upwardly through an eye at the end of a guide-bracket 19 on the receptacle 1, and is provided with laterally-projecting pins 20, graduated as to their length or position to correspond with the openings in a series of weights 21, normally resting upon said guide-bracket, whereby the uppermost pin will pass through the openings of all except the uppermost weight without raising them, but will raise said uppermost weight as the head 17 and its rod move upwardly, and so on with each succeeding weight and pin. A water-supply pipe 22 and an overflow-pipe 23 communicate with the receptacle 1, as shown.

The operation of this form of the apparatus is as follows: The carbide of calcium (shown at *x*) is introduced within the generating-chamber 2 by withdrawing the latter from the receptacle 1 and removing its bottom 4, after which said chamber is restored to its working position. Water is then admitted to the receptacle 1, the same rising within the annular space 3 thereof until it reaches the level of the overflow-pipe 23, and at the same time rising within the pipe 5 until its further upward movement is stopped by the pressure of the air confined within the chamber 2 at some point below the lowermost opening 6 thereof. Valve 14 is then opened, permitting the air in chamber 2 to escape to the receiver or

holder 13, whereupon the water in pipe 5 rises to its highest point in said pipe and flows through all of the outlet-openings 6, 7, 8, and 9, dropping thence upon the carbid at the bottom of the chamber. Such contact of the water with the carbid causes the instant generation of gas, which, rising to the top of the chamber and passing thence through pipe 10, enters the holder 13, expanding the latter and carrying upwardly the head 17 and its rod 18. In such upward movement of the rod 18 it first picks up the uppermost weight 21, the addition of which weight to the back pressure exerted by the gas upon the column of water in pipe 5 depresses said column below the level of the uppermost opening 9 thereof, and to that extent diminishes the amount of water fed to the carbid and the amount of gas generated. In its further upward movement the rod 18 picks up the second weight 21, thereby depressing the column of water in pipe 5 below the level of the outlet-opening 8, and so on, each succeeding weight picked up causing a further depression of the supply-column of water and a corresponding reduction of the amount of gas generated, until the last weight is picked up, (there being as many weights as there are outlet-openings in pipe 5,) when the column of water is depressed below the level of the lowermost opening 6 of the supply-pipe, thereby entirely shutting off the supply of water to the carbid and the generation of gas ceases. If, now, the valve 16 be opened and the gas lighted at the burner or burners supplied by the service-pipe 15, the withdrawal of gas from the holder 13 causes the head 17 and rod 18 to descend until its lowermost weight 21 is deposited upon the bracket 19, and the reduced weight exerted upon the holder reduces the back pressure upon the column of water in pipe 5 sufficiently to cause it to rise again to the level of the lowermost opening 6, thereby admitting more water to the carbid and generating more gas. Should several burners be lighted at once, so that the amount of gas consumed lowers the head 17 and rod 18 still farther, it deposits its second weight upon the bracket 19 and the water rises in pipe 5 to the second opening 7, and so on, the amount of water fed to the carbid and the amount of gas generated being exactly governed by the amount of gas consumed, so that the apparatus operates with entire accuracy whether it be generating gas for a single burner or for the maximum number of burners for which its capacity is designed. Such operation of the apparatus is entirely automatic, it being necessary simply to renew the supply of carbid as often as it becomes exhausted and to keep the receptacle 1 supplied with water.

It will thus be seen that I provide an apparatus for the generation of acetylene gas which is of the simplest form, and by means of which the quantity of gas generated is governed by the quantity consumed without the use of regulating-valves or other complicated

mechanical means, such automatic action being entirely due to the alternate differences between the pressure of the gas and the upward pressure or head upon the column of water in the supply-pipe.

In the form of the apparatus shown in Figs. 2 and 3 I use identically the same form of generator as that just described, but in place of the elastic holder 13 I employ a receiver 24, vertically movable within a receptacle 25, and having its open, lower end water-sealed by water in said receptacle in a manner common to gas-receivers generally. The pipe 10 in this instance connects with a vertically-disposed pipe 26, centrally located in the receptacle 25, for conducting the gas to the upper end of receiver 24, and I provide said receiver with a pipe 27 depending from its upper end, which has a telescopic action within the pipe 26 and serves to guide the receiver in its movement. A petcock 28 at the upper end of said pipe 27 enables gas to be drawn directly therefrom, if desired, but a service-pipe 29 is provided at the bottom of the receptacle for use as in the form first described. An escape-pipe 30 passes through the bottom of the receptacle 25 and upwardly therein to a point above the normal level of the water, said pipe having a telescopic action within a pipe 31, depending from the top of the receptacle, whereby in case an excess of gas should be generated and the receiver raised above the water-level the same will pass off through said pipe 30, which may be connected to a chimney-flue or other passage to the outside atmosphere, thus preventing any pollution of the air in the room containing the apparatus. From a cross-brace 33 of the receiver 24 are suspended a series of weights 32 by means of chains of varying lengths, as shown, which weights, when no gas is in the holder, rest upon the bottom of receptacle 25, but which, as the receiver rises, are successively picked up and, as it descends, are successively deposited again upon said bottom, their action being identical with the weights 21 in the first-described form of the apparatus. The operation of this form of the apparatus is practically identical with that of the first-described form, the only difference residing in the slightly different action of the receiver or holder, as above stated.

The generation of an excess of gas in either of the forms of the apparatus can occur only in case of leakage of some of the parts of the water-supply devices, whereby a surplus of water is admitted to the carbid, a defect which will of course be immediately remedied should it occur, and the provisions herein described for conveying any excess of gas to the open air are supplied with a view to obviating any ill effects from the happening of any such contingency, it being understood that so long as either form of the apparatus is in its normal working condition there can be no appreciable excess of gas generated.

By reference to Fig. 5 it will be noted that

the vent-tubes 6, 7, 8, and 9 of the supply-pipe 5 are not only located at varying heights in said pipe but that the tubes themselves are of varying lengths. The object of this construction is to secure a diffused distribution of the descending drops of water over the exposed area of carbid at the bottom of the generating-chamber, and thereby secure a more certain contact of the water with fresh carbid than would be possible with vent-tubes of an equal length. The same result is secured in the form shown in Fig. 4 by the varying location, transversely of the chamber, of the vents 38 39 40 of pipe 37.

In practice I provide a plurality of generating-chambers to be used in connection with either of the forms of the apparatus, to the end that a freshly-charged chamber can be kept at hand at all times to be instantly substituted in the water-receptacle for an exhausted one, and thus avoid any material interruption to the service supplied by the generator.

It will be noted that in all of the forms of the invention herein shown and described the water is conducted from an exterior source of supply to a point in the generating-chamber above the carbid in said chamber, from which point or points it descends upon the carbid in quantities directly governed by the differences between the pressure of the gas itself or of the pressure of the gas plus mechanically-added weight or weights and the pressure or head existing upon said water supply, the channel of communication between the water supply and the chamber being constantly open, thus entirely obviating the use of valves or other mechanical means for governing the passage of water to the carbid. I thus provide an apparatus for generating acetylene gas which is not only extremely simple and inexpensive in its construction, but which cannot get out of working order so long as its supplies of water and carbid are maintained.

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

1. In a gas-generator, the combination with a generating-chamber for holding calcium carbid, of a constantly open conduit leading from an exterior source of water supply to a point in said chamber above the carbid therein, and means for automatically changing the level of the delivering-orifice of said conduit and the water-level in said conduit relatively to each other, according to the amount of gas within the chamber, substantially as described.

2. In a gas-generator of the kind described, the combination with a generating-chamber having a gas-service pipe leading therefrom, of a water-receptacle forming an annular water-space about said chamber and having the water therein exposed to atmospheric pressure, and a constantly open conduit for conducting a column of water of less cross-sectional area from said annular space to a point

near the upper end of said chamber, said conduit being provided with an outlet-vent within said chamber located at a point near its upper end and below the normal level of the water in said water-space, substantially as and for the purpose set forth.

3. In a gas-generator of the kind described, the combination with a generating-chamber provided with a gas-service outlet, of a water-receptacle for holding a body of water exposed to atmospheric pressure, and a pipe leading from said receptacle at its lower end, through the bottom of said chamber and to a point near the upper end thereof which point is also above the normal level of the water in said receptacle, said pipe having its upper end open and being provided with an outlet-vent located at a point slightly below the normal level of the water in said receptacle, substantially as described.

4. In a gas-generator, the combination with a generating-chamber, of a water-receptacle, a pipe leading from said receptacle through the bottom of said chamber and upwardly within the latter to a point above the normal level of the water in said receptacle, said pipe being provided within said chamber with an outlet-vent located below the normal level of the water in said receptacle, a vertically-movable gas receiver or holder having pipe connection with the upper end of said generating-chamber, and means substantially as described for automatically increasing and diminishing the back pressure exerted by said holder upon the gas generated in said chamber, substantially as set forth.

5. In a gas-generator, the combination with a generating-chamber having imperforate sides and bottom, of a water-receptacle having constantly open communication with said chamber at a point near the upper end of the latter and below the normal level of the water in said receptacle, and means substantially as described for mechanically and automatically increasing and diminishing the back pressure exerted by the gas generated in said chamber upon the entering stream of water from said receptacle and thereby governing the admission of water to said chamber, substantially as set forth.

6. In a gas-generator, the combination with a generating-chamber having imperforate sides and bottom, of a water-receptacle communicating with said chamber by means of a pipe passing through the bottom of the chamber to a point near the upper end of the latter and provided with a plurality of outlet-vents located in varying horizontal planes, whereby the passage of water to said chamber will be governed by the pressure of gas therein, of an escape-passage for gas communicating with said chamber, and means for automatically opening the same when the gas-pressure exceeds a predetermined maximum, substantially as set forth.

7. In a gas-generator, the combination with

a generating-chamber, of an open water-receptacle having open communication with said chamber at a point slightly below the normal level of the water in said receptacle, a water-holding tank or reservoir containing a vertically-movable gas-holder the open, lower end of which is sealed by the water in the former, a pipe leading from said generating-chamber to said gas-holder, a gas-service pipe leading from said holder, and a gas-escape pipe connected with said movable holder, the end of which is normally sealed by the water in the receptacle and which is adapted to be opened by an extreme upward movement of the holder, substantially as described.

8. In a gas-generator, the combination with the water-receptacle 1, of the generating-chamber 2 located within said receptacle and having imperforate sides and bottom, pipe 5 passing through the bottom of said chamber and provided with one or more outlet-vents near its upper end, and pipe 10 passing through said pipe 5 and through the bottom of said receptacle 1, substantially as set forth.

9. In a gas-generator, the combination with the water-receptacle 1 provided with the vertically-disposed, gas-outlet pipe 10, of the generating-chamber 2 having a closed upper end and a removable bottom and having the pipe 5 passing through said removable bottom and provided with one or more outlet-vents near its upper end, substantially as described.

10. In a gas-generator, the combination with the water-receptacle 1, of the chamber 2 located therein and having imperforate sides and bottom, a water-sealed gas-holder, as 24, a water-supply pipe, as 5, leading through the bottom of said chamber 2 and provided near its upper end with a plurality of outlet-vents located in different horizontal planes, and a pipe for conducting gas from said chamber to said holder, arranged and operating substantially as described.

11. In a gas-generator, the combination with a generating-chamber, of an exterior source

of water supply, and a pipe leading from said water supply through the bottom of said chamber to a point near the upper end of the latter, said pipe being provided near its upper end with a plurality of radially-disposed vent-tubes of varying lengths and located in varying horizontal planes, substantially as and for the purpose set forth.

12. The combination with a vertically-movable gas-holder having its open, lower end water-sealed in a suitable tank or reservoir, of means for admitting gas to said holder and for withdrawing it therefrom, and a gas-escape pipe connected to said movable holder the end of which is normally sealed by the water in said tank or reservoir, and which is adapted to be opened by an excessive upward movement of the holder, substantially as set forth.

13. The combination with the water-receptacle 25 having the gas-escape pipe 30 projecting upwardly from the bottom thereof, of the vertically-movable gas-holder 24 located within said receptacle and provided with the depending pipe 31 surrounding said pipe 30, and means for introducing gas into and withdrawing it from said holder, arranged and operating substantially as set forth.

14. In a gas-generator, the combination with a generating-chamber, of an exterior source of water supply, a pipe leading from said water supply through the bottom of said chamber to a point near the upper end thereof, said pipe having near its upper end a plurality of outlet-vents located in different horizontal planes, a vertically-movable gas-holder having pipe connection with said generating-chamber, and a plurality of weights connected with said chamber and adapted to be successively picked up by the latter at different points in its vertical movement, substantially as described and for the purpose set forth.

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Witnesses:

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