(No Model.)

J. H. MORLEY.

ACETYLENE GAS GENERATOR.

No. 563,980. Patented July 14, 1896.

Fig. 1.

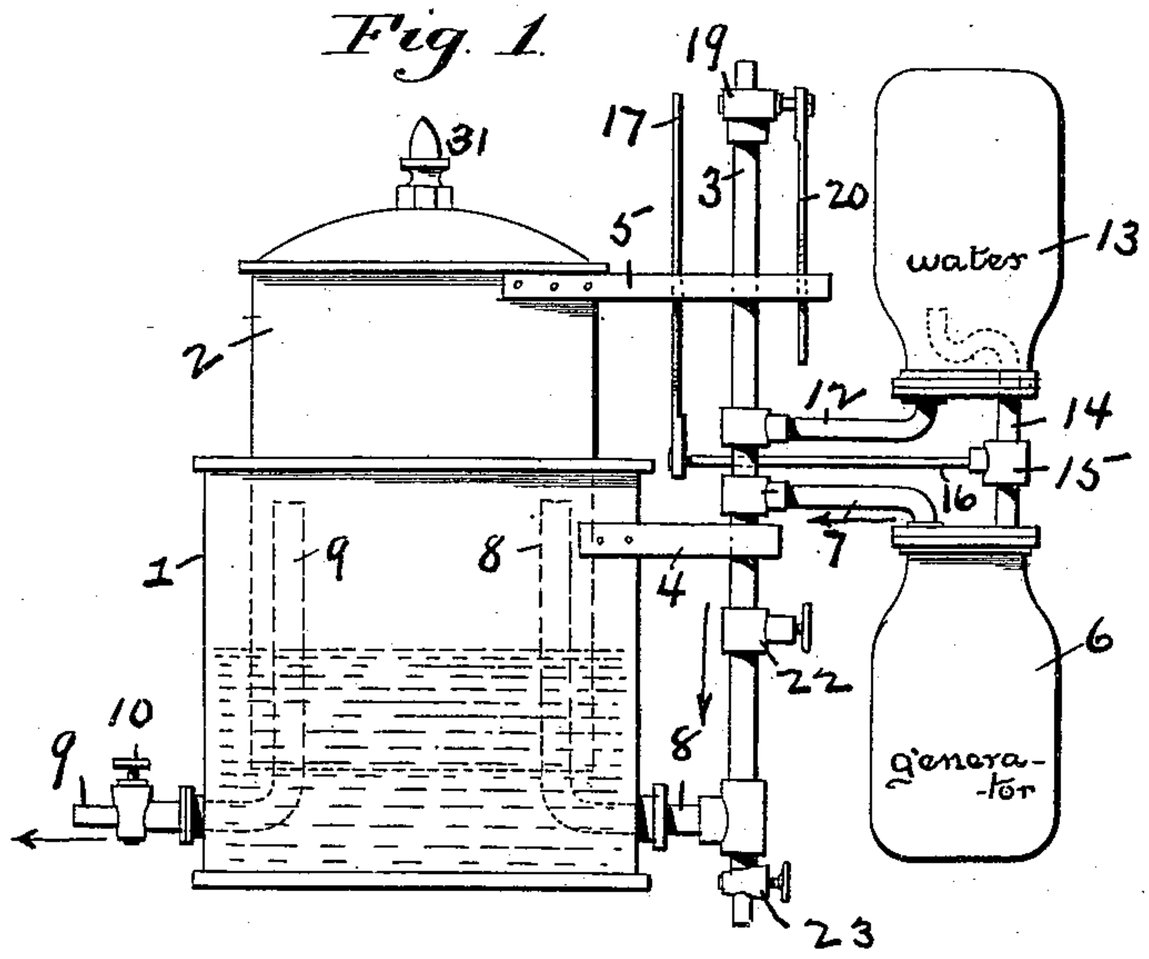


Fig. 2.

Fig. 3.

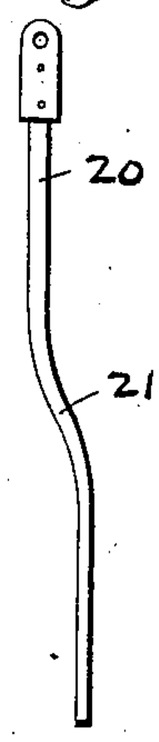
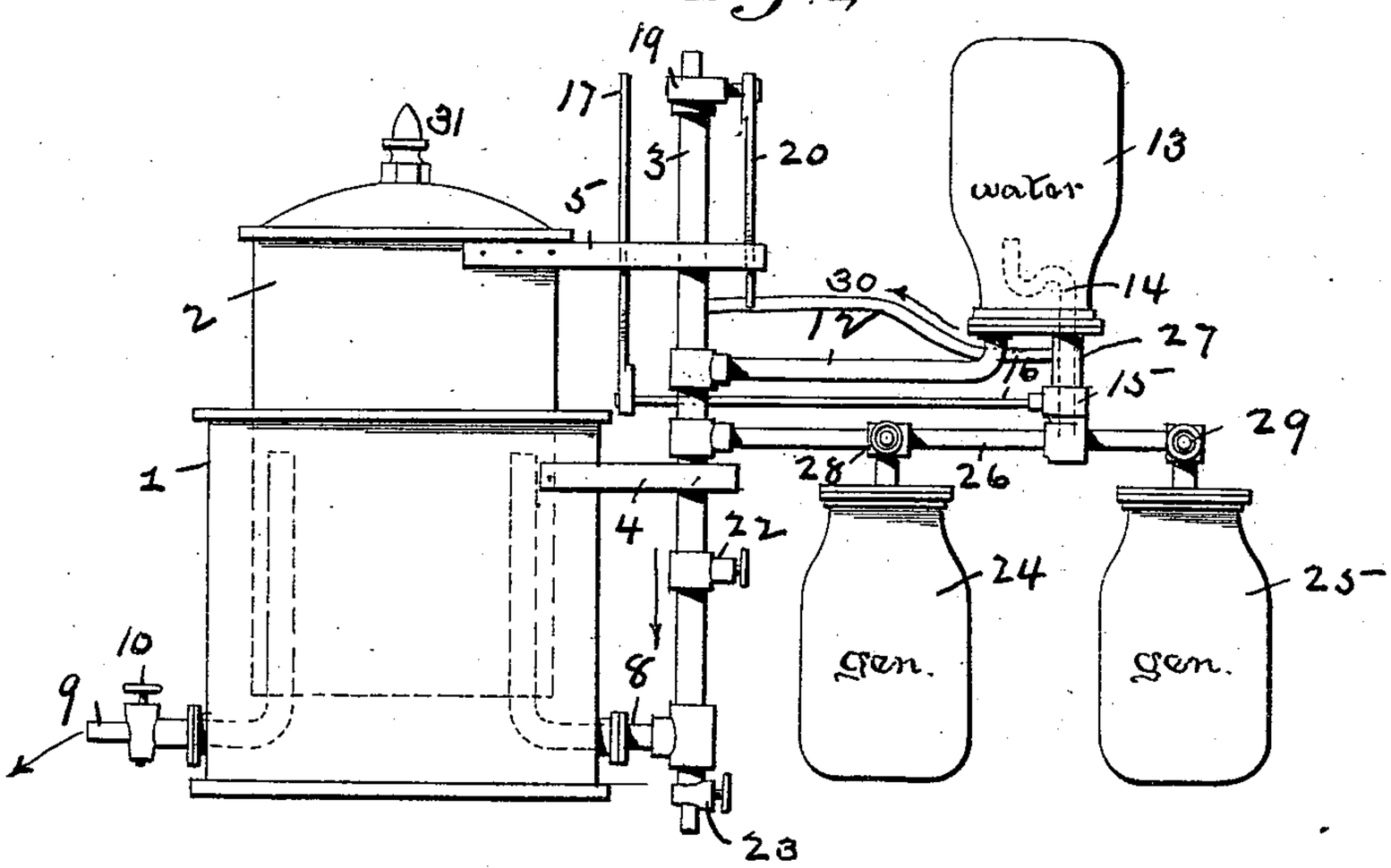


Fig. 4.



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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 563,980, dated July 14, 1896.

Application filed October 24, 1895. Serial No. 566,691. (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 apparatus for generating acetylene gas from carbide of calcium for illuminating and other purposes, and the object of the invention is to provide an apparatus of simple and inexpensive character, which will automatically restrict the amount of gas generated to the amount actually used and which will so govern the supply of gas to a burner or burners as to produce a steady and even flame.

To this end the invention consists in the apparatus 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 side view of an apparatus embodying the invention. Fig. 2 is a detail view of the cam-lever which governs the supply of water to the generating-chamber. Fig. 3 is a similar view of the cam-lever which actuates the waste or safety valve. Fig. 4 shows a slight modification in the apparatus.

Referring to Fig. 1, the numeral 1 designates a tank of any desired shape and size, and 2 designates the receiver for the gas, which receiver has its open lower end sealed by water in the tank 1, within which it is free to rise and fall in a manner common to gas-holders generally. A vertically-disposed standard 3, preferably consisting of a pipe or tube, is located adjacent to the tank 1, it being supported by braces 4, projecting from the tank or in any convenient manner, and the receiver 2 is provided at its upper end with a laterally-projecting bracket 5, which loosely embraces said standard, whereby the latter serves as a guide to steady the vertical movement of the receiver. A generating-chamber 6, in which is placed the carbide, has a pipe connection with the interior of the receiver 2 to conduct the gas from the former to the latter, and I prefer to make such connection as shown, that is to say, by means of a short pipe 7, leading from the upper end of chamber 6 into the pipe-standard 3, and a pipe 8, leading from said standard near its lower end, through the wall of tank 1 and thence upwardly within the receiver. A gas-service pipe 9, also passing through the wall of tank 1 and upwardly into the receiver, and containing a valve 10, serves to conduct the gas from said receiver to the point or points where it is utilized. Supported above the generating-chamber 6, preferably by means of a bracket 12, projecting from the standard 3, is a reservoir 13 for water, which reservoir is connected with the chamber 6 by a pipe 14, which pipe preferably terminates at its upper end in a siphon, as shown by dotted lines.

The pipe 14 contains a valve 15, having an oscillating stem 16, which is extended, as shown, to a point adjacent to the tank 1 and has connected to its outer end a cam-lever 17, (shown detached in Fig. 2,) which lever extends upwardly through a hole in the bracket 5 on the receiver 2 and is provided at the proper point in its length with a bent portion 18, whereby the vertical movement of the receiver and its bracket is caused to actuate said lever to open and close the valve 15. The sides of the hole in the bracket are pressed alternately against opposite sides of such bent portion in the upward and downward movement of the reservoir, such alternate pressures moving the cam-lever 17 in opposite directions and thus closing and opening the valve 15 at the required points in its movement.

At or near the upper end of the standard 3 is located a valve 19, the stem of which carries the cam-lever 20, (shown detached in Fig. 3,) which lever extends through another hole in the bracket 5 and is provided with the bent portion 21, by means of which the movement of the receiver is caused to open and close said valve. Said valve 19 is a waste-valve to permit the escape of any excess of gas generated over and above the holding capacity of the receiver 2, and for this purpose the upper end of the pipe-standard 3 will preferably have a pipe connection with a chimney-flue

or other outlet to the open air. A valve 22, located in the standard 3 between the branch pipes 7 and 8, enables the flow of gas to the receiver to be shut off at will or to be regulated as to quantity, as may be desired, and a drip-valve 23 at the lower end of said standard provides for the withdrawal of any water which may find its way into the same.

It is a well-known fact that carbide of calcium when brought into contact with water instantly generates the gas known as "acetylene" gas, the amount of gas generated being directly dependent upon the amount of water used and the rapidity with which it is supplied, and that such gas has a very high illuminating power, but the difficulty heretofore has been to so regulate and control the generation of the gas, relatively to the amount consumed, as to render the use of the same commercially available in competition with coal and other forms of illuminating-gas. This problem I have successfully solved with the apparatus above described, the operation of which is as follows:

The tank 1 being partially filled with water, as represented in Fig. 1, so that the lower end of receiver 2 is immersed therein, the requisite quantity of carbide being placed within the chamber 6 (which chamber will be made readily detachable from its cover, by screw-threads or otherwise, for the purpose) and the reservoir 13 being partially filled with water, (for which purpose it will be provided with a suitable opening at its upper end,) the apparatus is ready for use. In the lowest position of the receiver its bracket 5, through the action of cam-lever 17, retains valve 15 in its fully open position, and the water thus admitted to chamber 6 by coming in contact with the carbide in the latter causes the generation of the gas, and valve 22 being opened the gas passes through pipes 7 and 8 and the standard 3 into the receiver and, by filling it, causes it to rise. As the receiver rises it gradually closes valve 15 by its action on the cam-lever 17 until, by the complete closure thereof, the supply of water and the further generation of gas is stopped. If now valve 10 be opened and the gas lighted at the burner or burners to which it is conducted by the service-pipe 9, the consumption of the gas in the receiver will cause a descending movement of the latter, which movement, by its action on the cam-lever 17, partially opens valve 15 again and permits a few drops of water to descend to the carbide and thereby causes the generation of more gas, any excess of gas generated over the amount consumed again causing the closure of said valve, and so on indefinitely, the apparatus automatically regulating the generation of gas to correspond with the amount used until the generating capacity of the carbide is exhausted, when a fresh supply thereof must be introduced into the chamber 6. Should the supply of water in the reservoir 13 become exhausted, the water contained in the bend of the siphon at the upper end of pipe 14 acts as a water seal to prevent the escape of the gas through said reservoir, so that all danger of contaminating the air of the room in which the apparatus is located by escaping gas is obviated.

If for any reason any considerable amount of gas in excess of the amount consumed should be generated, the continued upward movement of the receiver caused thereby carries its bracket 5 into contact with one side of the bent portion 21 in lever 20 and opens the waste-valve 19, thereby permitting the surplus gas to pass off into the open atmosphere or into an auxiliary receiver, if desired, and doing away with all danger of explosion from such cause. The bracket presses against the opposite side of the bent portion 21 during the descent of the receiver and thus reverses the motion of the lever 20 and closes the said waste-valve.

As a matter of convenience I sometimes provide the apparatus with an auxiliary generating-chamber, so that as soon as the carbide in one chamber is exhausted the water supply can be diverted into the second chamber, and thus avoid the necessity of stopping the burning of the gas while the supply in the first chamber is being replenished. Such modification is illustrated in Fig. 4 of the drawings, in which the two chambers 24 and 25 are shown as being connected with the pipe 26 by means of valves 28 29, respectively. The pipe 26 forms a T with a short pipe 27 extending downwardly from the reservoir 13, but having no communication at its upper end with said reservoir, and a pipe 30 leads from said pipe 27 into the standard 3. The water-pipe 14 has its lower portion located within the pipe 27, as shown by dotted lines, whereby it is adapted to conduct the water from the reservoir to pipe 26 and through the latter to the chambers 24 or 25 without interfering with the passage of the gas in the reverse direction, through said pipes 26, 27, and 30 to the standard 3, and from thence to the receiver, as in the form first described. The valve 15 serves to open and close the passage through pipe 14, as previously described, its stem 16 passing through the shell of the outer pipe 27 for such purpose, while the annular passage within the latter pipe remains constantly open for the passage of the gas. It will be apparent from an inspection of the said Fig. 4 of the drawings that, the two chambers 24 25 being supplied with carbide, either of said chambers can be utilized to generate the gas, as in the first-described form of the apparatus, by opening its valve 28 or 29, and that when the carbide in said chamber becomes exhausted the other chamber can be at once thrown into action without interruption to the service supplied by the apparatus. In this manner a continuous service can be secured, the exhausted chamber being recharged with carbide while the other chamber is in operation.

A petcock 31 at the upper end of the re-

ceiver 2 serves to permit the escape of air from the receiver when the apparatus is first set in operation.

The equalizing action of the receiver upon the gas fed to the burner or burners secures a steady and even flame regardless of the amount of gas consumed and the frequency of the movements of valve 15 to admit more water to the generating-chamber.

An important feature of my invention lies in the fact that by utilizing the cam-shaped lever to actuate the water-governing valve, by the contact of said lever with the vertically-movable receiver, I am enabled to accurately govern the supply of water to the carbide for the smallest unit of light, say five-candle power, and also for the greatest unit of light for which the machine is designed, without any change in the apparatus itself, the amount of water supplied and the amount of gas generated corresponding in all cases with the amount of gas consumed.

By thus providing an apparatus which automatically restricts the amount of gas generated to the amount consumed, and at the same time secures a steady and uniform pressure upon the gas delivered through the service-pipe, I render it possible to use acetylene gas as an illuminant under precisely the same conditions that now attend the use of coal and other gases, while the light produced is of a very much higher candle-power.

The apparatus herein described can be made of any desired size and capacity, and the gas produced thereby can be used for illuminating or power-producing purposes, as may be desired.

Various modifications in the details of construction herein shown and described can be made within the spirit of my invention.

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

1. In a gas-generating apparatus, the combination, with a suitable tank and water-sealed gas-receiver vertically movable within said tank, of a gas-generating chamber having pipe connection with said receiver, a water-reservoir located in a plane above said chamber and having pipe connection therewith, a valve having oscillating stem and governing the passage of water from said reservoir to said chamber, a lever projecting from one side of said valve-stem, and provided with a bent portion, and a bracket upon said receiver loosely embracing said lever and pressing alternately against the opposite sides of such bent portion in the upward and downward movement of the receiver, to close and open the said valve, substantially as herein set forth.

2. In a gas-generating apparatus, the combination with a vertically-movable gas-receiver, of a gas-generating chamber, pipe connection between said chamber and said receiver, a source of water supply connected with said chamber, a valve governing the passage of water to said chamber, a lever connected to the stem of said valve and containing at one point in its length a cam-shaped bend, a waste-valve governing the escape of gas from said receiver, a lever connected to the stem of said waste-valve and containing at one point in its length a cam-shaped bend, and means on said receiver for loosely embracing both of said valve-operating levers in such manner that the vertical movement of the receiver will cause a swinging movement of said levers by reason of the bends in the latter, substantially as set forth.

3. The combination with tank 1 provided with the gas inlet and outlet pipes 8 and 9, of pipe-standard 3 communicating with said inlet-pipe 8, generating-chamber 6 having pipe connection with said standard, water-reservoir 13, valve 15 governing the passage of water from said reservoir to said generating-chamber and having connected to the stem thereof lever 18 provided with a bent portion as described, and the vertically-movable receiver 2 provided with the laterally-projecting bracket 5 which loosely embraces said lever 18 and presses alternately against opposite sides of the bent portion of the latter in the upward and downward movement of the receiver, substantially as described.

4. The combination with tank 1, of the receiver 2 provided with the bracket 5, pipe-standard 3 communicating with the interior of said receiver and provided with the valve 19 having connected to the stem thereof the cam-lever 20, generating-chamber 6 having pipe connection with said standard, reservoir 13, valve 15 governing the passage of water from said reservoir to said chamber and having connected to the stem thereof cam-lever 18, said cam-levers 18 and 20 being operatively engaged by said bracket 5 on the receiver, and means for withdrawing gas from said receiver, substantially as set forth.

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