No. 628,929. Patented July 18, 1899.

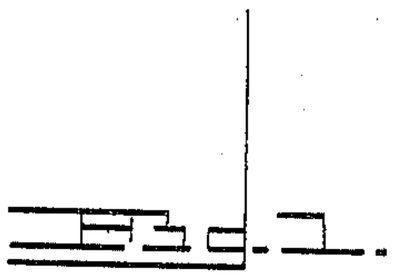
H. ELDRIDGE & S. BLUM.

ACETYLENE GAS GENERATOR.

(Application filed Aug. 31, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
E. L. Stewart.
H. J. Brucker

Hibbary Eldridge
Sylvain Blum Inventors
By their Attorneys,
Cachow & Co.

No. 628,929. Patented July 18, 1899.

H. ELDRIDGE & S. BLUM.

ACETYLENE GAS GENERATOR.

(Application filed Aug. 31, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.

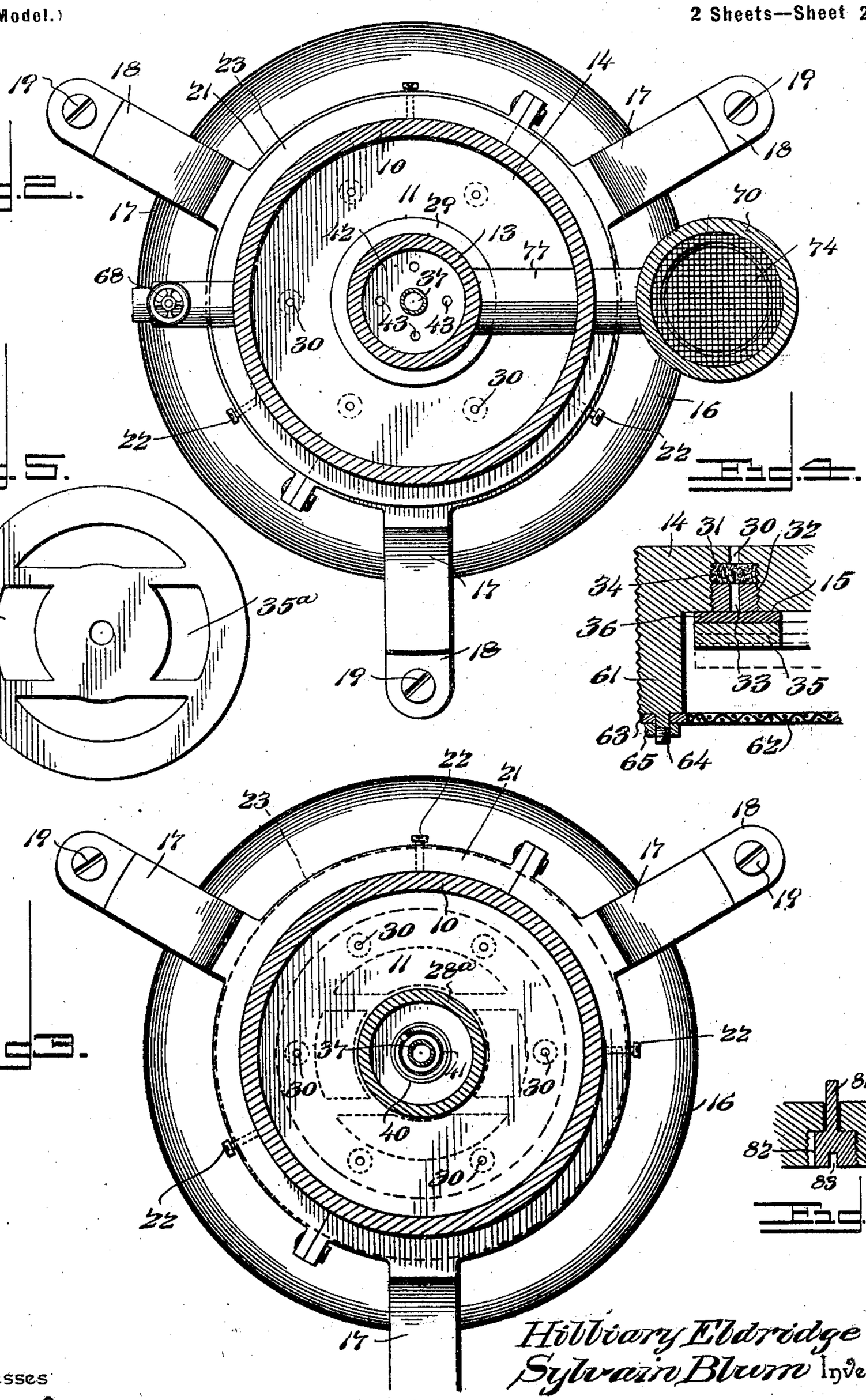


Fig. 5.

Fig. 3.

Fig. 4.

Fig. 6.

Witnesses

E. L. Stewart.

H. J. Benedict

Hibbiary Eldridge
Sylvain Blum Inventors

By their Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

HILLIARY ELDRIDGE AND SYLVAIN BLUM, OF GALVESTON, TEXAS.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 628,929, dated July 18, 1899.

Application filed August 31, 1898. Serial No. 689,952. (No model.)

To all whom it may concern:

Be it known that we, HILLIARY ELDRIDGE and SYLVAIN BLUM, citizens of the United States, residing at Galveston, in the county of Galveston and State of Texas, have invented a new and useful Acetylene-Gas Generator, of which the following is a specification.

Our invention is a gas-generator especially adapted for service to generate and supply illuminating-gas to locomotive-headlights; and the primary object of the invention is to provide a compact and simple apparatus for the generation of acetylene-gas to be supplied to the burner of such headlight. In a generator for this purpose it is necessary that the elements thereof shall be disposed in an exceedingly compact relation, to the end that the generator may be conveniently carried on a locomotive, and we have met this condition by disposing the water-supply, the carbid vessel, the gas-controlled regulating mechanism, and the purifier in a single apparatus.

Further objects of the invention are to provide means for automatically controlling the admission of the attacking liquid (water) according to the gas-pressure in the generator, to provide for the regulation of the admission of water to the carbid-chamber independently of the main-valve mechanism and also to prevent back pressure of the gas on the water-supply, to automatically vent the gas from the generator should the pressure exceed the desired limit and simultaneously close the water-admission ports to the generator, to purify the gas from moisture as it passes from the generator to the supply-pipe of the burner, to provide for access to the purifier and the carbid-chamber for the renewal of the charges therein without dismantling the apparatus, and to arrange the several parts to attain positive action thereof and maximum efficiency of the generator.

With these ends in view our invention consists in the novel combination of instrumentalities and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, we have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional elevation of our improved locomotive-headlight gas-generator. Fig. 2 is a horizontal sectional view on the plane indicated by the dotted line 2 2 of Fig. 1. Fig. 3 is a similar cross-sectional view on the plane indicated by the dotted line 3 3 of Fig. 1. Fig. 4 is an enlarged detail view through one of the packed water-ports from the water-supply chamber to the carbid-chamber. Fig. 5 is a detail plan view of the main valve which controls the flow of water to the carbid-chamber and the egress of gas from said carbid-chamber to a purifier. Fig. 6 is a detail sectional view representing a modified construction for regulating the flow of water from the water-tank independently of the main valve.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

The shell of our improved generator may be of any desired form in cross-section. It is indicated by the numeral 10 in the drawings as being of cylindrical contour, and this shell forms a chamber 11, in which is contained the water, which is admitted in limited volumes through valve-controlled ports to a carbid vessel adapted to contain a charge of calcium carbid, which is to be attacked by the water to secure chemical decomposition of the carbid and water to generate acetylene gas. This generator-shell is provided at its upper end with a concave or dished top 12, and within this shell is a central vertical tube 13, which is joined to the top 12 to open centrally therethrough. The lower end of the generator-shell 10 is open and interiorly screw-threaded, and the foot of the central tube 13 terminates within this shell 10 and on a plane above the interiorly-threaded length thereof. The lower open end of the generator is closed by a chambered bottom 14, which serves to retain the water supplied to the chamber 11 and is constructed with ports for the passage of water from the chamber to the carbid vessel, the latter being removably secured to the bottom, so that it may be detached from the apparatus for the purpose of removing spent carbid therefrom, cleaning said vessel, and replacing the exhausted carbid with a charge of fresh active carbid, as will hereinafter more fully appear. The bottom 14

is exteriorly screw-threaded to provide for its application removably to the interiorly-threaded open lower end of the generator-shell 10, and the lower or under face of this bottom 14 is perfectly flat and level to constitute a valve-seat 15 for the main valve.

The carbid vessel 16 of our generator is preferably of cylindro-conical form, although this is not essential, and its upper open end is interiorly threaded for the purpose of screwing it to the lower threaded portion of the bottom 14, thereby uniting the carbid vessel detachably to the bottom of the generator-shell.

The generator-shell and the carbid vessel are supported in a raised or elevated position by means of a tripod, to which the shell 10 is connected; but the carbid vessel does not have engagement with this tripod. The carbid vessel is coupled to the bottom of the shell 10 to be suspended therefrom, and said vessel is thus adapted to be readily detached from the generator because it does not rest upon a base. The legs 17 of the tripod have the foot-flanges 18, which are fastened by bolts or screws 19 to any suitable support—as, for instance, a base 20—and said legs of the tripod sustain the ring or annulus 21. The lower end of the generator-shell passes through this ring or annulus of the tripod, and said shell is formed with a circumferential exterior flange 22, which is adapted to rest upon the ring or annulus 21 of the tripod. Binding-screws 22 are fitted in threaded openings of the tripod-ring to bind against the generator-shell 10, and thereby firmly support the generator on the tripod.

A sole-flange 23 is formed exteriorly on the lower edge of the generator-shell 10, and a matching flange 24 is provided on the upper edge of the carbid vessel 16. Between these flanges 23 24 of the generator-shell and carbid vessel, respectively, is interposed a gasket 25, which is adapted to be compressed by and between said flanges when the carbid vessel is screwed to the bottom 14, thereby providing a gas-tight joint between the generator and the removable carbid vessel. Within this carbid vessel is an annular supporting-flange 26, on which is adapted to rest a grate or screen 27, which sustains the charge of calcium carbid within the vessel 16, above the bottom thereof. To provide for the ready insertion or removal of this grate 27, it is constructed in two or more sections, which are hinged together, as at 28, by an upwardly-opening hinge, as shown by Fig. 1, and in removing this grate its sections are drawn together or collapsed, so that the grate may be folded previous to withdrawing it from the vessel 16.

The partition or chamber 14 to the generator-shell is provided with a tubular boss 28^a, which rises centrally from the bottom, and this boss is of a diameter to fit snugly in the lower open end of the central tube 13 within the generator-shell. A gasket 29 is fitted around this tubular boss and interposed between the lower extremity of the central tube 13 and the bottom 14. By screwing the bottom to its place within the open end of the generator-shell the gasket 29 is compressed between the tube 13 and the bottom 14, and a tight joint is thus secured between the tube 13 and bottom 14 to prevent the water from leaking into the tube 13 or the gas from passing from the tube 13 into the water-chamber of the shell 10. The bottom 14 is furthermore provided with a series of transverse water-ports 30 in the vertical plane of the chamber 11, and each port 30 is enlarged at the lower portion thereof, where it opens through the lower valve-face 15 of the bottom 14. Each port has its enlarged lower portion interiorly screw-threaded to receive the exteriorly-threaded plugs 32, which are screwed into the port, and this plug has a central opening 33. The plug does not entirely fill the enlarged portion 31 of the water-port; but it leaves a small space or chamber adapted to receive a fibrous packing 34, which may be of any suitable material—as sponge, for example. The fibrous packing is compressed in the water-port by screwing the perforated plug 32 therein, and this packing prevents the rapid passage of water through the port and prevents the pressure of gas from retarding the flow of water from the chamber 11 to the carbid vessel. The water is adapted to percolate or drip through the compressed fibrous packing and escape through the central opening 33 of the plug 32 when the main valve is open, and thus provision is made for regulating the drip or flow of water through the port 30 irrespective of the main valve, because the plugs 32 may be adjusted to compress the packings more or less, and thereby vary the quantity of water which may escape through the ports 30.

While we have shown and described perforated plugs and fibrous packings to be compressed by adjusting the plugs in the ports 30, we do not strictly confine ourselves to the detailed construction herein illustrated, because we are aware that compressible plugs for use in the ports 30 may be employed in lieu of the metallic plugs and fibrous packings.

The main valve 35 is in the form of a flat disk arranged horizontally within the partition or bottom 14 for vertical movement therein toward or from the valve-face 15, and this main valve serves to cut off the flow of water entirely from the ports 30 to the carbid-chamber and the passage of gas from said chamber to the central gas-tube 13 of the generator. This cut-off valve 35 is arranged to cover all of the ports 30 and the perforated plugs 32 therein, as well as the lower open end of the central tubular boss 28^a on the bottom 14, where said boss opens through said bottom 14. The main cut-off valve, however, is not a solid or imperforate disk; but it is provided with openings or slots 35^a to permit

the water from the ports 30 and valve-plugs 32 to trickle over the surface of the valve and pass through said slots upon a distributing spraying-grate, which is supported by the bottom 14 above the carbid vessel, as will presently appear. A gasket 36 is interposed between the valve-seat face 15 of the bottom 14 and the main cut-off valve 35 for the purpose of securing a gas-tight joint between the bottom 14 and the valve when the latter is closed, and this valve is rigidly secured to a stem or rod 37, which is connected with a diaphragm-regulator that is exposed to the pressure of gas and is adapted to raise the rod or stem and the valve when the gas attains a certain pressure within the generator. The valve stem or rod 37 passes through the central gas-tube 13 of the generator and through a diaphragm-chamber, and the lower threaded end of this stem or rod 37 extends through a central opening in the cut-off valve 35. The valve and its rod are secured firmly together by the nut 38 and the washers 39 40, said washers being applied to opposite sides of the valve and the nut being screwed to the threaded extremity of said valve-rod. This valve stem or rod is hollow or tubular, with its lower end opening through the lower face of the valve and the nut 38 thereon, while the upper end of said stem is formed with a seat for the accommodation of a safety or vent valve, which is adapted to be opened automatically on the accumulation of gas within the generator above the desired pressure, and this valve-rod is thus adapted to operatively connect the diaphragm-regulator and the main cut-off valve to control the latter from the former and also to serve in connection with a safety-valve, by which the generator may be vented when the gas-pressure increases above the desired point. The washer 40 is fitted against the gasket 36 on the upper face of the main cut-off valve, and this washer serves as a metallic seat for a return or depressing spring 41, which, in connection with the weight of the valve and its stem, tends to move the valve to its open position on a decrease in the pressure of gas in the generator. The spring 41 is housed or contained in the chamber of the tubular boss 28^a, and one end of this spring is seated against the head 42 of said boss 28^a. This boss opens through the lower face of the chambered bottom 14, and it extends into the central gas-tube 13 of the generator, so that when the main valve 35 is lowered the gas from the carbid vessel is free to pass through and around the valve 35 into the chamber of the tubular boss 28^a, and the head 42 of said boss has a plurality of gas-ports 43, which provide for the passage of the gas from the boss into the central gas-tube 13.

The generator-shell 10 is provided with an internally-threaded flange 44, which protrudes above the dished top 12, and into this flange is screwed the flanged and threaded cover 45, thus uniting the cover detachably to the generator-shell. The dished top and the cap or cover 45 form between themselves a diaphragm-chamber 46, in which is contained a flexible diaphragm 47, of rubber fabric, leather, or any other suitable material. This diaphragm has its edge fitted upon a flat face of the dished top 12, and on said edge of the diaphragm is fitted a metallic washer or ring 48, upon which bears the flange of the cap or cover 45, whereby the cover is adapted to clamp the ring 48 firmly upon the flexible diaphragm and confine the latter circumferentially within the diaphragm-chamber 46. This diaphragm is exposed to the pressure of the gas which passes through the central tube 13 of the generator and communicates with the chamber 46, and to the diaphragm is attached or fastened the tubular stem or rod 37 of the main valve 35. This stem or rod is threaded exteriorly at two places 49 50 at and near its upper end, leaving an intermediate smooth portion for the guidance of the stem in a guide-flange 53 of the cover 45. On the threaded length 49 of the valve-stem are screwed the nuts 51, arranged on opposite sides of the diaphragm 47, and between the nuts and the piaphragm are the washers 52, which engage with the diaphragm and prevent wear thereon by adjustment of the nuts. A regulating-nut 54 is screwed on the threaded length 50 of the valve-stem 37, and this nut is adapted to be rotated to engage with the guide-flange 53 of the cover 45. Normally the regulating-nut 54 is adjusted on the valve-stem to allow the latter to play vertically with the diaphragm and adjust the main valve without permitting the nut 54 to rest upon the guide-flange 53; but when it is desired to close the valve 35 against the passage of water to the carbid vessel or the flow of gas from said vessel to the central tube 13 of the generator the nut 54 may be screwed down against the guide-flange 53 to raise the valve-stem 37 and force the main valve 35 against its seat on the bottom 14, whereby the ports 30 and the lower open end of the tubular boss 28^a may be tightly closed.

The upper end of the tubular valve stem or rod 37 is formed with a valve-seat 55, upon which is adapted to fit a conical vent-valve 56, which is housed within a shell 57, screwed on a threaded upper extremity 50 of the valve-stem. The vent-valve is normally depressed to rest upon the seat on the tubular valve-stem by a spring 58, which is contained within the valve-shell 57, that travels with the stem 37, and this shell may be adjusted on the stem to compress the spring and force the valve 56 tightly against the seat. The valve-shell 57 is adjusted to place the spring under a tension sufficient to hold the valve to its seat against the pressure of the gas within the generator; but when the gas exceeds the pressure to which the spring is adjusted the valve is lifted and the gas is free to escape through the stem 37 and ports 59, which are provided in the shell 57 of the safety-valve. A jam-nut 60 is screwed on

the threaded length 50 of the valve-stem 37 to bind against the shell of the vent-valve and hold the latter against displacement when it is adjusted to close the vent-valve.

The chambered bottom 14 of the generator-shell is provided with the depending arms or extensions 61, which support the distributing or spraying screen 62 below the bottom 14 and over the carbid vessel. This screen has a rim 63, provided with openings for the reception of threaded stems 64, which are attached to the extensions 61, and on these stems are screwed the nuts 65, which serve to hold the screens 62 removably in place below the valve 35, which is housed within the chambered bottom 14.

A water-inlet nipple 66 is provided on one side of the generator-shell 10 to communicate with the water-chamber 11 therein, and this nipple is interiorly threaded to receive a threaded plug 67, which may be removed when it is desired to fill the chamber 11 with water. This plug 67 has a vertical port or opening 67ª, which provides for the admission of atmospheric air to the water-chamber 11, and the water in this chamber is thus exposed to air-pressure, so as to insure the water passing through the ports 30 in the bottom 14. To provide for drainage of water from this chamber 11 a drain-cock 68 is provided on one side of the generator-shell 10 above the point where said shell is seated on the ring of the tripod, and by opening this cock 68 the water may pass from the chamber 11 to enable the latter to be cleaned.

In connection with our generator we employ a purifier adapted to contain a charge of calcium carbid, which by its affinity to water eliminates the moisture which is contained in acetylene gas produced within the generator. The shell 70 of this purifier is mounted on and coupled to the generator-shell 10, and the ends of said purifier-shell are closed by the heads 71, packings 72 being interposed between the heads and the ends of the shell 70 to secure gas-tight joints. Within this shell 70 is an annular flange 73, which supports a screen or grate 74, on which is placed a charge of calcium carbid. The purifier is coupled to the generator by the threaded tube 75, which communicates with the chamber of the purifier below the grate or screen 74 therein, so that the gas is compelled to travel through the carbid on the grate before it finds its egress from the purifier, whereby the gas subsequent to its generation is again subjected to the action of calcium carbid for the elimination of moisture from the gas. The purifier is operatively connected with the central tube 13 of the generator by a pipe connection 77, the inner end of which opens into the tube 13, and the outer end thereof is interiorly threaded for union by the coupling 75 with the purifier. The gas is conveyed from the purifier to the burner of the headlight through a suitable pipe or tube, (not shown,) adapted to be coupled to the pipe connection 78, which is arranged above the screen or grate 74 and is shown as extending from one side of the purifier-shell.

The operation of our apparatus may be described as follows: The several parts of the apparatus having been assembled on the generator-shell, it is fitted in the supporting-ring of the tripod, and the clamping-screws are adjusted to firmly bind the generator-shell in place. Before filling the chamber 11 of the shell 10 with water the adjusting-nut 54 is operated to lift the valve-stem 37 and force the cut-off valve 35 partly against its seat on the bottom 14 to prevent water from dripping from the ports 30 and the perforated plugs therein. Water may now be introduced into the chamber 11 through the nipple 66, and the plug 67 is then screwed into the nipple to allow air to pass into the chamber 11. The charge of calcium carbid is now introduced into the purifier 70 to rest upon the grate therein, and the upper head is replaced to make a tight joint. The carbid vessel 16 is also charged with a quantity of fresh active carbid, which rests upon the grate, and the vessel is then screwed to the bottom 14 to make a tight joint through the medium of the gasket with the flange at the lower end of the generator-shell 10. An off-bearing gas pipe or tube is now coupled to the pipe connection 78, after which the regulating-nut 54 is turned to lift it from the guide-flange 53 of the cover 45. The valve 35 now descends owing to its weight and the action of the depressing-spring thereon, and water is thus permitted to pass through the ports 30 and the valve-plugs 32 to trickle over the valve and the distributing grate or screen 62. As the water attacks the carbid in the vessel 16 acetylene gas is at once evolved by the decomposition of the water and carbid and the gas flows from the vessel 16 around the valve and through the tubular boss 28ª and its ports into the central gas-tube 13 of the generator. The gas flows through the connection 77 into the purifier below the grate 74 thereof, and the gas is thus brought in contact with the second charge of carbid contained within the purifier, which carbid is adapted to absorb the moisture from the gas, and thereby dehydrate the latter, so that the gas reaches the burner in a dry condition. When the water is dripping on the carbid within the vessel 16 and the generation of gas is in progress, the pressure to the burner is regulated by the flexible diaphragm 47, which is exposed to the gas-pressure in the tube 13 and the chamber 46, and an excess of gas-pressure moves the diaphragm in an upward direction, thereby lifting the valve 35 to its seat, whereby the flow of water to the carbid is cut off and the passage of gas from the vessel 16 to the purifier is arrested. Of course a decrease of the pressure in the tube 13 and the diaphragm-chamber, due to the consumption of the gas at the burners, allows the valve and its stem, assisted by the action of the spring 41, to descend away from

the seat-face of the bottom 14, thereby opening the passages for the flow of water to the carbid-chamber 16 and permitting the gas to flow from the generator to the purifier. Should there be an accumulation of gas in the carbid vessel 16 after the inlet of water shall have been arrested by the closing of the valve 35, the gas will pass through the tubular stem or rod 37 and act against the vent-valve 56 to open the latter against the pressure of the spring 58; but in order to open this vent-valve the pressure of the gas within the carbid-chamber must exceed the pressure of the gas that acts against the diaphragm, which, through the rod, holds the valve 35 to its seat against the bottom 14. In the generation of the gas some of the carbid in the vessel 16 is decomposed, and the charge of carbid in the purifier is also decomposed by the absorption of the moisture from the gas as it passes to the burner. The spent or exhausted carbid in the vessel 16 and the purifier is free to sift through the grates or screens which are contained within the vessel 16 and the purifier, thus presenting the fresh or active carbid to the action of the water which is admitted to the vessel 16 and to the gas as it traverses the purifier. To arrest the generation of gas, the nut 54 is screwed on the valve-stem to rest upon the flange 53 of the cover 45, and this adjustment of the nut lifts the stem and main valve to prevent the water from flowing through the ports and the plugs in the bottom 14.

In Fig. 6 of the drawings we have illustrated a screw-plug 80 to regulate the volume of water which may pass through the port 30 in lieu of using the screw-plug and the fibrous packing. This plug 80 has an extended stem 81 to enter the contracted part of the port 30, and it has a longitudinal slot 82, that forms a channel for the flow of water through the plug when it is screwed down to unseat it. To conveniently adjust the plug, the lower face thereof has a notch or niche 83 to receive the end of a screw-driver or other implement.

Changes may be made in the form of some of the parts, while their essential features are retained and the spirit of the invention embodied. Hence we 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 we claim is—

1. The combination with a water-chamber and a carbid-chamber, of a partition between said chambers and provided with water-ports and a gas-port, a single cut-off valve arranged by a single movement to close the water and gas ports, and a gas-pressure regulator connected with said valve to positively seat the latter on an increase of gas-pressure above a certain limit, substantially as described.

2. The combination with a water-chamber and a carbid-chamber, of a partition between said chambers and provided with water-ports and with a gas-port, a gas-passage connected to said partition to communicate with the gas-port, a diaphragm-regulator confined in said gas-passage to be exposed to the pressure of gas therein, a single valve arranged to be seated against the partition for closing the ports therein, and a valve-stem attached to said valve and the regulator, substantially as described.

3. The combination with a water-chamber and a carbid-chamber, of a partition arranged between said chambers and provided with water and gas ports, a valve arranged to be seated against said partition to open or close the water and gas ports simultaneously, and a pressure-regulator operatively connected with said valve, substantially as described.

4. The combination with a water-chamber having water-ports, a gas-passage, and a carbid-chamber, of a single valve arranged to control the admission of water to the carbid-chamber and the exit of gas therefrom, a tubular valve-stem connected to said valve for movement therewith, a vent-valve normally seated on said tubular valve-stem to travel with the same and arranged to be opened automatically by gas-pressure in excess of the pressure required to seat the valve, and a regulator operatively connected with said valve to seat the latter when the gas-pressure attains a certain limit below that required to unseat the vent-valve, substantially as described.

5. In an acetylene-gas generator, the combination with a water-chamber and a carbid-chamber, of a partition provided with water-ports, a gas-passage extending through the water-chamber and opening through said partition to communicate with the carbid-chamber, a single cut-off valve arranged below said partition and movable relative thereto for simultaneously closing the gas and water ports, a diaphragm-regulator confined within said gas-passage, a single rod or stem extending through the gas-passage and connected to said valve and the diaphragm-regulator, the upper end of said stem arranged to protrude beyond the regulator-chamber, and a regulating-nut fitted to said protruding end of the valve-stem for adjusting the same and the valve to seat said valve against the partition and close the gas and water ports therein, substantially as described.

6. The combination with a water-chamber and a carbid-chamber, of a partition provided with packed water-ports, a gas-passage extending through the water-chamber and opening centrally through said partition, a cut-off valve arranged below the partition to control the admission of water and the outlet of gas therethrough, a tubular stem attached to the valve and extending through the gas-passage, a vent-valve shell movable with the tubular stem, a spring-actuated vent-valve confined slidably within said valve-shell and normally seated on the tubular stem, and a diaphragm-regulator confined in the gas-passage and con-

nected with said valve-stem to close the cut-off valve under a gas-pressure lower than the pressure required to open the vent-valve, substantially as described.

7. The combination with a carbid-chamber and a water-chamber, of a partition arranged between said chambers and provided with water-ports, a cut-off valve arranged to be seated against said partition, a diaphragm-regulator confined within a chamber which is in communication with the carbid-chamber, and a valve-stem attached to the diaphragm-regulator and the cut-off valve to operatively connect said parts, substantially as described.

8. The combination of a generator-shell having a water-chamber, a carbid vessel, a partition between said water-chamber and the carbid vessel and provided with water-ports, a diaphragm-regulator communicating with the gas-chamber of the carbid vessel, a cut-off valve arranged to be seated against the partition to cover the water-ports therein, and a stem or rod attached to the diaphragm-regulator and the cut-off valve, substantially as described.

9. The combination of a generator-shell having a central gas-tube and a top arranged to form, in connection with a cover, a diaphragm-chamber and said shell also provided with a water-chamber, the carbid-receptacle, a partition or bottom between the carbid-receptacle and the water-chamber of the generator-shell and provided with ports for the passage of water, a diaphragm confined within the diaphragm-chamber, a main cut-off valve arranged to cover the ports in the partition or bottom, a valve-stem connected to the diaphragm and the cut-off valve, and a spring which assists the downward movement of the cut-off valve and its stem, substantially as described.

10. The combination with a generator-shell having a water-chamber and a carbid-chamber, of a main cut-off valve arranged to control the flow of water from the generator-shell to the carbid vessel, a tubular valve-stem communicating with the carbid vessel and attached to the main valve, a diaphragm attached to the stem or rod and confined within a chamber which is in communication with the carbid vessel, and a safety-valve mounted on the tubular stem or rod to travel therewith and adapted to be opened by pressure within the carbid-chamber which exceeds the pressure required to close the cut-off valve by action against the diaphragm, substantially as described.

11. The combination with a generator having water-inlet ports and a gas-outlet port, of a cut-off valve to close the ports in said chamber, a tubular valve-stem movable with the cut-off valve, a pressure-regulator device contained within a chamber which communicates with the carbid vessel and is attached to the stem to control the main cut-off valve, and a safety-valve seated against the tubular valve-stem to travel therewith and arranged to be opened by excessive gas-pressure within the carbid-chamber when the main valve is operated by the regulator to close communication between the regulator-chamber and the carbid vessel, substantially as described.

12. The combination with a supporting-frame and a water-cistern mounted thereon, of a single externally-threaded bottom partly screwed into said cistern to project below the latter and provided with water-ports, a carbid-shell secured to the projecting part of said bottom and coupled thereby detachably with the cistern, a gas-passage opening through the bottom, a single valve to control the flow of water from the cistern and to cut off the gas from the gas-passage, and a regulator mechanism connected actively with said valve, substantially as described.

13. The combination of a generator-shell having a water-chamber, a partition or bottom secured removably to said generator-shell and provided with ports which open into the water-chamber, a carbid vessel secured removably to the partition or bottom, a cut-off valve arranged to be seated against said partition or bottom, and a pressure-regulator connected operatively with said cut-off valve, substantially as described.

14. In an acetylene-gas generator, the combination with a water-chamber and a carbid-chamber, of a partition or bottom provided with water-ports having the packings and the adjustable compression-plugs for obstructing the free flow of water therethrough, a cut-off valve arranged to be seated against said partition to close the water-ports therein, a pressure-regulator to force the valve to its seat on an increase of gas-pressure above a certain limit, and a depressing-spring seated directly against the valve to normally hold the latter free from its seat on the partition, substantially as described.

15. The combination with a generator-shell and a carbid-receptacle, of a partition or bottom provided with the water-ports, adjustable perforated plugs fitted in said ports, and packings confined within the ports and compressed by said plugs, and a cut-off valve to open or close said ports and the plugs therein, substantially as described.

16. In a gas-generator, a partition between the water-chamber and a carbid vessel and provided with ports for the passage of water from one chamber to the other, and adjustable plugs fitted within said ports and arranged to control the volume of water-chamber pipes through the ports, in combination with a cut-off valve arranged to entirely cut off the flow of water through the ports and the plugs confined therein, substantially as described.

17. The combination with a valve arranged to control the passage of water from the water-chamber to a carbid-chamber and a diaphragm-regulator, of a tubular valve-stem attached to said valve and the diaphragm-regu-

lator and communicating with the carbid-chamber, and a safety-valve having a cut-off mounted on the tubular valve-stem to travel therewith, and said safety-valve normally seated against the tubular valve-stem to close the vent-port leading therefrom, whereby the tubular stem is adapted to serve as a vent from the carbid-chamber, substantially as described.

18. In a gas-generator, the combination of a shell having a central gas-tube and a water-chamber which surrounds said tube, a bottom or partition secured to the shell and provided with a tubular boss which fits in the gas-tube and with parts in the bottom of the water-chamber, a purifier having a pipe connection with the gas-tube of the shell, a cut-off valve beneath the partition or bottom to close the tubular boss and the water-ports therein, a valve-stem attached to the cut-off valve, and a diaphragm-regulator contained within the chamber which communicates with the central gas-tube and attached to the valve-stem, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

HILLIARY ELDRIDGE.
SYLVAIN BLUM.

Witnesses:
B. I. WILLCOXON,
E. R. CHEESBOROUGH.