

J. E. FULTON.
ACETYLENE GAS APPARATUS.

(Application filed May 18, 1899.)

(No Model.)

3 Sheets—Sheet 3.

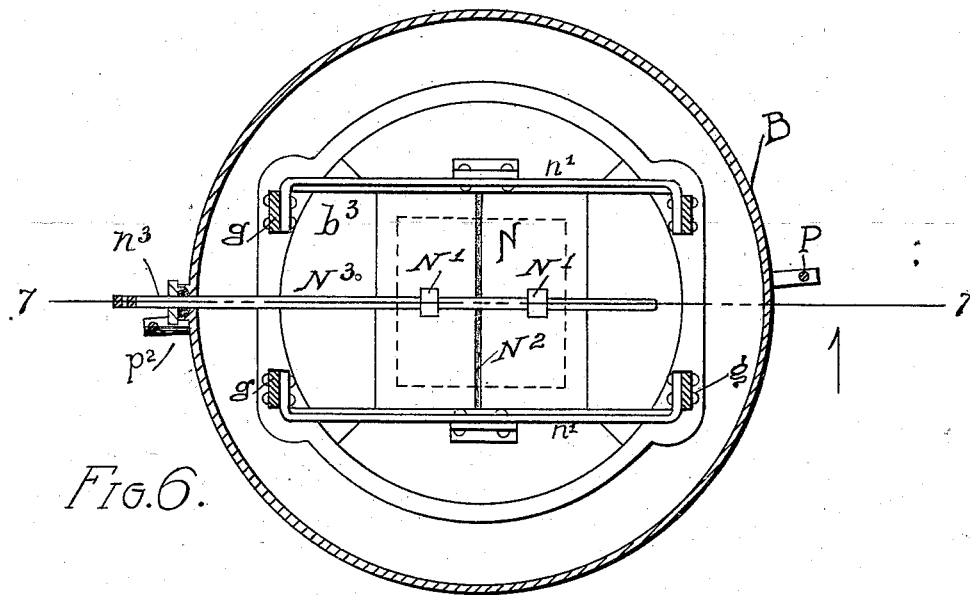


FIG. 6.

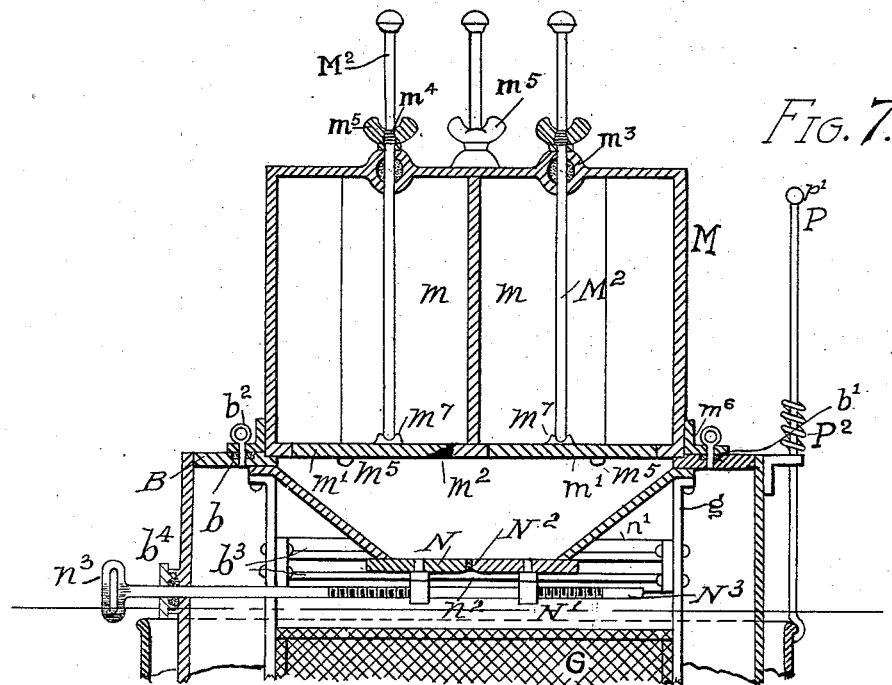


FIG. 7.

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JAMES E. FULTON, OF ATHENS, ILLINOIS.

ACETYLENE-GAS APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,981, dated May 22, 1900.

Application filed May 18, 1899. Serial No. 717,271. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. FULTON, a citizen of the United States, residing at Athens, in the county of Menard and State of Illinois, have invented certain new and useful Improvements in Acetylene-Gas Machines, of which the following is such a full, clear, and exact description as will enable others skilled in the art to which it appertains to make and use my said invention.

My invention relates to machines of that class in which calcium carbide is decomposed in water in a suitable generator, and the gas thus generated is conveyed to a suitable receiver, from which it is conveyed for use as occasion may require.

The purposes of my invention are to provide an apparatus so constructed and arranged that excessive pressure of gas within the receiver will react on the generator-cylinder, so as to raise the cylinder in such manner as to withdraw the carbide from contact with the water, and thereby suspend the generation of gas within the generator until the pressure in the receiver is reduced to such extent as to permit the generator-cylinder to descend and again bring the carbide into contact with the water in the generator, thus maintaining a practically-uniform supply and pressure of gas within the receiver; to provide simple and effective means for cooling the gas before its admission to the receiver; to provide a magazine in connection with the generator adapted to contain a number of charges of calcium carbide and adapted to discharge said charges separately into a receiver within the generator; to provide means for forming a gas-tight connection of the magazine with the generator-cylinder; to provide a carbide receptacle or basket of improved construction; to provide a gas-tight closure between the magazine and the generator-cylinder and means for opening and closing same; to provide guides of improved construction to guide and limit the movements of the generator-cylinder and the receiver-cylinder with respect to the generator-shell and the receiver-shell, respectively; to provide simple and effective means for removing from the generator the lime or sediment deposited therein, and to provide a filter intercommunicating with the receiver and the

main service-pipe for the purpose of purifying the gas before its delivery to the burners.

With these ends in view my invention consists in the novel features of construction and combinations of parts shown in the annexed drawings, to which reference is hereby made and hereinafter particularly described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a side elevation of the complete machine. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 2. Fig. 4 is an enlarged horizontal transverse section through the magazine on the line 4 4 of Fig. 3. Fig. 5 is an enlarged horizontal transverse section through the generator on the line 5 5 of Fig. 3. Fig. 6 is an enlarged horizontal transverse section on the line 6 6 of Fig. 3. Fig. 7 is an enlarged vertical section through the magazine and the closure on the line 7 7 of Fig. 6.

Similar letters of reference designate like parts in all of the views.

The main structure of the generator consists of a shell A, closed at the bottom and open at the top, and a generator-cylinder B, closed at the top and open at the bottom and freely slidable within the shell A. The main structure of the receiver consists of a shell D, open at the top and closed at the bottom, and a receiver-cylinder E, closed at the top and open at the bottom and freely slidable within the shell D. Coaxial with the shell D and secured to the bottom thereof is a cylindrical cooling-chamber F, which is closed at the top. A receptacle G, adapted to contain calcium carbide, and preferably in the form of a basket with open meshes, is suspended from the under side of the top of the cylinder B by rods g or other suitable means. A bent pipe H is secured in any suitable manner to the shell A, and its vertical member extends upward through the bottom of the shell A into the interior of the cylinder B and its horizontal member projects outward through the wall of the shell. A pipe H' extends through the shell D into the chamber F. A pipe H² projects upwardly from the upper wall of the chamber F into the interior of the cylinder E. The contiguous ends of the pipes H and H' are joined by a valve J, which controls commu-

nication between the pipes, so that the flow of gas from the generator to the receiver may be shut off whenever it is desirable to do so. A bent pipe H^2 extends vertically through the top of the chamber F into the interior of the cylinder E, and its horizontal member extends through the wall of the shell D, and its outer end is connected with a filter K, which is in turn suitably connected with the main service-pipe L.

When it is desired to generate gas, the shells A and D are filled with water to a level somewhat below the upper ends of the pipes H, H^3 , and H^2 , and a suitable quantity of calcium carbide is placed in the basket G, and the cylinder B descends until the calcium carbide or a part of it becomes immersed in the water in the shell A, whereupon the generation of gas begins by reason of the well-known chemical action between the calcium carbide and the water. The gas thus generated passes down in the pipe H, and thence through the pipe H' and through the cooling-chamber F, where it is cooled by the water surrounding the chamber, and thence into the receiver E, where it is stored for use, and whence it is conveyed by the pipe H^2 into the filter K, and thence to the main service-pipe L, from which it is distributed to the burners in the usual well-known manner.

The degree of the pressure of gas within the receiving-cylinder E is determined and controlled by the weight of the generator-cylinder B and its appurtenances. If, however, that is not sufficient to produce the desired pressure, a suitable weight or weights (not shown) may be placed on top of the generator-cylinder. By reason of the construction shown and described the gas will continue to flow through the pipes H and H' into the receiving-cylinder E so long as the pressure is not excessive; but when the pressure becomes excessive the gas will act against and raise the generator-cylinder B to such an extent as to withdraw the calcium carbide from contact with the water, thereby stopping the generation of gas until the pressure is reduced to the requisite degree, whereupon the generator-cylinder will again descend, bringing the calcium carbide into contact with the water and causing the resumption of the generation of gas. It will be seen then that the gas acts directly on the cylinders themselves to regulate and control the pressure without the employment of valves, levers, or other extraneous, unnecessary, and complicating devices.

The magazine M is preferably cylindrical in form and is divided by radial partitions m into a series of chambers. In the lower end of each chamber is a door m' , fitting in an opening m^2 in the bottom of the chamber, said opening and door being of approximately the same contour, but somewhat smaller than the bottom of the chamber. Near the extreme edges of the door are underlying lugs m^5 , which support the door and serve to keep it from falling through the opening and on

which the door turns to open downward, as hereinafter described. Rods M^2 pass through and are slidable in gas-tight glands m^3 in the top of the magazine, and the lower ends of the rods have a hinge connection m^7 with the doors m' . The rods M^2 are threaded for a part of their length, as at m^4 . Thumb-nuts m^5 fit on the threaded parts m^4 and act against the upper surface of the top of the magazine so as to raise the rods when the nuts are turned in one direction, as to the right, and so as to lower the rods when the nuts are turned in the opposite direction, as to the left. When the nuts are turned to lower the rods to such an extent as to release the threaded part of the rods from the nuts, the rods slide downward through the nuts and permit the doors m' to turn on the lugs m^5 , thereby discharging the calcium carbide through the opening in the bottom of the chamber into the basket G. By reason of the peculiar construction and arrangement of the magazine and its doors the contents of all of the chambers is discharged almost directly under the center of the magazine, thereby assuring the delivery of the calcium carbide approximately at the center of the basket and obviating any risk of the calcium carbide falling outside of the basket. This method of delivering the calcium carbide is of great practical advantage, because if the calcium carbide were discharged directly into the water there would be too rapid and violent generation of gas, which might result disastrously. By employing the means shown and described this danger is completely obviated.

On top of the cylinder B is an annular channel b , in which a gasket b' , of rubber, felt, or other yielding material, fits, the gasket being of a thickness somewhat greater than the depth of the channel. An annular flange m^6 surrounds the magazine and overlaps the gasket b . Screws b^2 pass through the flange m^6 and screw into the top of the cylinder B. When the screws b^2 are screwed down, they cause the flange m^6 to bear firmly all around on the gasket b' , thereby forming a gas-tight connection of the magazine with the cylinder.

In charging the magazine the screws b^2 are unscrewed from the top of the cylinder, the cylinder is then removed and inverted, and the charges are introduced into the chambers through the openings in the bottom of the magazine. The doors are then closed sufficiently to bring the screw parts m^4 of the rods M^2 into position to be engaged by the nuts m^5 . The nuts are then turned so as to draw the rods outward, thereby completely closing and securing the doors. The magazine is then replaced, with its flange resting on the gasket, and the screws b^2 are turned to secure the magazine to the top of the cylinder, as already described.

In order to prevent the escape of gas while the magazine is removed, I provide a closure for the opening in the upper end of the generator-cylinder, which I will now describe.

This closure consists of two slides N, slidable between parallel guides b^3 on the under side of the top of the cylinder B. On the under side of each slide is an internally-screw-threaded lug N', the threads in one of the lugs being right-hand and those in the other left-hand threads. Secured to one end of one of the slides is a cushion N², of rubber, felt, or other elastic material, which serves to form a gas-tight joint between the contiguous ends of the slides when they come together. A screw N³ fits in the screw-threaded holes in the lugs N' and is threaded for such part of its length as is sufficient to move the slides to the required extent. The screw-threads in the lugs N' being, respectively, right-hand threads and left-hand threads, the slides may be drawn toward each other or may be slid away from each other, accordingly as the screw N³ is turned to the right or to the left. Directly under the line of contact of the abutting ends of the slides is a slight protuberance n^2 on each of the lower guides, on which the under side of each of the slides rides, and the protuberances serve to press the slides up closely against the upper guides, so as form gas-tight joints between the slides and the upper guides. The screw-rod N³ passes through a suitable gland b^4 on the generator-cylinder B and has at its outer end a suitable handle n^3 , by means of which the rod may be turned.

The means for guiding and limiting the up-and-down movements of the generator-cylinder and the receiver-cylinder consist of vertical rods P, secured to the generator-shell B and the receiver-shell D, respectively, by rivets p or other suitable securing devices. At the upper end of each of the rods is a fixed ball or stop p' . Brackets P', secured to the generator-cylinder and the receiver-cylinder, respectively, are provided with eyes p^2 , which slide freely on the rods P. Coiled springs P² surround the rods P between the stops p' and the eyes p^2 and serve to prevent concussion of the brackets against the stops.

The lower part of the generator-shell A slopes inward, as shown. At the center of the lower extremity of the shell A is a valve R, fitted with a slide R', sliding between guides r . A rod R² is connected with one end of the slide R' and passes outward through a gland r' and has at its outer end a handle by means of which the slide may be pulled outward or pushed inward to open or to close the valve, as occasion may require. Directly under the valve R is a pan S to receive the lime or sediment as it is discharged from the lower end of the generator. The sediment resulting from the decomposition of the calcium carbide is precipitated and accumulates in the lower conical part of the generator-shell A, from which it may be discharged into the pan S by opening the valve R, thereby permitting the water to rush out through the valve and carry the sediment with it. The outflow of a part of the water suffices to remove the sediment

without interfering with the operation of the machine, sufficient water being afterward supplied to replace that drawn from the shell.

The filter K is preferably a sheet-metal cylinder divided into two compartments by a wire-gauze partition k , one of the compartments being filled with some porous and absorbent material, such as charcoal, and the other compartment being filled with fibrous material, such as asbestos or cotton fiber. In passing through the filter any solid or extraneous matter carried by the gas is arrested, and the gas is freed from moisture and delivered to the service-pipe in fit condition for use.

A valve J' in the pipe intercommunicating between the receiver-cylinder and the filter serves to shut off the flow of gas to the filter when it is desired to do so.

When it is desired to charge the magazine, it is only necessary to turn the handle so as to draw the slides N together in order to close the closure and prevent the escape of gas from the generator-cylinder.

By reason of the construction which I have shown and described my gas-machine is practically continuous in its operation, and the calcium carbide may be replenished and the lime and sediment may be removed without the escape of any considerable quantity of gas and without interfering with the generation and delivery of gas.

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

1. In a gas-machine, a flanged magazine having radial partitions downwardly-opening doors, and means for operating said doors; in combination with a generator-cylinder, a gas-ket between said cylinder and said magazine, securing devices connecting said magazine with said cylinder, a receptacle within said cylinder, a shell inclosing said cylinder, and a gas-receiver in communication with said cylinder as set forth.

2. In a gas-machine, a magazine having compartments open at one end, doors fitting in the openings in said compartments, rods screw-threaded for a part of their length and having pivotal connection with said doors, glands on said magazine through which said rods pass and thumb-nuts fitting on the threaded parts of said rods, as set forth, in combination with a generator-cylinder, a receptacle for gas-producing material within said cylinder and a closure within said cylinder between the magazine and said receptacle, substantially as shown and described.

In witness whereof I have hereunto subscribed my name at Springfield, Illinois, this 14th day of February, A. D. 1899.

JAMES E. FULTON.

Witnesses:

TURNER ENGLISH,
ALEX. MCCOSKER.