No. 631,207. Patented Aug. 15, 1899.

W. H. ELDREDGE.

ACETYLENE GAS GENERATOR.

(Application filed Mar. 30, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

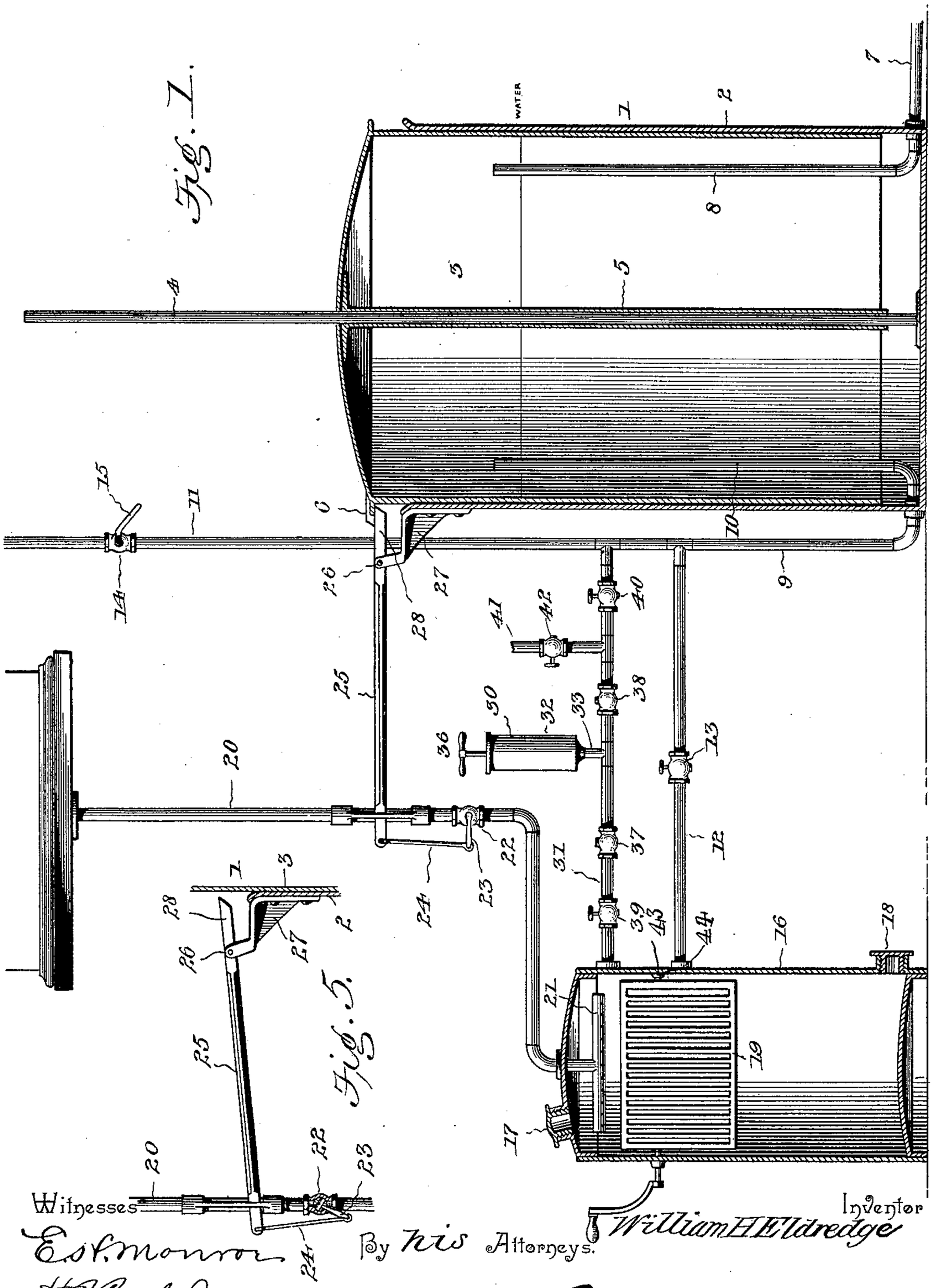

Fig. 5.

Witnesses

E. F. Monroe

H. J. Berkeley

By his Attorneys.

Inventor

William H. Eldredge

C. A. Snow & Co.

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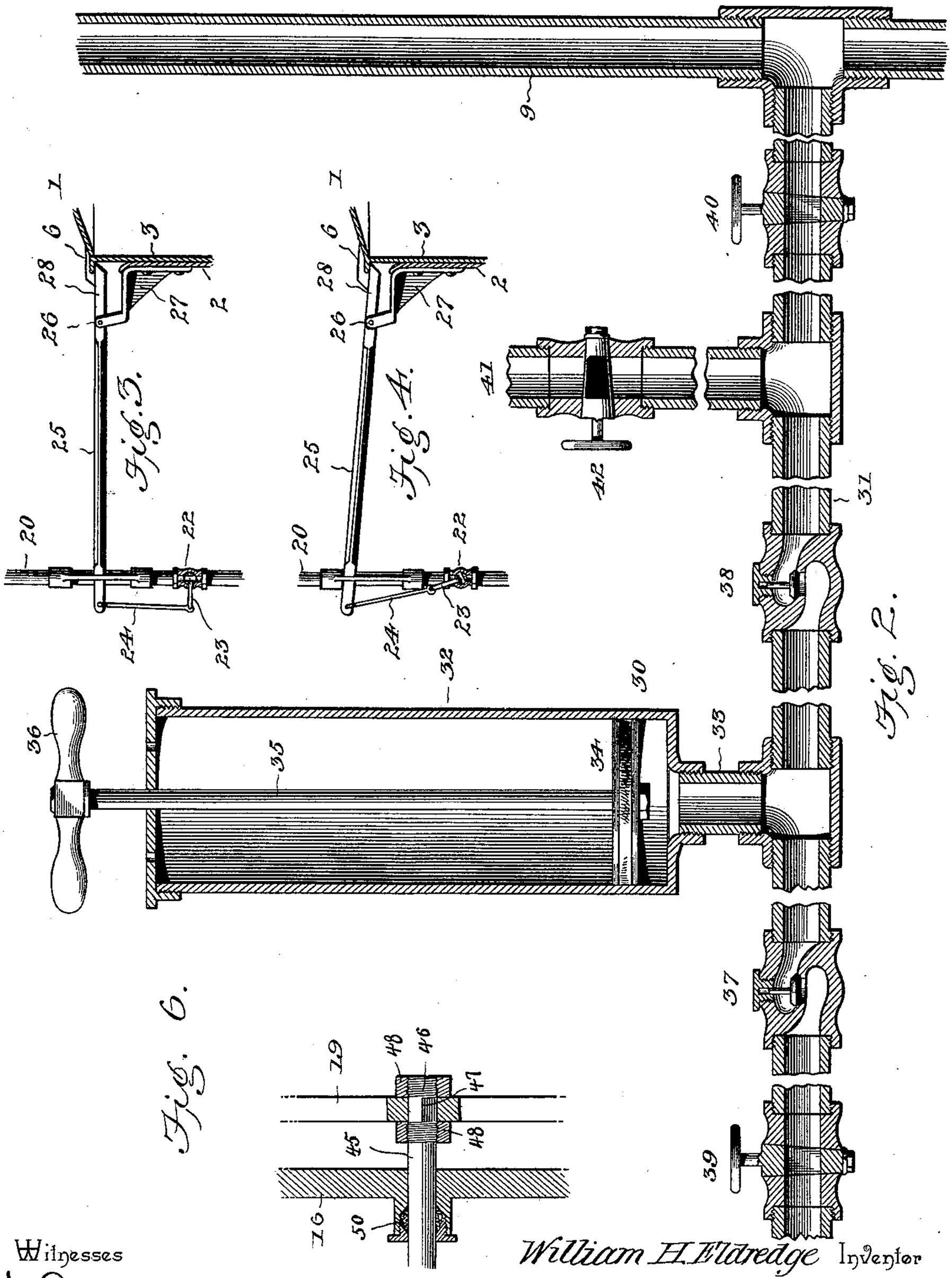

Witnesses
E. F. Monroe
H. E. Beachlake

William H. Eldredge Inventor
By Wis Attorneys,
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

WILLIAM H. ELDREDGE, OF LEON, NEW YORK.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 631,207, dated August 15, 1899.

Application filed March 30, 1898. Serial No. 675,725. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. ELDREDGE, a citizen of the United States, residing at Leon, in the county of Cattaraugus and State of New York, have invented a new and useful Acetylene-Gas Generator, of which the following is a specification.

My invention relates to improvements in generators for the production of the gas known to the art as "acetylene" gas, in which a solid, such as calcium carbid, is to be attacked by water to attain chemical reaction between and decomposition of said carbid and water for the generation of the gas.

One of the objects that I have in view is to automatically control the generation of the gas in proportion to the demands of the service by bringing the attacking liquid to the carbid on a reduction of the gas-pressure, and when sufficient gas has been generated to restore the desired pressure the supply of water to the carbid is automatically shut off, thus arresting the generation until a subsequent reduction of the pressure, owing to consumption, renders it necessary to renew the generation and the production of the gas.

A further object of the invention is to provide means by which the gas contained in the generator may be mechanically forced into the gasometer previous to opening the generator to recharge the carbid vessel or crate therein and to construct this forcing mechanism in a manner to expel the air from the generator subsequent to the recharge of said carbid vessel, so that when the gas is generated it will not be commingled to any appreciable extent with atmospheric air contained in said generator.

A further object of the invention is to construct the generator with a view to its ready cleansing of the spent or exhausted carbid which may accumulate in the bottom thereof and to precipitate such spent carbid from the basket or crate; also, to provide means by which the water-inlet valve is closed in abnormal positions of the gasometer-bell, and, finally, to provide for the automatic escape of surplus gas from the apparatus.

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

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

Figure 1 is a sectional elevation of a gas-generating apparatus constructed in accordance with my invention. Fig. 2 is an enlarged detail sectional view through the forcing means between the generator and the gasometer by which the gas in the generator may be forced into the gasometer previous to recharging the carbid vessel. Figs. 3, 4, and 5 are detail sectional views illustrating the various positions of the water-inlet valve, which is controlled by a trip mechanism adapted for operation by the gasometer-bell. Fig. 6 illustrates a detailed construction of the carbid vessel or basket with a shaking-bottom therein.

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

Referring more particularly to Fig. 1, the numeral 1 indicates the gasometer in its entirety. It consists of a tank 2 and a vertically-movable bell 3, which is slidably fitted to the tank so as to rise and fall therein under the varying pressures of the gas stored in the gasometer. In the practical construction of the tank and valve I make the parts of galvanized sheet-steel to obviate corrosion due to chemical action of acetylene gas on metal; but the particular materials may be varied as desired. Extending vertically through this gasometer is a guide-rod 4, which is rigidly fastened at its lower end to the bottom of the tank, and this guide-rod is of a length to extend above the bell 3 in its highest adjustment under the pressure of the gas. The guide-rod is arranged centrally in relation to the tank and bell, and the latter is operatively connected with said guide-rod without permitting the escape of gas by the employment of a tube 5, the upper end of which is rigidly attached to the head of the bell by a gas-tight joint, such as is obtained by soldering said tube to the bell. This tube fits loosely around the vertical guide-rod, and its lower

extremity terminates near the lower edge of the bell. The bell and its tube are designed to be immersed in water contained in the tank. Hence the gas is confined within the bell against escape, because the water forms the seal between the tank and the bell and its tube. This vertically-movable bell carries a trip-arm 6, which is rigidly attached to its head and extends laterally therefrom a suitable distance to actuate the water-inlet valve and an automatic vent-valve, as will hereinafter appear.

7 designates the outlet-pipe which passes through the tank below the limit of the bell, and said outlet-pipe has a vertical branch 8, which extends through the water in the tank, so as to receive the gas confined within the bell.

The inlet-pipe by which the gas is conveyed from the generator to the gasometer is indicated at 9 as extending through the tank and upwardly alongside of the same, and said inlet-pipe has a branch 10, placed vertically within the tank and extending through the water therein above the level of the seal. This inlet-pipe outside of the gasometer is extended vertically a suitable distance above the bell, so as to form a vent-pipe 11, which may be extended or carried any suitable distance, so as to discharge any gas which may be admitted thereto outside of the building or dwelling. From this inlet-pipe extends a horizontal branch 12, which communicates with the pipe 9 and is attached to the generator shell or cylinder to receive the gas therefrom, and in this horizontal branch pipe 12 is fitted a globe-valve 13, which may be closed to cut off communication between the generator and the vertical inlet-pipe 9.

The vertically-extended vent-pipe 11 is provided with an automatic safety-valve 14, to the apertured plug of which is attached an operating-lever 15. This lever extends outwardly from the safety-valve, so as to lie in the path of the trip-arm 6 on the bell 3, and the weight of the lever 15 is sufficient to keep the valve 14 normally closed. The valve 14 thus serves to prevent escape and waste of the gas; but should a large volume of gas be generated, either accidentally or intentionally, the pressure of the gas stored in the bell will raise the latter above its normal working position and bring the trip-arm 6 into engagement with the valve-lever 15, thereby opening the valve 14 to the escape of gas. A reduction of the volume and pressure of the gas allows the valve to descend and withdraw the arm 6 from the lever 15, and the weight of this lever closes the valve 14 against the further escape of gas.

The generator which I employ is situated exteriorly to and alongside of the gasometer, and it has a vertical cylinder or shell 16, preferably constructed of galvanized sheet-steel to obviate corrosion. In the head of this generator-shell is provided a filling-nipple 17, closed by means of a suitable head, and at the lower part of the shell 16 a cleaning-opening 18 is provided, such opening being also closed by a cap or head, which may be removed when it is desired to clean the shell 16 of the accumulation of spent or exhausted carbid discharged into the lower part of said shell 16 from the carbid vessel or basket 19, which is suspended or supported in any suitable way within the generator.

The water necessary to generate acetylene gas by attacking the carbid contained in the vessel or crate 19 is admitted by means of a water-inlet pipe 20, shown in the accompanying drawings as arranged in a vertical position above the generator and adapted to lead to an elevated tank, by which the necessary pressure of water is attained for supply to the generator. The lower end of this water-pipe is suitably attached to the head of the generator, and the contents of the pipe are discharged into a sprayer 21, the latter being of any suitable construction and suspended from a generator-head over the carbid crate or vessel, so as to spray the water in thin streams over the carbid, thereby effecting maximum generation of the gas in proportion to the volume of water admitted to the generator. In this water-pipe 20 is provided a water-inlet valve 22, having a turning plug fitted in a seat of the valve-shell to rock or oscillate therein, and this plug has a transverse port adapted to be brought into and out of alinement with the liquid-passage through said shell, as represented by Figs. 3, 4, and 5. To a protruding end or part of this turning plug forming one element of the water-valve 22 is rigidly fastened a short lever-arm 23, which extends outwardly a suitable distance from the valve, and to the free end of this short lever is pivoted a link 24, the opposite end of which is in like manner pivoted to the extremity of the long arm of a trip-lever 25. This trip-lever is fulcrumed, as at 26, to a fixed arm 27 on the gasometer in a manner to provide a short lever-arm 28, which is arranged in the path of the trip-arm 6 on the gasometer-bell, and when the bell is raised to its normal position by the pressure of gas stored in the gasometer the trip-arm is free from the short lever-arm 28, and the weight of the long arm of the lever 25 moves the lever 23 to a position where the valve 22 is closed against the passage of water through the inlet-pipe to the sprayer within the generator. The long arm of the valve-lever 25 is slidingly confined on the water-inlet pipe 20 by a keeper (shown in Figs. 1, 3, and 4) which is attached to the pipe 20 adjacent to the inlet-valve, and this valve-lever is thus guided in a vertical plane in its movement toward or from the valve 22 for the purpose of actuating the latter without torsional strain on the link or the lever-arm. The weight of the long arm of said lever 25 normally keeps the water-valve 22 closed without the necessity of providing a separate counterweight for the lever to close said valve, thus simplifying the construction and in-

creasing the efficiency of the operation. The employment of the keeper to slidingly confine the long arm of the lever is advantageous in view of the fact that the lever is mounted on the gasometer to utilize the gravity of its long arm in closing the water-valve, and said keeper directs the lever in its play to and from the valve. Under normal conditions of service the gasometer-bell is raised by the pressure of gas therein to a position where its trip-arm is between the valve-lever 25 and the controlling-lever 15 of the safety-valve. A reduction of the gas-pressure in the gasometer allows the bell to descend for its trip-arm to actuate the lever 25 and open the valve 22 for the admission of water to the generator to attack the carbid therein and renew the generation of gas, which when it accumulates in the bell raises the latter and withdraws the trip from the lever 25, the weight of which closes the valve 22 and again cuts off the flow of water from the pipe 20 to the generator. An excessive accumulation of gas raises the bell to its highest position and causes the trip to open the safety-valve. When the gasometer is entirely free from gas, the weight of the bell causes it to descend to its full limit within the tank 2, and the trip-arm 6 depresses the short arm 28 of the lever 25 to a position where the long lever-arm raises the link 24 and lever 23, so as to turn the valve-plug to a position where the passage through the valve-shell is closed, said valve 22 thus being closed under abnormal adjustments of the gasometer-bell.

In my apparatus I have provided a forcing mechanism 30, by which the gas contained in the generator may be drawn therefrom and forced into the gasometer previous to the opening of the generator for the purpose of recharging the carbid in the crate or vessel 19, thus obviating the escape of gas into the apartment and removing one of the causes of explosion, and this forcing mechanism is also constructed so that the air in the generator after the fresh charge of carbid has been placed therein may be withdrawn or expelled from the generator, whereby when the generation of gas is resumed the fresh supply of gas will not be commingled to any appreciable extent with atmospheric air. By eliminating air from the generator previous to resumption of the production of gas one of the objections to ordinary acetylene-gas apparatus is removed—*i. e.* the production of a poor quality of gas due to the admixture of air with acetylene at the initial stage of gas production. This forcing mechanism 30 is illustrated more clearly by Fig. 2 of the drawings, by reference to which it will be seen that I have provided a valved pipe 31 in addition to the branch pipe 12 between the generator and the inlet-pipe 9. This pipe 31 is arranged in a horizontal position above and parallel to the pipe 12, and its ends are attached to the generator-shell and to the pipe 9, respectively. Above this pipe 31 is a piston-cylinder 32, having a nipple 33 attached to the pipe 31 at a point intermediate of its length, and in this cylinder is operatively fitted a piston-head 34, to which is attached a piston-rod 35, having a handle 36 or other convenient means for operating the piston. In the pipe 31 on one side of the cylinder is fitted an inwardly-opening check-valve 37, the latter being arranged between the cylinder and the generator, so that on the upstroke of the piston the valve 37 will open to permit the gas to pass from the generator into the piston-cylinder. Another check-valve 38 is also provided in the connecting-pipe 31; but it is placed in said pipe between the attachment of the pipe 31 to the pipe 9 and the communication of the cylinder-nipple 33 with the pipe 31. This last-named check-valve 38 opens outwardly on the downstroke of the piston in said cylinder 32; but when the piston is raised said check-valve 38 is closed against its seat, thus preventing the passage of gas through the pipe 31 and into the pipe 9 when the piston is raised to draw the gas from the generator into the cylinder 32. A shut-off valve 39 is provided in the pipe 31 between the generator and the check-valve 37, and a similar shut-off valve 40 is placed in the pipe 31 between the check-valve 38 and the pipe 9. Said pipe 31 is also provided with an air-outlet 41 at a point between the shut-off valve 40 and the check-valve 38, and in said air-outlet is arranged a shut-off valve 42. When it is desired to recharge the carbid vessel in the generator with a fresh quantity of carbid, the valve 13 in the pipe 12 is closed to cut off communication between the generator and the pipe 9, and the valves 39 and 40 are opened to establish communication from the generator to the piston-chamber and also from the latter to the pipe 9, the valve 42 being closed. The piston is now operated, preferably by hand, and on its upstroke it draws gas from the generator into the cylinder 32, the check-valve 37 readily opening for the passage of gas, while the check-valve 38 remains closed. On the downstroke of the piston the check-valve 37 is closed by pressure of the gas, while the check-valve 38 opens to permit the gas to pass from the cylinder, the pipe 9, and from thence to the gasometer, and the operation described is repeated a desired number of times until the gas has been practically forced from the generator into the gasometer, after which the valves 39 and 40 are closed. The filling-nipple 17 of the generator may now be opened to permit a fresh charge of carbid to be placed in the vessel or basket 19, or the head which closes the opening 18 may be removed for cleaning the lower part of the generator from accumulations of spent carbid, said openings 17 18 being securely closed before the apparatus is restored to its condition for operation. The generator having been opened when the fresh charge of carbid is placed therein, it is filled with atmospheric air, which it is desirable shall be exhausted therefrom previous to resumption of

gas production, and this is effected in my apparatus by opening the valve 39 in the pipe 31 and the valve 42 in the air-outlet 41, the valve 40 remaining closed. The piston is now operated to exhaust the air from the generator and expel it through the outlet 41. When the air has been practically exhausted from the generator, the valves 39 and 42 are closed and the valve 13 in the branch inlet-pipe 12 is opened to restore the generator to its position for service.

In my generator I provide the carbid crate or basket 19 with a grated bottom, which is mounted or fitted in the vessel or basket so as to have a shaking motion therein for the purpose of precipitating the spent or exhausted carbid from the crate or basket into the lower part of the generator-shell 16. This carbid-crate is preferably of cast metal with slots or openings in its side and bottom, and on one side it is formed with a gudgeon or pintle 43, preferably integral therewith and loosely fitted in a bearing 44 rigid with the generator-shell on the inside thereof.

The crate or basket is suspended on one side by the gudgeon and on its other side by a crank-shaft 45, the horizontal arm of which is threaded at 46 on opposite sides of an angular portion 47, which is fitted in an opening in the crate, so as to be attached thereto against turning. On the threaded lengths 46 of the crank are fitted the securing and jam nuts 48, which serve to make the crate or basket rigid with the shaft, and this shaft passes through a stuffing-box 50, attached to the generator to prevent leakage and waste of gas. Said crank-shaft is provided with a suitable handle for operating the crate, so as to vibrate the latter in the generator and cause it to strike against the generator-shell, so as to jar the crate and cause the spent carbid to be discharged through the slots or openings in the crate or vessel.

I am aware that changes in the form and proportion of parts and in the details of construction may be made by a skilled mechanic without departing from the spirit or sacrificing the advantages of my invention, and I therefore reserve the right to make such modifications as clearly fall within the scope of the invention.

Having thus described the invention, what I claim is—

1. In an acetylene-gas apparatus, the combination with a gasometer, a generator and a valved inlet-pipe, of a separate pipe attached to the generator and said inlet-pipe, a pump communicating with the separate pipe, controlling-cocks situated in said pipe between the generator and the inlet-pipe and on opposite sides of the exhausting-pump, check-valves also situated in the separate pipe between the controlling-valves and the pump, and a valved air-outlet between the check and controlling valves located in that part of the pipe connection between the pump and the gasometer, substantially as described.

2. In an acetylene-gas apparatus, the combination with a generator, a gasometer, and a valved pipe, of a separate exhausting-pipe connected to the generator, an exhausting-pump attached to the separate pipe, a check and controlling valves, 37, 39, in the separate pipe between the generator and the pump, like valves, 38, 40, also located in said pipe and between the pump and the gasometer, and a valved air-vent pipe, 41, coupled to that part of the separate pipe between the check and controlling valves therein which lie between the pump and the gasometer, substantially as described.

3. In an acetylene-gas apparatus, the combination with a generator, a gasometer and a valved pipe, 12, of a separate valved pipe, 31, attached to the generator, an exhausting-pump coupled to the separate pipe, and controlling and check valves located in the said pipe to secure exhaustion of air or gas from the generator and forcing all the air or gas either through the vent-pipe or into the gasometer according to the adjustment of the controlling-valves, substantially as described.

4. In an acetylene-gas apparatus, the combination with a generator and a gasometer, of a gas-pipe, 9, having the automatic relief-valve disposed in the path of the gasometer-bell, the valved pipe, 12, connecting the generator with the pipe, 9, at a point below said relief-valve, the separate pipe, 31, attached to the generator and the pipe, 9, above the pipe, 12, the exhausting-pump coupled to the separate pipe, 31, and the controlling and check valves located in the separate pipe, 31, between the exhausting-pump, the generator and the gasometer, 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 H. ELDREDGE.

Witnesses:
E. E. TUTTLE,
W. W. HALLENBECK.