(No Model.)

W. R. ADDICKS.

APPARATUS FOR MANUFACTURING GAS.

No. 576,529. Patented Feb. 9, 1897.

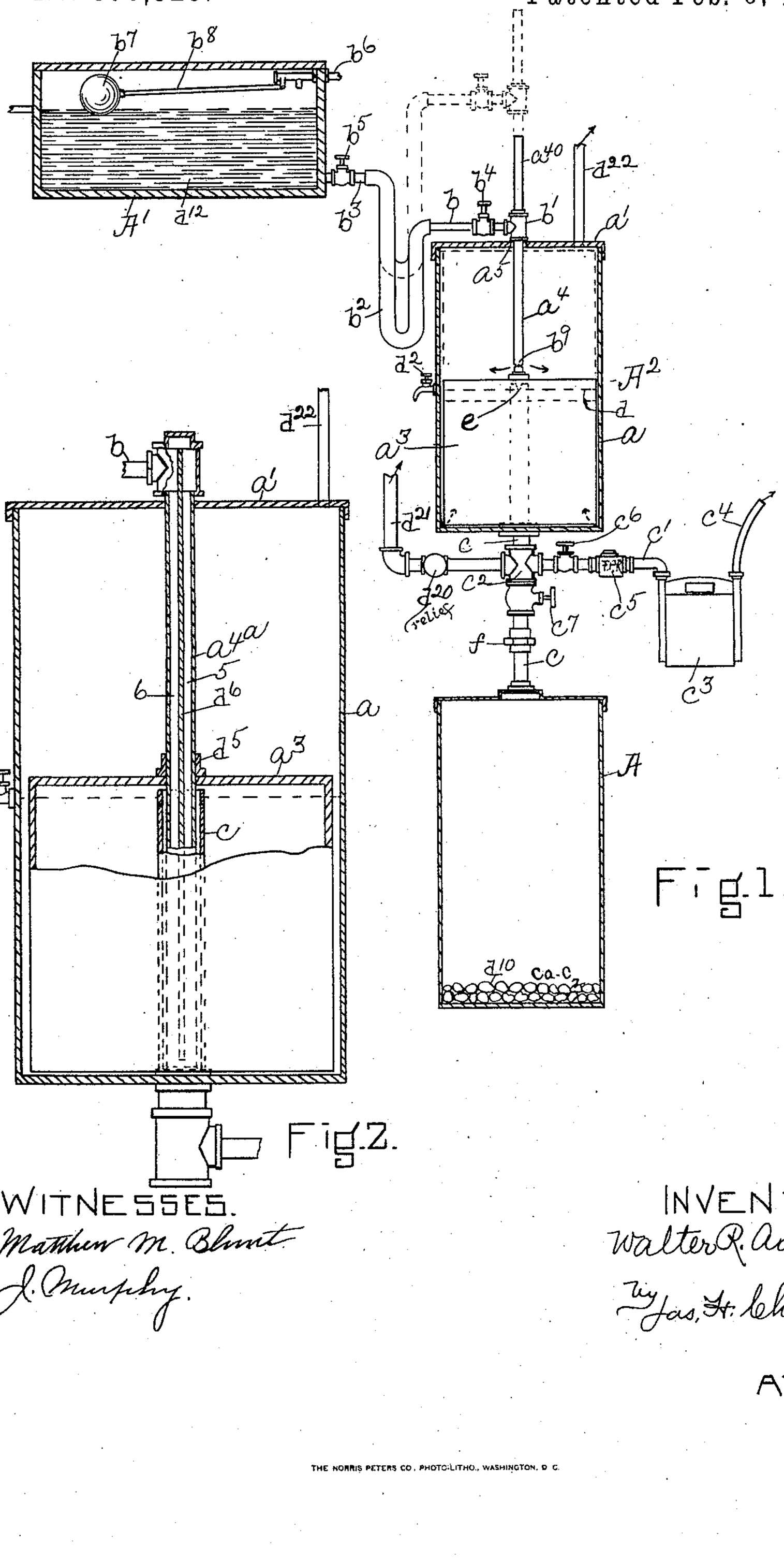

Fig. 1.

Fig. 2.

WITNESSES.
Matthew M. Blunt
J. Murphy.

INVENTOR.
Walter R. Addicks
by Jas. H. Churchill
ATT'Y

UNITED STATES PATENT OFFICE.

WALTER R. ADDICKS, OF BROOKLINE, MASSACHUSETTS.

APPARATUS FOR MANUFACTURING GAS.

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To all whom it may concern:

Be it known that I, WALTER R. ADDICKS, residing in Brookline, county of Norfolk, and State of Massachusetts, have invented an Improvement in Apparatus for Manufacturing Gas from Chemicals, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an apparatus for the manufacture of gas by means of chemicals, and, among other uses, the invention is particularly applicable for the manufacture of acetylene gas, whereby the generation of the acetylene gas may be automatically proportioned to the consumption, so that the gas is not required to be stored under pressure, and as a result the apparatus is capable of being employed for isolated plants, such as dwelling-houses and like places, without the dangers attending the presence of gas stored under pressure.

In accordance with this invention the apparatus consists, essentially, of a generator or chamber in which is placed one of the bodies or chemicals employed in the manufacture of the gas, a liquid-supply for another or combining body or chemical employed in the manufacture of the gas and which is to be admitted into the generator or chamber referred to, and an intermediate regulator which communicates with the generator and with the liquid-supply, the said regulator being connected with the liquid-supply, so that in one position of the regulator the admission of the liquid from the supply into the generator is cut off and a seal is formed which prevents the passage of the generated gas back through the apparatus and in another position admits liquid into the generator substantially in proportion to the amount of gas required to be generated, as will be hereinafter described. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 represents in section and elevation a gas apparatus embodying this invention; and Fig. 2, a partial section and elevation, on an enlarged scale, of a modified form of regulator.

In accordance with this invention the gas is generated by bringing one chemical or body into contact with another chemical or body within a closed chamber designated the "generator," with which the burner at which the gas is consumed is suitably connected. One of the chemicals is located within the generator and may be in liquid or solid form, and the other chemical, which is in liquid form, is located in a suitable vessel or chamber, which I prefer to designate as the "supply tank or vessel," and between the said generator and the supply-tank is interposed a regulator for the supply of the liquid admitted into the generator.

In the presence instance A represents the generator referred to, which may be of any suitable construction and preferably of metal.

A′ represents the liquid-supply tank or vessel, which also may be of any desired or suitable construction, and A^2 the intermediate regulator, to be more specifically described.

The regulator A^2 (shown in Fig. 1) consists, essentially, of a tank or vessel a, open at its top or upper end and provided with a cross-piece a' for a purpose as will be described.

The vessel a contains within it a vessel or gas-holder a^3, open at its bottom and closed at its top or upper end, which has erected upon and suitably secured to it a stand-pipe a^4, extended through a suitable opening a^5 in the cross-piece a'. The stand-pipe a^4 above the cross-piece a' communicates by a pipe connection with the liquid-supply tank or vessel A′, which pipe connection may and preferably will be made as herein shown, and consists of a metallic pipe-section b, connected to the stand-pipe a^4 by a T-coupling b', a rubber or other flexible pipe b^2, having one end connected to the pipe-section b and its other end joined to a rigid pipe-section b^3, connected to the supply-tank A′ and forming the liquid-outlet for the same.

The pipe-sections b b^3 may and preferably will be provided with suitable cocks or valves b^4 b^5, respectively. The liquid-supply tank A′ is provided with a liquid-inlet pipe b^6, the outlet of which is automatically controlled by a suitable valve operated by a float b^7, connected to the valve by the lever b^8, in the manner now common to water-supply tanks, and which does not need to be specifically described. The stand-pipe a^4 is preferably provided at or near its lower end with suitable

perforations or liquid-outlets b^9, for a purpose as will be described. The generator A is provided, as herein shown, with a combined liquid-inlet and gas-outlet pipe *c*, which, as shown in Fig. 1, is extended up through the bottom of the outside vessel *a* of the regulator and is made of a height substantially equal to the height of the holder or vessel a^3, the said pipe between the generator and regulator A^2 having connected to it, as herein shown, a gas-outlet pipe *c'*, which is represented as connected to a T-coupling c^2 and which constitutes the gas-inlet pipe for the meter c^3, which may be of any usual or suitable construction and which is provided with a gas-outlet pipe c^4, the gas-pipe *c'* having interposed in it a regulator c^5, controlling the outflow of gas from the generator. The gas-outlet pipe *c'* may and preferably will be provided with a suitable valve c^6, and the water-inlet pipe *c* may also be provided with a valve c^7.

In practice the gas-outlet pipe c^4 for the meter c^3 is connected with suitable burners, (not shown,) which are located at the points where it is desired to burn the gas. The vessel *a* of the regulator A^2 is designed to contain a predetermined amount of water, the level of which is indicated by the dotted line *d*, the said vessel being provided, as herein shown, on or about the water-line, with the outlet-pipe *d'*, provided with a valve d^2.

In the manufacture of gas, which, for the purpose of this invention, may be supposed to be acetylene, the carbid, which may be supposed to be calcium carbid, is in solid form and is located within the generator A, the said carbid being represented at d^{10}. The carbid constitutes one of the chemical bodies from which the gas is evolved, and the other of said bodies is water contained in the supply-tank A' and represented by d^{12}.

In the full-line position of the regulator shown in Fig. 1 it may be supposed that the chamber A is free from water and that the liquid-supply from the tank A' is cut off. Let it be supposed that it is now desired to generate the acetylene gas by the admission of water from the tank A' into the generator A. To effect this result, the valves c^7, b^4, and b^5 are opened and the valve c^6 of the gas-outlet pipe *c'* may also be opened, in which case the outlet for the gas is closed at the burners. When the water-outlet valves b^5 b^4 are opened, water from the supply-tank A' flows by gravity through the pipe-section b^3, the flexible pipe b^2, pipe-section *b*, and into the stand-pipe a^4, from which it issues through the perforations b^9 into the chamber or vessel *a*, which it gradually fills up to the water-line *d*, the outlet-valve d^2 being at such time open. When the water has reached the water-line *d*, it finds an outlet, preferably in substantially small quantities, into the pipe *c*, through which it flows into the generator A, where it meets the carbid d^{10} and forms the acetylene gas.

The gas generated in the chamber A ascends through the pipe *c* into the holder a^3 above the water-line, and as it accumulates it lifts the holder until the pipe-section *b* has been raised above the water line or level in the supply-tank A', at which time the supply of water from the tank is automatically cut off and a liquid seal is formed in the flexible pipe-section b^2, which prevents the passage of the gas back through the water-supply tank A'. When the flow of water from the tank A' is cut off, the supply of water to the generator A is also at the same time cut off by the same means, and as soon as the column of water within the holder a^3 falls below the inlet-orifices of the pipe *c* water is no longer admitted into the generating-chamber and consequently acetylene gas is no longer being generated. The water admitted into the generator A is preferably admitted in small quantities, as above described, which may be effected by providing the upper end of the pipe *c* with one or more V-shaped notches *e*, but instead of this particular construction any other suitable arrangement may be made for the admission of the water in minute quantities into the pipe *c*. When the generation of gas has been automatically stopped, as above described, the holder a^3 occupies the position indicated by dotted lines, and when a burner is opened and the gas lighted the volume of gas within the holder diminishes according to the output at the burner, and as the volume of gas in the holder diminishes the said holder descends until the pipe-section *b* is again brought below the water-level in the supply-tank A', and as soon as the pipe-section *b* has been brought below the water-level water is again admitted into the vessel *a* and into the holder a^3 and flows through the pipe *c* into the generator A, thereby creating a fresh supply or quantity of gas, which, ascending into the holder a^3, elevates the same and sustains it at a point where the supply of water into the generator A is in proportion to the amount of gas consumed at the burner.

If a number of burners are lighted at one time, the holder a^3 will fall a greater distance and a larger volume or quantity of water will flow into the generator A, thereby increasing the amount of gas generated, which increased amount soon restores the holder a^3 into its position to maintain a substantially constant supply of gas to the burners. To provide for any additional gas which may be generated after the liquid-supply is cut off, the vessel *a* is made of sufficient length to permit the water in it to be forced up around the holder a^3 after the latter has been stopped in its upward movement by the cross-piece *a'*, which may be a light cover. The length of the vessel *a* is sufficient to create an additional amount of storage-room and a sufficient amount of pressure without destroying the water seal to operate a relief-valve d^{20} for the apparatus, which relief-valve may be located, as herein shown, in a pipe d^{21}, connected to the T-coupling c^2. When the vessel *a* is

closed by a cover, the latter may have connected to it a pipe d^{22}, which may lead off to the atmosphere, so that should the check-valve fail to act the water seal might still be broken and the surplus gas would pass off from the vessel a with safety. After excess of gas has been thrown off by either the relief-valve or by pipe d^{22} the normal condition would be restored. In order to prevent the formation of a vacuum in the pipe a^4, the latter is provided with an extension a^{40}, which is open to the atmosphere and thereby limits the siphon action from the tanks A′ to the coupling b'.

While I may prefer to employ the construction of regulator shown in Fig. 1, I do not desire to limit my invention in this respect, as other forms of regulators may be used, such, for instance, as shown in Fig. 2, wherein the pipe a^{4a}, corresponding to the pipe a^4, is shown as closed at its upper end and made of a length substantially equal to the length of the vessel a and extended into the inlet-pipe c for the gas-generator, the pipe a^{4a} being extended through the top of the holder a^3 and secured thereto in any suitable manner, as by collar d^5. In order to prevent the formation of a vacuum when the regulator shown in Fig. 2 is used, the said pipe may be longitudinally divided by a wall or partition d^6, which separates the pipe into two passageways 5 6, communicating at their top and bottom for the circulation of gas, which thereby prevents such vacuum being formed.

In the regulator shown in Fig. 2 the pipe c is made of larger diameter than the pipe a^{4a}, so as to afford a passage for the gas from the generator A into the holder a^3.

From the above description it will be seen that the apparatus herein shown is capable of being utilized on a large scale for gas-works, and is especially applicable for use on a small scale for isolated plants and as a portable gas apparatus for use in dwelling-houses, stores, and like places, for the reason that the gas may be generated in proportion as it is used, and is not stored under excessive pressure, whereby the danger from explosions is reduced to a minimum.

The automatic supply of the liquid from the supply-tank takes care of variation of the volume of gas in the holder, due to barometric pressure, as well as the variation of the volume of water in the vessel a, due to evaporation or other causes. In Fig. 1 the same liquid as that supplied to the generator is required to be used in the holder, but in Fig. 2 a different fluid, such as oil, may be used in the holder.

The generator A may and preferably will be detachably connected to the holder by a coupling f, or in any other suitable manner, whereby an exhausted generator may be quickly and easily replaced with a fresh one without interfering with the supply of gas from the holder to the burners. The valve c^7 is closed while this exchange is effected.

I claim—

1. In an apparatus for manufacturing gas from chemicals, the combination of the following instrumentalities, a generator or chamber in which one of the chemicals is placed, a supply for a liquid constituting another chemical which combines with the chemical in the generator to form the gas, and a regulator consisting of a gas-holder, a vessel or chamber in which said holder is movable, a pipe connection between the gas-holder and the liquid-supply and movable with the gas-holder, substantially as and for the purpose specified.

2. In an apparatus for manufacturing gas from chemicals, the combination of the following instrumentalities, viz: a generator or chamber in which one of the chemicals is placed, a water-supply tank provided with an automatically-controlled water-inlet valve, and a regulator intermediate of the said water-supply tank and the said generator and consisting of a liquid-containing vessel, a gas-holder movable in said vessel, a pipe secured to said holder to move therewith, a flexible pipe connection joining said gas-holder pipe with the water-supply tank, and a pipe connected to the generator and extended up into the gas-holder, substantially as described.

3. In an apparatus for manufacturing gas from chemicals, the combination of the following instrumentalities, viz: a generator or chamber in which one of the chemicals is placed, a supply for a liquid constituting another chemical which combines with the chemical in the generator to form the gas, and a regulator communicating with the liquid-supply and with the gas-generating chamber and automatically operated by the gas generated to regulate and control the supply of the said liquid to the generating-chamber, a gas-outlet pipe communicating with the generator and with the regulator, and means to cut off the said gas-outlet from the regulator, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER R. ADDICKS.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.