

No. 649,610.

Patented May 15, 1900.

W. MILLER.
ACETYLENE GAS GENERATOR.

(Application filed Nov. 7, 1899.)

(No Model.)

Fig. 1.

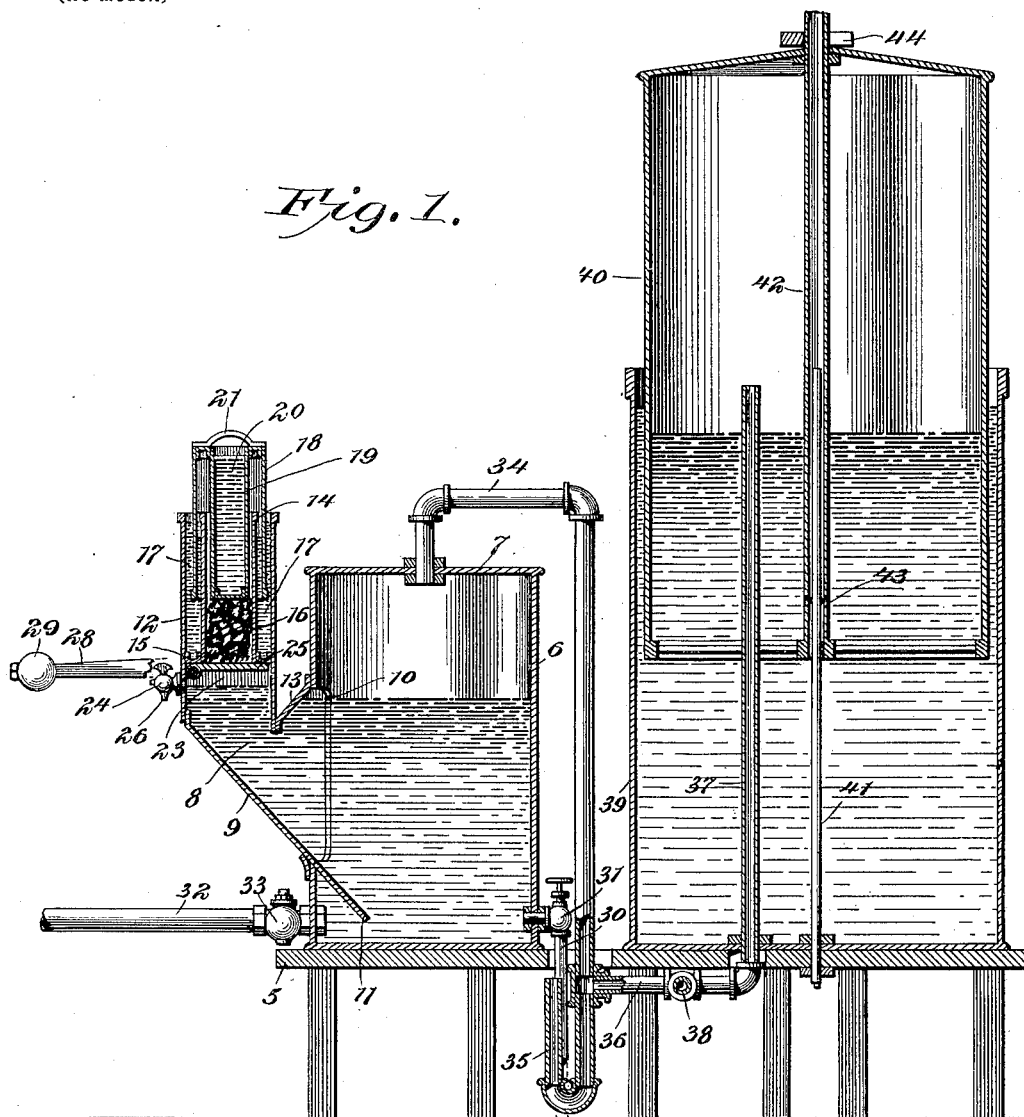
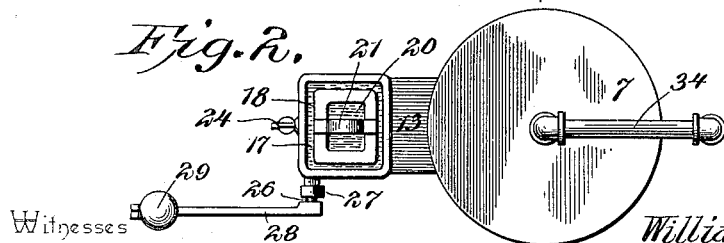


Fig. 2.



Witnesses

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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 649,610, dated May 15, 1900.

Application filed November 7, 1899. Serial No. 736,124. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MILLER, a citizen of the United States, residing at Thomasville, in the county of Thomas and State of Georgia, have invented a new and useful Acetylene-Gas Generator, of which the following is a specification.

My invention is an improvement in acetylene-gas generators of that class wherein the gas is generated by the decomposition of a solid or chemical, such as calcium carbide, within and below the surface of a body of liquid, such as water, and storage of the gas until desired for use is obtained by the employment of an expansible holder or gasometer separate from the generator.

It is desirable in this art to simplify the construction of the apparatus with a view to minimizing the cost of construction, to effect economy in the quantity of carbide, and improve the quality of the gas, so as to bring the expense of installing and the maintenance of the plant within the reach of people of moderate means, thus enabling them to enjoy the luxury of a good light. It is also desirable to arrange the elements of the apparatus for operation in a manner which will not require skilled attention and make the machine safe to handle, so that ignorant or careless people will not improperly adjust the parts, and thereby leave the way open for the escape of gas, this latter contingency being objectionable for hygienic reasons and because of the liability of explosion.

The object of this invention is to provide a simple and efficient generator in which the liability of the escape of gas is almost wholly overcome. The charge of active material may be easily discharged into the generator-chamber, and provision is made for the escape of air and for the easy introduction of the active material with the presence of a minimum volume of air in the magazine, thus avoiding adulteration of the acetylene by the admixture of atmospheric air therewith.

To the accomplishment of these ends my invention consists of a generator embracing novel features of construction and arrangement of parts and in the combination of devices, as will be hereinafter fully described and claimed.

To enable others to understand the inven-

tion, I have illustrated a preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a sectional elevation of an acetylene-gas apparatus embodying my improvements. Fig. 2 is a plan view of the generator and the magazine for the active material, the expansible gas-holder being omitted.

The same numerals of reference indicate like parts in both figures of the drawings.

The generator and the expansible gas-holder of my apparatus are shown by Fig. 1 as resting on a common platform or bench 5; but the employment of this element is optional. The tank or vessel 6, which forms the generator-chamber, is of comparatively large capacity, adapted to be nearly filled with a volume of water which will absorb the heat due to the decomposition of the active material, such as calcium carbide, and to wash the gas of impurities suspended mechanically therein, whereby heating of the gas and the generator is minimized and impurities are eliminated from the gas, so as to produce a superior quality of the illuminating agent. The upper part of the generator-tank is closed by the head 7, and through one side of this generator opens a conduit 8, the latter having an inclined bottom 9. An opening 10 of large area is formed in this side of the generator-tank for the bottom 9 of the conduit to extend through said opening and thereby establish communication between the chamber of the tank and the space or chamber of the conduit, said inclined bottom 9 being extended, as at 11, well into the chamber of the tank for the purpose of discharging the carbide upon the bottom of the tank, substantially at a central point therein. A vertically-arranged magazine 12 lies close to the generator and in the vertical plane of the outer extremity of the inclined conduit. This magazine is joined in any suitable way to the conduit, so as to form practically a continuation thereof, and it will be evident that the conduit and the magazine may be integral one with the other or constructed separately and united in a gas-tight manner, as shown by the drawings. The lower end of the magazine is extended for some distance below the upper end of the large opening 10 in the gener-

ator-shell, and between this magazine and the generator is an inclined wall 13, serving as a deflector for the ascending bubbles or globules of acetylene. This magazine contains or is equipped with an internal shell 14, that is disposed centrally within the magazine, and is provided at its lower end with a flange 15, suitably united to the shell 12. This internal shell forms within itself the magazine-chamber 16, adapted to contain a charge of active material, which may be supplied to the generator at any suitable period in the apparatus by the means which will be hereinafter described. The arrangement of the internal shell concentric with the magazine 12 provides, in addition to the magazine-chamber, a seal-chamber 17, which is preferably of angular form and lies between the two shells 12 14, the lower part of said seal-chamber being closed by the flange 15. The tank or shell 6 of the generator is designed to be supplied with water until the generator-chamber is filled nearly, if not quite, up to the level of the opening 10 therein, and the water is free to pass into the chamber of the conduit 8, so as to fill the latter up to the same level as the water in the generator-chamber; but when the apparatus is in operation and gas-pressure is established in the generator-chamber the water-level in the last-mentioned chamber is lowered by the pressure of the gas, while the water-level in the chamber of the conduit is raised slightly, as indicated by Fig. 1. The seal-chamber and the magazine-chamber open in an upward direction through the shells 12 14, and these chambers are designed to be closed by a bell having a displacement-plunger, thereby minimizing the leakage of air from the apparatus through the magazine, providing for the positive displacement of the charge of active material, and limiting the charge of atmospheric air which may enter the magazine or remain therein during the period of recharging the magazine-chamber with another supply of active material. This bell 18 is loosely fitted in the seal-chamber 17, so as to be immersed in the liquid seal contained therein and to be free to travel in a vertical direction, and said bell is provided with a hollow displacement-plunger 19, which is made fast with the head of the bell, so as to be adjustable or movable therewith. This displacement-plunger 19 is arranged to fit snugly in the magazine-chamber for the purpose of resting upon the charge of active material. Said displacement-plunger is closed at its lower end, while its upper end opens through the head of the bell 18, thus making provision for the ready introduction of a weight into the hollow plunger. This weight is indicated by the numeral 20 in the form of a liquid which substantially fills the chamber of the plunger; but it is evident that sand or any other material may be employed as the means for weighting the plunger and the bell. Said bell and plunger are intended to be withdrawn from the maga-

zine subsequent to discharging one supply of active material to the generator and previous to the introduction of another charge of material in the magazine, and to facilitate the manipulation of these connected parts I provide a handle 21, which is attached to the head of the bell.

By reference to Fig. 1 of the drawings it will be noted that the flange 15 of the interior magazine-shell is joined to the exterior magazine-shell 12 at a point some distance above the water-level in the conduit 8 or the lower part of the shell 12, and thus a very narrow chamber or space 23 is provided between the lower extremities of the magazine and seal chambers and the normal water-level in the shell 12. A petcock 24 is attached to the magazine to communicate with this intermediate chamber substantially on the level of the normal water-line therein, and thus the petcock is in communication with a space of the magazine below the magazine-chamber which contains the charge of active material for a purpose which will hereinafter appear.

25 designates a carbid grate or bottom which is arranged normally across the lower end of the magazine-chamber 16 for closing the latter and retaining the charge of active material therein. In the embodiment of the invention shown by the drawings this grate or bottom is mounted to swing on a horizontal axis and in a vertical plane by attaching the grate to or making it integral with a horizontal rock-shaft 26, the latter arranged at one side of the vertical plane of the magazine-chamber. This rock-shaft is supported below the flange 15 of the internal magazine-shell, and said shaft and the grate or bottom are disposed in the chamber 23 at the lower part of the magazine-shell 12. The inner end of this rock-shaft is journaled in a suitable bearing (not shown) provided on the inside of the shell 12, and said shaft passes through a stuffing-box 27, which is attached to the other side of the shell 12. To the exposed projecting end of the rock-shaft is fastened an arm 28, serving as a means for the operation of the shaft and the grate attached thereto, whereby the grate may be turned to a lowered inclined position for the purpose of dumping or discharging the charge of active material from the magazine-chamber to the inclined bottom of the conduit 8. The rock-shaft and the grate may under some conditions be actuated automatically by operative connections with the floatable bell or movable member of the gas-holder. In the drawings I have shown the arm of the rock-shaft as provided with a counterpoise or weight 29, which serves to normally turn the rock-shaft in a direction to press the grate or bottom 25 closely against the flange 15 of the internal magazine-shell, thus arresting the escape of the carbid and supporting the charge in the magazine-chamber 16, and in this adaptation of the invention the counterpoised arm 28 is arranged externally of the magazine, so as to serve as

the means for manually turning the rock-shaft to move the grate into its inclined dumping position.

30 designates the water-feed pipe, which leads from a suitable source of supply and is connected with the lower part of the generator-tank 6, said pipe having a suitable stop-cock 31 for controlling the admission of water to the generator. A cleaning-pipe 32 is coupled to the tank of the generator, preferably at a point opposite the pipe 30, said pipe 32 being also provided with a stop-cock 33, whereby the admission of water to the generator by the pipe 30 and the opening of the valves 31 33 serves to flush the generator, so as to carry out the pasty mass of lime or carbide residue through the cleaning-pipe 32.

34 designates a gas-pipe which is coupled to the head 7 of the generator, and at its lower end this pipe is provided with a drip-trap 35, in which is free to accumulate the water resulting from condensation of the moisture in the gas as the latter flows from the generator to the expansible gas-holder. A branch pipe 36 is coupled to the gas-pipe 34 at a point above the drip-trap 35, and this branch pipe terminates in a vertical length of pipe 37, which extends through and above the water contained in the tank of an expansible gas-holder for the discharge of the gas into the floatable bell of the latter. A service-pipe 38 is coupled to the branch pipe 36 at a point between the trap and vertical length of pipe 37, said service-pipe being indicated in cross-section by Fig. 1 and adapted to lead or convey the gas to the burners or other points of consumption.

The tank 39 of the expansible gas-holder has the bell 40 fitted loosely therein, so as to be partly immersed in the water contained in the tank. A vertical vent-pipe 41 is fastened to the bottom of this tank, so as to extend above the water, and over this vent-pipe is telescopically fitted a vent-tube 42. This tube extends through and is fastened to the head of the floatable bell, and the tube is provided near its lower end with one or more transverse apertures 43, the latter being normally submerged in the water, so as to be sealed against the escape of gas; but the elevation of the floatable bell by the accumulation of gas therein to a point sufficient to withdraw the perforated part of the vent-tube from the water permits the gas to escape through the opening 43 and into the vent-tube, whereby the surplus gas may escape automatically until the volume is reduced to permit the bell to again descend for the submergence of the perforated part of the vent-tube. This vent-tube fits snugly to the pipe 41, and the parts 41 42 are thus made to serve a twofold purpose, which consists in an automatic vent for the gas-holder and a means for directing the vertical travel of the floatable gas-bell. One or more weights 44 may be fitted to the upper protruding end of the vent-tube

for the purpose of increasing the pressure exerted by the floatable bell upon the gas.

The operation is as follows: The water having been supplied to the gas-holder and to the generator either by the pipe 30 or by pouring the water through the internal shell 14, the charge of calcium carbide or other agent is introduced into the magazine-chamber, so as to rest upon the grate or bottom, and then the bell 18, with the weighted displacement-plunger, is adjusted to the magazine for the bell to enter the seal-chamber and the plunger to rest upon the carbide. The counterpoised rock-shaft holds the grate or bottom closed against the weight of the charge and the connected bell and plunger, and the operator then manipulates the weighted arm, so as to tilt the grate and discharge the carbide into the conduit 8. The movement of the bottom allows the bell and plunger to descend within the magazine, so that the plunger operates to positively eject the carbide therefrom, and said plunger and the bell remain in their lowered positions during the generation of the gas and until the operator finds it convenient to replenish the carbide-supply in the magazine. As the carbide is discharged upon the inclined bottom of the conduit it travels by gravity along said bottom and is thereby directed into the central part of the chamber formed by the tank 6. The operation of dropping the carbide into the water results in the decomposition of the carbide and the formation of acetylene gas, which is free to rise in bubbles or globules through the water into the upper part of the chamber in the tank 6, from whence the gas flows through the pipe 34, the branch 36, and the length 37 into the gas-holder. The establishment of gas-pressure in the holder and in the chamber of the generator depresses the water-level in the latter and raises the water-level in the magazine-shell 12, thus reducing the area of the chamber 23, and the gas in the chamber of the tank 6 is prevented from passing into the chamber 23 below the magazine by the presence of the liquid seal around the inclined deflector 11. It is evident that the gas may be carried to the burners by the pipe 38 and that the water of condensation accumulates in the drip-trap 35. The employment of the displacement-plunger on the bell, which is free to play in the seal-chamber of the magazine, and the petcock 24 in communication with the space 23 below the magazine-chamber are important features of my improvement. On the discharge of the carbide due to the adjustment of the grate or bottom the displacement-plunger drops automatically with the bell, so that the plunger practically fills the space previously occupied by the carbide, thus leaving the smallest possible space in the magazine to be filled with gas. The petcock 24 is intended to be opened when the generator and the conduit are charged with water, so as to indicate the level of the

water in these elements. Previous to withdrawing the bell and the displacement-plunger from the magazine for the purpose of introducing another charge of active material in the magazine-chamber this petcock should be opened, so as to allow air to enter the chamber 23, whereupon the elevation and withdrawal of the displacement-plunger and the bell does not create a vacuum in the magazine, owing to the fact that air is free to flow therein from the petcock, whereby gas is prevented from being drawn into the magazine-chamber. The escape of gas under these conditions is minimized by the presence of the liquid seal around the deflecting-partition 13 and the variation in the level of the water in the generator-tank and the conduit 8. This petcock is also advantageous when replacing the bell and displacement-plunger after a charge of active material shall have been placed in the chamber 16 so as to rest upon the grate, because the air is free to escape through the petcock on the descent of the displacement-plunger, thus preventing the air displaced by the plunger from exerting pressure upon the liquid seal and entirely obviating the passage of air in the generator so as to adulterate the gas.

Changes within the scope of the appended claims may be made in the form and proportion of some of the parts while their essential features are retained and the spirit of the invention is embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom.

Having thus described the invention, what I claim is—

1. An acetylene-gas generator comprising a generating-chamber, a carbid-magazine communicating therewith below the water-level therein, and having a pivoted counterweighted grate or bottom, at a point above the water-level, whereby an intermediate chamber is formed below the magazine, a cock communicating with said intermediate chamber, and a sealed bell in the carbid-magazine, and having a plunger to bear on the charge therein, substantially as described.

2. An acetylene-gas generator comprising a generating-chamber adapted to contain a liquid, a magazine communicating with said

chamber and provided with a seal-chamber which is independent of the magazine-chamber, means for closing the seal-chamber and sustaining the charge of active material therein, a bell immersed in the seal-chamber of said magazine, and a displacement-plunger movable with said bell and fitted in the magazine-chamber to travel freely therein on the discharge of the active material therefrom, substantially as described.

3. An acetylene-gas generator comprising a generating-chamber, a magazine in communication with said chamber and provided with the independent magazine-chamber and seal-chamber, a weighted bell and plunger connected together and fitted respectively in the seal-chamber and the magazine-chamber, and means for closing the magazine-chamber against the weight of the charge and the displacement-plunger therein, substantially as described.

4. An acetylene-gas generator comprising a tank forming a generating-chamber, an inclined conduit communicating with said chamber below the normal water-line therein, a magazine fast with said conduit and provided with an internal shell forming a magazine-chamber within a surrounding seal-chamber, a hinged grate or bottom normally closing the bottom of the magazine-chamber, and a bell provided with a weighted displacement-plunger adapted to the magazine and seal chambers, substantially as described.

5. An acetylene-gas generator comprising a generating-chamber, a magazine communicating with said chamber below the normal water-line therein and provided with a magazine-chamber above the water-line, a hinged counterpoised grate or bottom closing the magazine-chamber, a displacement-plunger movable in the magazine-chamber, and a valve communicating with the magazine at a point between the chamber thereof and the water-level in the lower part of the same, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM MILLER.

Witnesses:

JOSEPH H. MERRILL,

E. R. PRINGLE.