

No. 646,255.

Patented Mar. 27, 1900.

R. L. BECK.
ACETYLENE GAS GENERATOR.

(Application filed June 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 3.

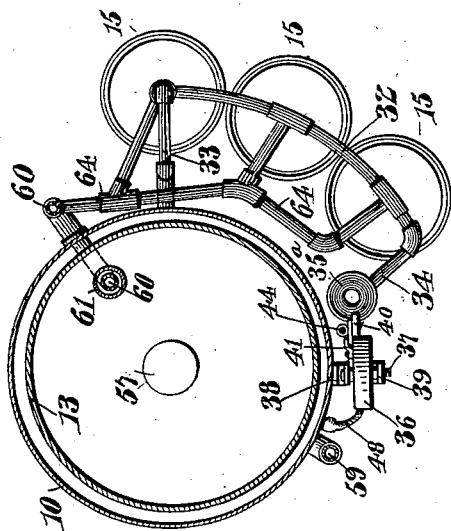


Fig. 6.

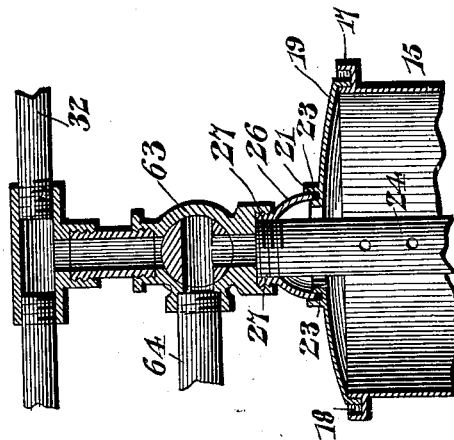
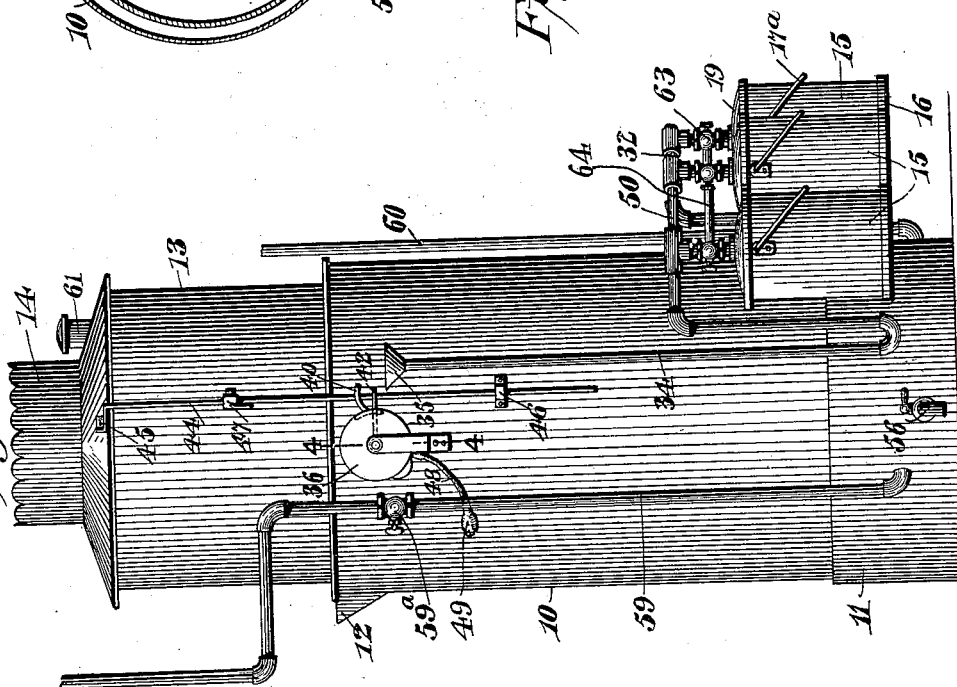


Fig. 1.



Witnesses

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No. 646,255.

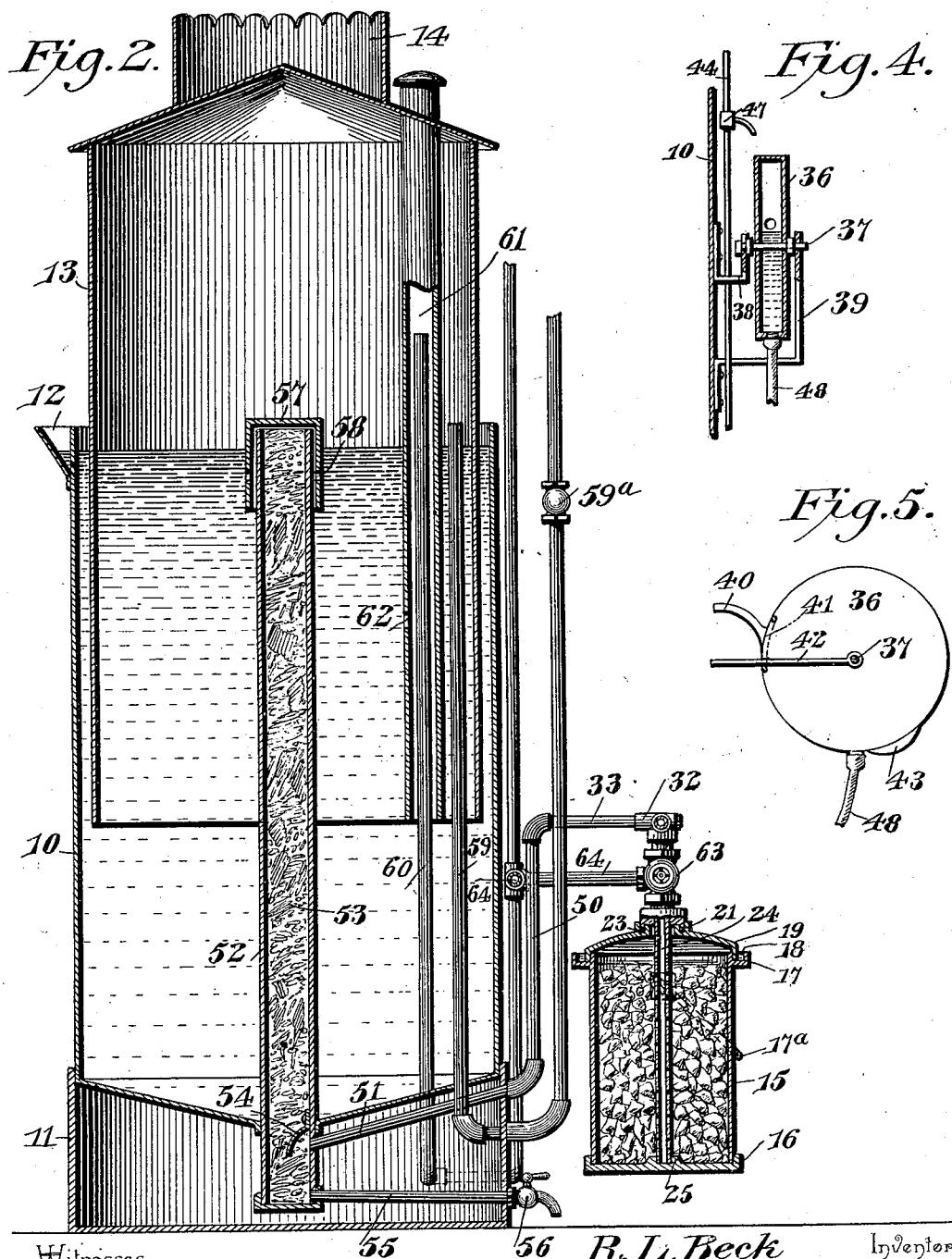
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2 Sheets—Sheet 2.



Witnesses

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UNITED STATES PATENT OFFICE.

RODEN L. BECK, OF MELVERN, KANSAS, ASSIGNOR OF ONE-HALF TO ORREN C. WILLIAMS, JR., OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 646,255, dated March 27, 1900.

Application filed June 27, 1899. Serial No. 722,039. (No model.)

To all whom it may concern:

Be it known that I, RODEN L. BECK, a citizen of the United States, residing at Melvern, in the county of Osage and State of Kansas, have invented a new and useful Acetylene-Gas Generator, of which the following is a specification.

My invention relates to improvements in apparatus for generating gas of that kind produced by a liquid attacking a solid, according to the now familiar process of producing acetylene by the decomposition of calcium carbide and water.

One object of the invention is to provide improved means for feeding water to either of a series of generators on a decrease in the available gas-supply, such water-feeding devices being supplied from the gasometer-tank and operable to cut off the flow of water to the active generator on exhaustion of the carbide charge therein.

A further object is to provide an improved construction of the generator wherein a perforated pipe is employed for admitting water to the carbide for the escape of gas from the chamber and as a means for holding the generator-cover in place to secure a gas-tight joint.

A further object is to provide means by which the gas is cooled, the aqueous vapors therein condensed, and is washed free from sediment before it enters the chamber of the gasometer-bell.

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.

In the drawings, Figure 1 is a side elevation of a gas-generating apparatus constructed in accordance with the principles of my invention. Fig. 2 is a diagrammatic sectional elevation through the gasometer and the generator, illustrating the pipes forming the piping system, by which water is conveyed to the generator, gas is transferred from the generator to the gasometer, so as to traverse the condenser, and the gasometer and generator may be vented. Fig. 3 is a sectional plan view illustrating a battery of generators in operative relation to the storage-gasometer,

the generators of such battery being suspended from a common pipe in a manner for the water to overflow from one generator to the other, so as to bring the generators successively into service. Fig. 4 is a vertical sectional elevation on the line 4-4 of Fig. 1, illustrating the water-feed devices and the trip for controlling the same. Fig. 5 is an elevation of the tiltable water-feed drum, illustrating the trip-lever and counterpoise by which the drum may be actuated. Fig. 6 is an enlarged detail sectional view through the cover for the generator, illustrating the means by which the cover may be clamped upon the generator to secure a gas-tight joint between said cover and the generator-bell and also between the cover and the gas-outlet.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

10 designates the tank of the gasometer, having the base or footpiece 11 for elevating the bottom thereof above the floor and accommodating the several pipes, and near its upper end said tank is equipped with a filling-spout 12, by which water may be conveniently poured into the chamber of said tank to nearly fill the latter, substantially to the line indicated by Fig. 2 of the drawings. The gas-bell 13 is inverted into the tank 10 for immersion in the water therein, so as to be normally sealed by the water and to travel freely in a vertical direction. This gas-bell may be of any construction preferred by those skilled in the art, and for convenience in weighting the bell, so as to secure pressure upon the gas, I have provided a weight-receptacle 14 on the head of the bell, said weight-receptacle being open for the ready introduction or removal of one or more weights, according to the desired gas-pressure.

In my apparatus I employ a battery of generators which are designed to be brought successively into service by the water overflowing from an active generator to a reserve or inactive generator, so that the generation of gas may be continued automatically in the event of exhaustion of the carbide charge in one or the other of the generators which are included in said battery, whereby the exhausted generator may be uncoupled and re-

moved from the apparatus for the purpose
 of recharging said exhausted generator and
 without interrupting the continuity of the
 gas-generating operation. The generators
 5 forming this battery are suspended from a
 single pipe which serves for the inlet of water
 to the generators and for the outflow of gas
 therefrom, and each generator is suspended
 for removal individually from the pipe.
 10 Each generator consists of a body or recep-
 tacle 15, designed to contain a proper quan-
 tity of calcium carbid, said body of the gen-
 erator pail or receptacle being of sheet-metal
 construction or of cast metal. If the body is
 15 made of sheet metal, I prefer to equip it with
 a cast-metal base 16, as shown more clearly
 by Fig. 2, and to this cast-metal base is firmly
 united in any suitable way a perforated pipe
 20 the generator and adapted to be connected
 detachably to a horizontal pipe for the pur-
 pose of suspending the generator removably
 from said horizontal pipe. At its upper end
 the pail or receptacle of the generator is pro-
 25 vided with an offstanding flange 17, which is
 fashioned to provide an intermediate cham-
 ber 18, adapted to receive a suitable liquid
 to form a seal around the flanged edge of a
 cover 19, said cover being seated upon the
 30 generator-receptacle 15 for its flanged edge
 to be immersed in the liquid seal which is
 contained in the chamber 18, thus minimiz-
 ing the leakage of gas from the generator.
 For the purpose of conveniently carrying the
 35 generator out of doors after it shall have
 been uncoupled from the horizontal pipe and
 previous to recharging said generator with-
 out permitting the gas to escape into the
 building I provide the generator with a bail
 40 or handle 17^a, which normally lies in a folded
 position alongside the generator-receptacle;
 but this bail can be elevated to a position
 above the generator-receptacle for conven-
 iently handling the latter.
 45 The cover is provided in its upper face with
 a central depression or pocket 21. A gasket
 23 is fitted within the pocket or depression 21
 in the upper face of said cover, said gasket
 surrounding the upper extremity of a perfo-
 50 rated pipe 24. This pipe is arranged cen-
 trally within the chamber for its lower end to
 be secured firmly to the bottom 16 by means
 of the threaded joint 25, the upper end of
 said pipe 24 extending through an orifice in
 55 the cover 19 and projecting therefrom through
 the gasket 23, which is seated in the central
 pocket 21 of said cover. This pipe 24 is thus
 attached to the pail or vessel to remain in a
 fixed position therein, said pipe being pro-
 60 vided with numerous perforations at points
 intermediate its length and between the joint
 25 and the point where the cover 19 is fitted
 removably thereto. The pipe serves an im-
 portant purpose in my generator, because it
 65 provides for the distribution of water to the
 mass of the carbid charge which is packed in
 the generator-chamber around said tube, the

perforations in the upper part of the tube al-
 lowing the gas to escape freely from the cham-
 ber of the generator through said tube and
 the piping system connected therewith. A
 coupling 26 has threaded engagement at 27
 with the upper protruding end of the perfo-
 rated pipe 24, said coupling being thus ad-
 justable by the threaded joint connection with
 75 the perforated pipe for the purpose of com-
 pressing the gasket 23 to make a tight joint
 around the pipe 24 at the point where it passes
 through the generator-cover, thus minimiz-
 ing the leakage of gas from the generator. 80

The coupling 26 is threaded interiorly and
 exteriorly, the interiorly-threaded portion 27
 of said coupling having engagement with the
 pipe 24 for adjustment thereon to compress
 the gasket 23, while the externally-threaded
 85 portion of the coupling has a threaded en-
 gagement with the shell of a three-way cock
 for the purpose of attaching the pipe 24 to
 said cock, which is in turn connected to a
 horizontal pipe, whereby the coupling 26 and
 90 the pipe 24 operate to suspend the generator
 vessel removably from the horizontal pipe.
 The coupling 26 is flared or enlarged toward
 its lower portion, as shown more clearly by
 Fig. 6, for the purpose of making the lower
 95 edge of the coupling enter the annular recess
 21 and engage properly with the gasket 23,
 thus enabling the coupling to turn freely
 around the upper protruding end of the pipe
 24 and exposing the portion of the coupling 100
 between the three-way valve and the gener-
 ator-cover for convenient access. The per-
 forated pipe 24 also serves as the means for
 distributing water to the carbid within the
 generator and as the outlet of gas from said 105
 generator.

32 designates the horizontal pipe from which
 the generators constituting the battery are
 individually suspended, and, as shown by
 Fig. 3, this pipe 32 is of curved or segmental
 110 form, so as to lie parallel to the gasometer and
 dispose the battery of generators in close re-
 lation thereto, thus reducing the floor area
 occupied by the apparatus. At one end this
 horizontal pipe 32 is provided with a branch 115
 adapted to convey the gas to a pipe, presently
 described, which transmits the gas to the con-
 denser located within the gasometer; but to
 the other end of the horizontal pipe 32 is con-
 120 nected the short leg of a vertically-disposed
 trap-pipe, into which water is supplied in
 regulated volumes from a suitable water-feed
 mechanism, said trap-pipe being open to the
 atmosphere and containing under all condi-
 125 tions of service a certain quantity of water,
 which forms a seal in said trap-pipe to pre-
 vent the gas from escaping from either of the
 generators of the battery.

The long leg of the trap-pipe is disposed
 alongside of the gasometer-tank 10, so as to 130
 have its upper end terminate in a funnel-
 shaped mouth 35. This trap-pipe 34 extends
 to the lower end of the generators, so that the
 legs may normally contain a sufficient supply

of water to prevent the gas from passing from the generator through the trap-pipe, and water in regulated volumes is supplied to said trap-pipe 34 by means of a rocking feed vessel or drum 36, which is equipped with a spout that overhangs the funnel-mouth 35 for delivering the water into said trap-pipe. This rocking feed vessel or drum is supported by a horizontal shaft 37, alongside of the gasometer-tank and in a plane approximately the same as the normal water-line within the tank 10, one end of said shaft 37 being supported in a short bracket 38, which is fixed to the tank 10 between the latter and said drum, while the other end of the shaft 37 finds a bearing in the long bracket 39, also secured to the tank, all as more clearly shown by Fig. 4. The drum or vessel is hollow to provide a chamber adapted to receive a supply of water which is to be delivered to the trap-pipe 34, said drum arranged to oscillate on or with the shaft 37 for delivering its contents into the trap-pipe. The drum is provided on one side with a spout 40, designed to be normally elevated above the water-level in the tank 10, so as to cut off the flow of water from the drum to the funnel-mouth of the trap-pipe, said drum being furthermore provided with a guide or stop 41, which is arranged on one side thereof in a position to receive the trip-lever 42. Said lever is fitted loosely on or fulcrumed to the drum-shaft 37 to extend alongside of the drum and pass through the guide or stop 41 thereon, said lever being disposed in the path of the trip, which is movable with the floatable bell 13. In order to normally maintain the tiltable feed-drum in a position for its delivery-spout 40 to be raised above the level of the water in the tank, I contemplate the employment of a counterweight 43, which in the preferred embodiment of my invention is made fast with the tiltable drum on the outside thereof and normally occupies a position on the under side of said drum. It will be understood that the drum is rocked or turned on the descent of the bell through the medium of positively-acting trip devices, so that the contents of the drum will be discharged through the spout 40 into the trap-pipe; but on ascent of the bell the trip devices are moved free from the drum, so that the counterweight is free to exert its ponderosity in a manner to return the drum to its normal position, as shown by Figs. 1 and 5, wherein the spout is raised above the water-level in the tank in order to cut off the flow of water to the trap-pipe. The trip-rod 44 is arranged in a vertical position alongside of the bell and the tank, the upper end of said rod being fastened, as at 45, to the head of the floatable bell, while the lower end thereof is fitted slidably in a guide 46 on the tank 10. Said trip-rod carries a trip-arm 47, which is clamped adjustably to the rod in any preferred way, the trip-lever 42 being disposed in the path of the trip-arm, so as to be actuated thereby on the descent of the bell. It will be under-

stood that the bell does not descend until the gas is consumed at the burners; but on the descent of the bell the rod 44 and arm 47 travel downwardly therewith until the arm engages with the lever 42, whereupon the lever is depressed to engage the bottom of the guide or stop 41, and thereby turn the drum 36 until its spout drops below the water-line in the tank 10, whereby the water is delivered from the drum into the pipe 34, to flow from thence to the pipe 32 and into the pipe 24, by which the water is distributed to the carbid. The gas generated by the water attacking the carbid flows through the pipe 32 and into the chamber of the floatable bell through the course presently described, thus raising the bell and withdrawing the trip rod and arm from the lever 42, whereupon the counterweight 43 returns the drum to its normal position. The water is supplied to the rocking drum by means of a flexible tube 48, one end of which is coupled to the under side of said drum; but its other end is united at 49 to the tank 10 at a point below the water-line therein, thus providing for the flow of water from the tank through the flexible tube and into the rocking drum.

The gas is conveyed from the generator by a pipe 50, having operative connection with the upper end of the pipe 33, said gas-pipe 50 being provided with a branch 51, which is carried below the bottom of the tank 10 in a manner to be united to the lower end of a condenser-shell 52. This condenser is erected in a vertical position within the water-chamber of the tank 10, the lower end of said condenser-shell being made fast with the bottom of said tank in any approved way. The shell 52 receives a metallic filling 53, composed, preferably, of waste metal—such as scraps of tin, sheet metal, or other suitable material designed to afford a very large area of condensing-surface within the shell 52. This metallic filling extends from the bottom to the top of the shell, and as the shell is immersed at all times in the cool water of the tank said shell and metallic filling thereof are kept at a low temperature, whereby the heated gas from the generator will impinge against the cool metallic filling within the condenser for the purpose of having its aqueous vapors condensed by contact with the filling before the gas is admitted to the floatable bell 13. A shield 54 is secured within the condenser opposite to the delivery-orifice from the branch 51 of the gas-pipe to keep the metallic filling from packing around the port or orifice and obstructing the flow of gas into the condenser. For discharging the water of condensation from the condenser I employ a drain-pipe 55, which is coupled to the foot of the condenser and carried to the outside of the tank 10, through the base 11 thereof, said drain-pipe having a stop-cock 56.

The condenser which I have embodied extends through the water-bath within the tank 10; but the gas is not allowed to escape di-

rectly from this condenser into the floatable bell. I have provided means by which the course of the gas is diverted so as to pass through the water, near the level thereof, for the purpose of washing the gas to eliminate any sediment which may be carried therewith from the generator. This end is attained by the employment of a cap 57, which is fitted loosely on the upper part of the condenser-shell, said cap extending into the water-bath in the chamber of the tank 10. The depending portion of this cap is perforated with a number of gas-ports 58, which are normally immersed in the water by the gravity of the cap, which is seated upon the shell 52; but the pressure of gas which accumulates in the generator is sufficient to lift the cap until it is raised from the upper edge of the shell 52, whereupon the gas can pass between the shell 52 and the depending perforated part of the cap to find its egress through the gas-ports 58 into the water, from whence the gas escapes in the form of bubbles, so as to accumulate in the bell 13.

The service-pipe 59 extends through the water-bath of the tank, so as to lead through the base 11, the upper end of said pipe terminating above the water-level in the tank for the gas to flow freely from the bell, the outer part of the service-pipe having a stop-cock 59^a.

A vent-pipe 60 extends through the tank 10, so as to pass through the base, and over this pipe is fitted a telescopic tube 61, the upper end of which tube is secured to the head of the bell to travel vertically therewith. At a point intermediate its length the tube is provided with a perforation 62, which is normally sealed by the water in the tank; but on the excessive generation of gas and accumulation thereof within the bell the tube rises with the bell until the perforations 62 are withdrawn from the water, thus opening a vent through the port 62, the telescopic tube, and the pipe 60 for the gas to escape.

The gas-pipe 32 is provided at points intermediate its length with a series of three-way cocks 63, said cocks being situated for convenient manipulation by hand to open or close the passage through the pipe 32 from the generator to the gasometer. The third or extra port of each valve may be adjusted to establish communication from the generator to a pipe 64, which is connected to each of the three-way valves and the outer part of the vent-pipe 60, and previous to uncoupling either generator for recharging the latter this cock 63 should be opened to cut off the gas-passage through the pipe 32 to the pipe 50 and open the communication from the generator to the vent-pipe 60 through the branch connection 64, whereby the gas which may remain in the generator is free to escape through the vent-pipe 60.

The operation is as follows: The generator having been charged with carbid and the parts assembled substantially as shown by

the drawings, the gas-bell is free to settle in the tank 10 and carry downward the trip-rod 44. The arm 47 impinges against the lever 42 for the purpose of turning the drum 36 and discharging water into the trap-pipe, from whence the water flows through the pipe 32 into the perforated pipe 24 of one generator. Gas is at once generated by the water attacking the carbid, and the gas passes through the perforated pipe 24, the pipe 32, and the pipe 50 into the condenser, in which the aqueous vapors are condensed, and the gas is held in check until it accumulates sufficient pressure to lift the cap 57 and find a vent through the ports therein, the gas passing into the water, near the level thereof, and emerging from said water, so as to accumulate in the bell. The bell is raised by accumulation of gas therein to lift the trip-rod and withdraw the trip-arm from the lever, thus permitting the counterweight to return the drum to its normal position and cut off the flow of water. This operation is repeated intermittently on the reduction of the available gas-supply within the bell; but in the event of exhaustion of the carbid in the active generator of the battery the water will accumulate therein until it overflows the exhausted generator and thence flows into the second generator of the battery, thereby continuing the generation of gas. It will be evident that the valves 63 in two or more of the generators should be left in an open condition for the water to overflow from one generator to the other; but normally these valves are adjusted to cut off communication to the vent-pipes 64 and 60. If desired, the valve to the exhausted generator may be turned to cut off communication with the pipe 32 and establish communication with the pipe 64; but this is not essential, because the water when it overflows the exhausted generator will displace the gas therefrom, thus obviating the necessity for venting the generator. It is therefore evident that ordinary stop-cocks may be used in lieu of the three-way valves, if desired. The exhausted generator may now be uncoupled, carried out of doors, the spent carbid removed, and a fresh charge of active carbid placed therein, after which the generator should be brought back and assembled in operative relation to the gasometer in the manner described.

Changes 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 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. In an acetylene-gas apparatus, the combination with a gasometer, and a generator water-supply pipe, of a fixed supporting-bracket on the gasometer, a tiltable water-fed drum mounted in said bracket and pro-

vided on one side with a spout and on its opposite side with a counterweight which is fixed in place on said drum, a flexible tube attached to said drum and to the gasometer
5 below the water-line therein, a lever fulcrumed independently of the drum and engaging loosely therewith, and a bell-actuated trip arranged to engage with said lever, substantially as described.

10 2. In an acetylene-gas apparatus, the combination with a gasometer-tank, a generator, and a trap-pipe connected with said generator, of a tiltable feed-drum mounted on the gasometer-tank in a plane approximately of
15 the normal water-line therein, a flexible connection between said drum and the tank, means for normally holding the tank in a position to cut off the flow of water therefrom to the trap-pipe, and trip devices for positively turning the drum against the action of
20 its retractor, substantially as described.

3. In an acetylene-gas apparatus, a generator having a removable cover, a perforated pipe fixed to the generator to pass loosely
25 through the cover thereof, a coupling united to said perforated pipe, and a gasket seated on the cover around the pipe and engaging with the coupling to be compressed thereby, in combination with a pipe having connection
30 with said coupling, means for admitting water to said pipe in regulated volumes, and a gasometer, substantially as described.

4. In an acetylene-gas apparatus, a gasometer provided with a vertical condenser-tube
35 fixed to and extending below the bottom thereof, a generator having a pipe attached to the condenser-tube, a filling of metallic scraps within said tube and forming a condensing-surface of large area, a guard, 54,
40 fixed to the condenser-tube adjacent to the

point of attachment of the generator-pipe and extending laterally therefrom across the part formed thereby and arresting a tendency of the scrap filling from entering said pipe, and a drain attached to the lower protruding end
45 of the condenser-tube, substantially as described.

5. In an acetylene-gas apparatus, the combination with a gas-pipe, 32, and a vent-pipe, of a three-way valve coupled to said gas-pipe
50 and connected with the vent-pipe, a generator having a removable cover provided with an annular coupling-seat, a coupling having threaded connection with said valve and fitted to the seat of the generator-cover, and a
55 perforated pipe fixed to the generator and having threaded engagement with the coupling, substantially as described.

6. In an acetylene-gas apparatus, a generator provided with a sealed chamber at the
60 open end of its receptacle, a cover fitted in the sealed chamber and provided with a gasket-seat, a perforated pipe attached to the generator and passing through the cover thereof,
65 and a coupling screwed on said pipe and adapted to the gasket-seat of the cover, in combination with a horizontal pipe, and a cock or valve attached to the pipe and having threaded engagement with said coupling, whereby
70 the perforated pipe and coupling suspend the generator from the horizontal pipe and said coupling also confines the generator in place, substantially as described.

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

RODEN L. BECK.

Witnesses:

O. C. WILLIAMS, Jr.,

W. O. STEPHENS.