No. 612,845. Patented Oct. 25, 1898.

W. HECKERT.

ACETYLENE GAS GENERATOR.

(Application filed Apr. 25, 1898.)

(No Model.)

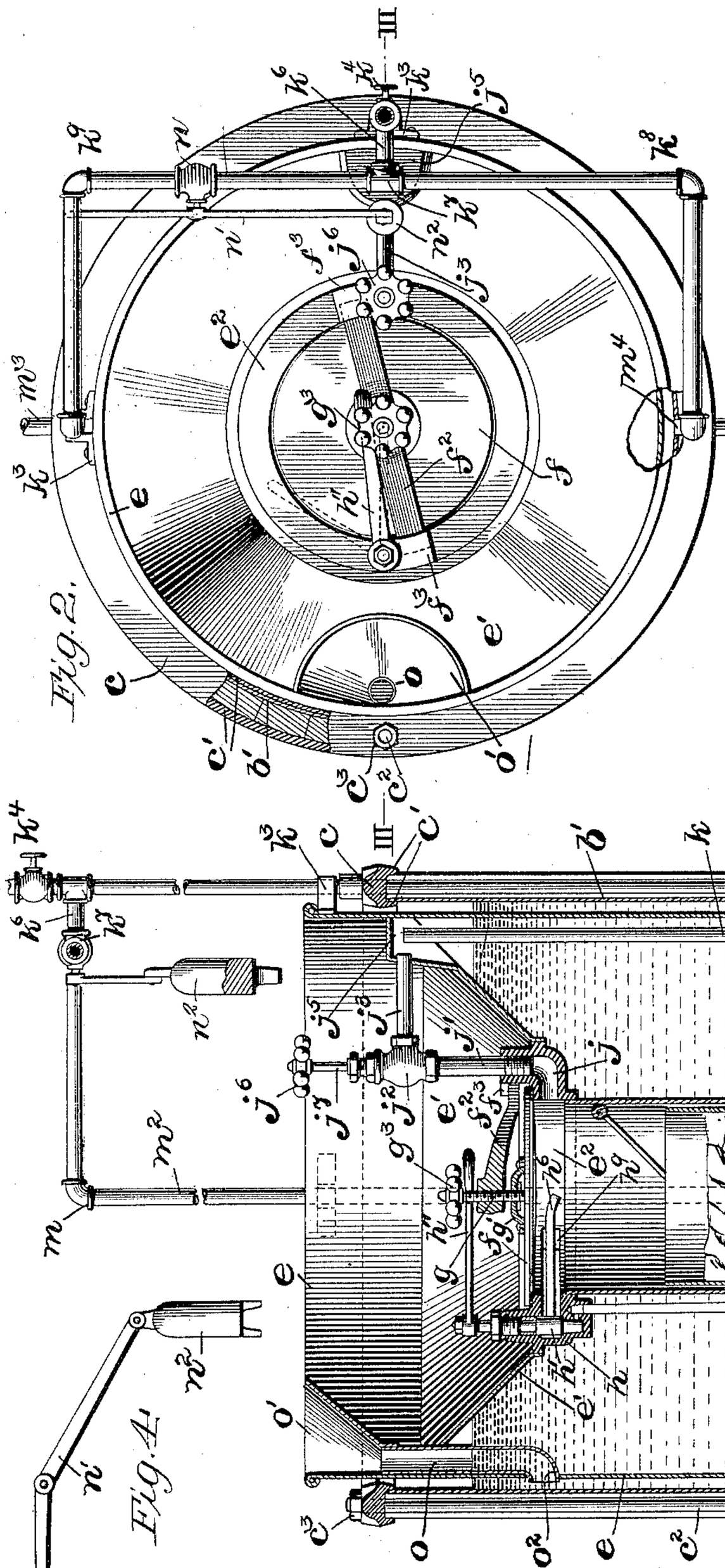

Fig. 2.

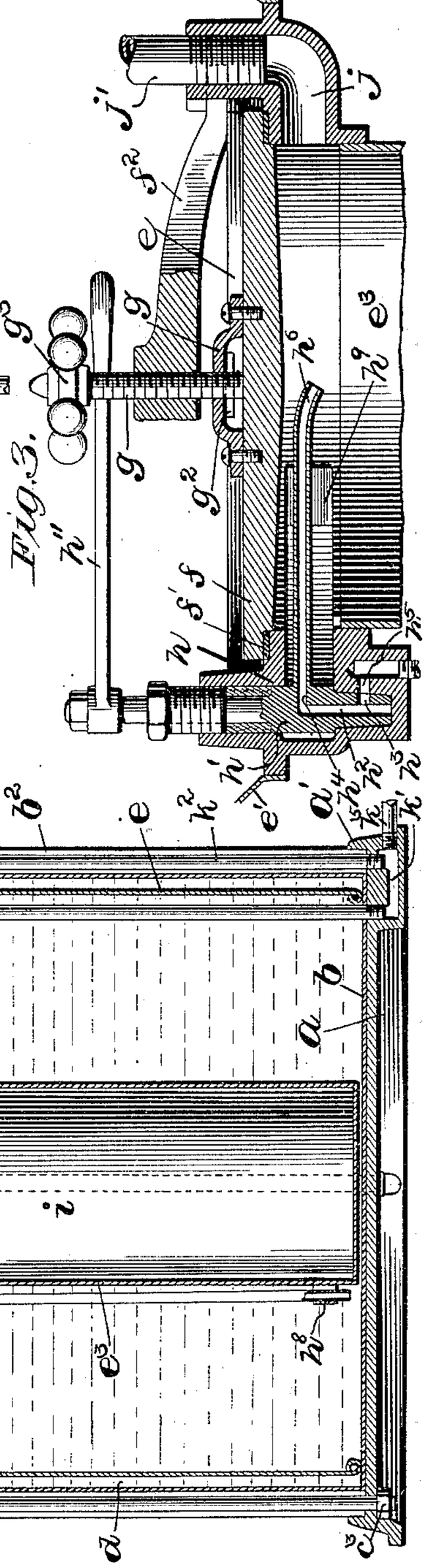

Fig. 3.

Fig. 4.

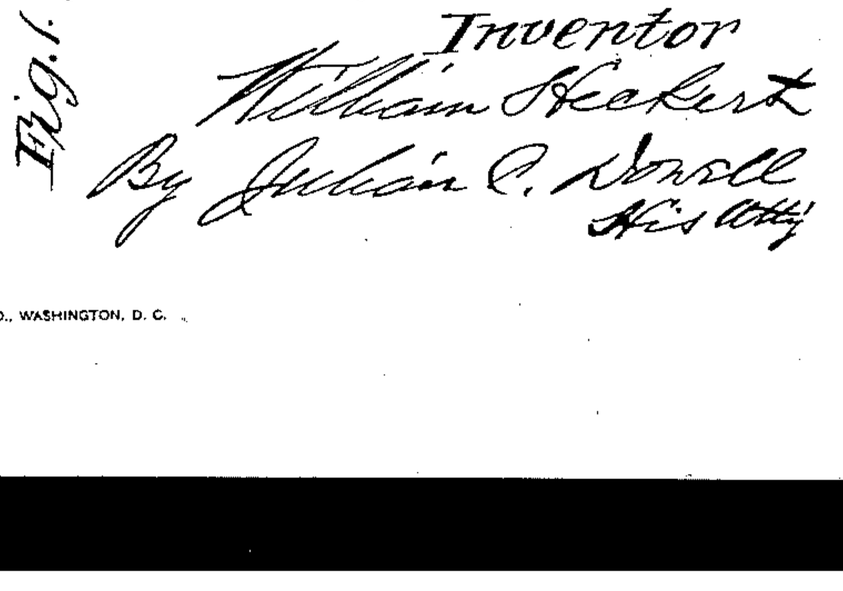

Fig. 1.

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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 612,845, dated October 25, 1898.

Application filed April 25, 1898. Serial No. 678,774. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HECKERT, a citizen of the United States, residing at Findlay, in the county of Hancock and State of Ohio, have invented certain new and useful Improvements in Acetylene-Gas Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The superiority of acetylene gas in point of illuminating power and economy of production is well recognized, as also the fact that it does not asphyxiate, and the very limited extent to which it has been utilized is doubtless attributable to popular distrust brought about by numerous reported fatalities from explosions. The fact that the mere bringing together of water and calcium carbid results in evolving the gas ready for use indicates the practicability of its generation in domestic plants; but the fear of explosions has prevented any extended utilization of the gas in this way.

The aim of my present invention is therefore to provide a generating plant which demonstrates incapability of explosion and wherein the gas is produced in the most economical manner and every facility is afforded for perfect management. The relative arrangement of manipulative parts is such as to insure against mistakes; but even if the apparatus is mismanaged no damaging results ensue and the most that can happen is the wasting of gas by its blowing off through safety-outlets.

The construction of apparatus illustrated in detail in the accompanying drawings and specifically described hereinafter is one which has proven highly satisfactory in actual practice; but it is of course to be understood that the invention may be otherwise embodied.

Of said drawings, Figure 1 represents the complete apparatus, chiefly in central vertical section, but with some of the parts showing in side elevation and some parts broken away for obvious reasons. Fig. 2 represents the apparatus for the most part in top plan view, some portions being broken away and some shown in cross-section. Fig. 3 is a cross-section, on an enlarged scale, taken substantially on the line III III of Fig. 2, but some parts appearing in elevation; and Fig. 4 represents in side elevation a safety device.

In the drawings the letter a designates the base or bed of the apparatus, formed with a marginal upstanding flange a', which embraces the lower portion of a cylindrical tank having a bottom b, resting upon the flat top of the base a, and sides b', formed of metal the same as the bottom b, but preferably covered from top to bottom by a jacket of vertically-arranged wooden strips b^2. A double-flanged metallic ring c is fitted upon the top edge of the tank, its flanges c' holding the metal sides and wooden jacket together, while at the bottom this jacket is confined by the flange a', and long bolts c^2 occupy spaces between certain of the wooden strips of the jacket and pass through the ring c and the base, their screw-threaded ends projecting to receive clamping-nuts c^3. This tank is intended to contain a body of water, which is designated in the drawings by the letter d, and within the tank there is an inverted cylindrical gas-holder, having sides e, rising somewhat above the sides of the tank under all circumstances, and a top e', preferably in the form of an inverted frustum of a cone and located at some distance below the upper edge of the sides e. The opening at the center of this conical top e' is occupied by a cast-metal ring e^2, which is suitably secured to a pendent flange of the top e' and supports a cylindrical receptacle e^3, depending, substantially, to the plane of the lower edge of the gas-holder, the bottom of said receptacle being closed and its upper end open where the ring e^2 surrounds it and is secured to it. A suitable closure for said receptacle is applied to the upper side of the ring e^2, said closure comprising a cover-plate f, which rests upon a rubber gasket f', occupying a recess provided for it in the upper side of the ring, a yoke f^2, whose ends are adapted to take under lugs f^3, formed upon the upper side of the ring beyond the circle of the cover-plate f, and a clamping-screw g, which is entered through a screw-threaded opening in the middle of the yoke f^2 and extends loosely through a plate g', fastened to the cover f

and recessed in its under side to accommodate a cotter-pin g^2, entered through the screw. It will be seen that upon turning the screw to the right by means of its knob g^3 its end will be caused to bear downwardly upon the cover f and press the same tightly upon the gasket f', the yoke f^2 resisting outward movement of the screw by reason of its ends being engaged with the lugs f^3. When the cover is to be removed, the screw g is turned back by manipulating the knob g^3, and the pressure of said cover upon the gasket is thereby removed, and then the yoke f^2 is swung around until its ends are moved from under the lugs f^3, after which the closure can be removed except for an obstruction in the form of a certain valve-handle hereinafter described, which must be swung out of the way and is so manipulated in cutting off communication of water to the calcium carbid. At one side of the ring e^2 there is formed a valve-casing h, which is occupied by a rotatable plug h', having a longitudinal bore h^2 and two ports h^3 and h^4, extending out of said bore and through the side of the plug. The lower port h^3 is adapted to register with a port h^5 in the valve-casing, this latter port communicating with a pipe h^7, which extends down alongside the receptacle e^3 and terminates near the bottom of the same, where it is secured by a suitable bracket h^8. The lower end of this pipe is open for communication of water, which when the plug h' is adjusted, as shown in Fig. 3, may pass through the ports h^5 and h^3 into the passage h^2 and thence out through the port h^4 into an elongated spigot h^6, which is secured to the plug and projects horizontally therefrom to a point over the middle of the receptacle e^3, where its end is bent slightly downward for the purpose of discharging the water upon the calcium carbid. The plug-valve h' has a stem which projects somewhat above the valve-casing and carries a handle in the form of an arm h'', this being the part hereinbefore referred to as offering an obstruction to the removal of the cover f. It will thus be apparent that before the closure can be removed the supply of water to the receptacle e^3 is necessarily cut off by swinging the valve-handle to one side. When this operation takes place, the spigot h^6 moves into a recess h^9, formed for the purpose in the ring e^2, and thus leaves the top of the receptacle e^3 entirely clear for the introduction and removal of the calcium carbid, which is preferably contained in a pail i, as shown in Fig. 1, said pail having a suitable handle by which it can be conveniently handled.

At the side of the ring e^2 opposite that where the valve-casing h is located a passage j is formed, said passage communicating with the interior of the calcium-carbid receptacle and also communicating with a vertical pipe j', which is connected with a union j^2, from which a horizontal pipe j^3 projects, the latter opening at its outer end into the interior of the gas-holder and the top of the latter being formed with an upward-extending recess j^5 where said pipe j^3 enters for the purpose of providing for the entrance of the gas into the holder at a higher point than the level of the water in the tank can ever attain. The union j^2 also constitutes a valve-casing, the valve within the same being employed to cut off communication between the calcium-carbid receptacle and the gas-holder when the calcium carbid is to be replenished, this being accomplished by manipulating a knob j^6 on the end of the valve-stem j^7.

The service-piping comprises a section k, extending vertically through the gas-holder, with its open upper end in the recess j^5 and its lower end opening into a chamber k', formed in the base a, with which chamber another section k^2 of said service-piping communicates at its lower end, thence extending upwardly between certain of the wooden strips of the jacket b^2 and through and beyond the ring c, this pipe constituting one of a number of guides for the gas-holder and the latter being provided with projections k^3, embracing such guides. This pipe k^2 is provided with a suitable valve, as at k^4, and is connected directly with the illuminating system; but if more convenient a pipe k^5 may be used leading horizontally out of the chamber in the base a, or both pipes may be employed to convey the gas to the burners. At some distance above the tank there is a horizontal branch k^6 leading out of the pipe k^2 and connected with a three-way union k^7, from opposite sides of which extend angular pipes k^8 and k^9, which are in turn connected by elbows m with vertical pipes m^2, extending along the opposite sides of the tank and constituting guides for the gas-holder in its vertical movements. Each of the pipes has a horizontally-extending outlet branch or nipple m^3 at the lower end; but they serve different purposes, as will presently appear. The pipe k^9 has a valve-casing n at a point intermediate of its length, and the valve in said casing has a lever n' fastened to its stem, such lever carrying at one end a weight n^2, which normally maintains the valve closed, the closing movement of the lever being limited by one arm of the latter abutting a portion of the pipe. This pipe k^9 is in communication with the pipe k^2, and if it should ever happen that the gas-pressure in the holder becomes excessive the upward movement of the holder will bring the pipe j^3 against the weight n^2, thereby lifting the same and causing the opening of the valve in the casing n, so that the excess gas-pressure can escape through the pipes k^9, m^2, and m^3 to the atmosphere. The pipe k^8 is not in communication with the pipe k^2 and does not serve as a conduit, but simply as frame-work; but the lower portion of the pipe m^2, associated with said pipe k^8, is utilized as an overflow water-pipe, this pipe being connected by a nipple m^4 with the tank at a suitable elevation.

Of course the water in the tank has to be replenished from time to time, and as a means for accomplishing this and ascertaining whether it is at the proper level I provide a tube *o*, which extends vertically along the inner wall of the gas-holder and through the top of the same, said tube opening at its upper end into a funnel *o'* and formed at its lower end with a bend o^2, passing through the side of the gas-holder and opening into the tank. This bend is substantially in the plane of the spigot h^6, and therefore when water can be seen by looking down the tube *o* its level is such as to provide for the feeding of water to the calcium carbid, as will be apparent.

The operation of the apparatus should be obvious from the above description and need be but briefly explained. Water having been introduced into the tank, so that it rises in the tube *o*, and the handle *h''* having been swung over the cover *f*, so as to open communication for water to the interior of the calcium-carbid receptacle, the water in seeking its own level will naturally pass through the pipe h^7 and out of the spigot h^6 and will drop from the end of the same upon the calcium carbid in the receptacle, whereupon acetylene gas will be evolved and will pass out through the pipe *j'* and into the holder and thence out through the service-piping described. The capacity of the water-inlet to the calcium-carbid receptacle is more than sufficient to supply water for generation of gas in the maximum quantity, and hence the gas-pressure will soon operate to elevate the gas-holder and carry the spigot above the water-level; but consumption of the gas causes the lowering of the holder, and the latter soon settles at a position where just the required amount of water will drip from the spigot to generate enough gas to supply the burners. Whenever the gas is not consumed as fast as it is produced, the pressure within the holder and upon the surface of the water will cause the holder to be lifted, and thereby the spigot will be carried above the water-level, and water being no longer supplied to the carbid the generation of gas will cease. It will be seen that the generation of gas is thus automatically controlled according to the consumption, and there can never be such accumulation of gas as to produce an explosion. In fact, the safety device here shown is not absolutely necessary, but is merely employed as a measure of precaution.

When a fresh charge of calcium carbid is to be introduced, the knob j^6 is manipulated to cut off communication between the receptacle e^3 and the service-piping, and the handle *h''* is swung to one side, closing the water-inlet to the calcium-carbid receptacle, and then the latter's closure is removed, as hereinbefore explained, and the pail containing the residue of the previous charge is removed and a pail containing a fresh charge introduced, the closure replaced, and the handle *h''* and knob j^6 manipulated, and the operation goes on as before. The gas in the holder at the time communication is closed between the latter and the calcium-carbid receptacle will keep the burner supplied while the apparatus is being recharged; but of course the gas-holder will lower, so that when the apparatus is restored to operating adjustment the operation first described will be repeated.

The water-level can be readily ascertained by looking into the tube *o*, and if no water is seen therein then the supply must be replenished. The presence of water in the said tube indicates a level high enough to supply the spigot, for, as hereinbefore stated, the bend of the tube is in substantially the plane of the spigot.

The entire safety of the apparatus will be apparent, and even if the attendant should neglect to open communication between the calcium-carbid receptacle and the gas-holder after opening the water-inlet no explosion will result, for the gas-pressure will stop the feed of water through the spigot.

It will be observed that the calcium-carbid receptacle is kept practically immersed in water, which will have a beneficial cooling effect and render overheating by the chemical generating action impossible.

It will thus be seen that an apparatus constructed in the manner above described and as illustrated in the accompanying drawings is well calculated to entirely fulfil the objects primarily stated. At the same time it is to be understood that I do not limit myself to this particular form of apparatus, as the invention is capable of embodiment in numerous other ways.

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

1. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a reëntrant top with a calcium-carbid receptacle depending therefrom within the tank so as to be practically immersed in the water therein, and having a restricted water-inlet at the top in communication with the interior of the tank, a gas-conduit leading out of the upper part of the calcium-carbid receptacle into the upper part of the inverted gas-holder and extending through the space inclosed by the reentrant top where it is provided with a valve, and a suitable service-outlet from the gas-holder.

2. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle with a restricted water-inlet at the top supplied from the tank, a gas-conduit leading out of the upper part of the calcium-carbid receptacle into the upper part of the inverted gas-holder, and a service-pipe having its inlet end in proximity to the outlet

end of said conduit, said service-pipe extending down through the gas-holder and tank and passing out underneath the former.

3. In acetylene-gas apparatus, the combination of a water-tank, an inverted gas-holder therein carrying an open-ended tube which extends vertically along the inner wall of the gas-holder and through the top of the same and is formed with a bend at its lower end where it passes through the side wall of the gas-holder and opens into the tank, a calcium-carbid receptacle carried by the gas-holder and having a restricted water-inlet at its upper part about on a level with the bend in said tube, said water-inlet being supplied from the tank through the gas-holder, a gas-conduit leading out of the upper part of the calcium-carbid receptacle and into the upper part of the gas-holder, and a suitable service-outlet from the latter.

4. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle with a restricted water-inlet at the top supplied from the tank, a valve-plug controlling said inlet and having a spigot to conduct the restricted flow of water to the middle of the receptacle, said spigot being moved to one side when the valve-plug is turned to close the water-inlet, a gas-conduit leading out of the upper part of the calcium-carbid receptacle into the upper part of the gas-holder, and a suitable service-outlet from the latter.

5. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle depending from its top with a suitable closure thereat, said receptacle adapted to contain a pail or can of calcium carbid and having a restricted water-inlet at its upper part communicating with the tank through the gas-holder, a valve-plug controlling said inlet and having a spigot adapted to conduct the restricted flow of water to a point over the pail of calcium carbid and to swing to one side when the valve-plug is turned to close the inlet so as to permit the removal of said pail, a valved gas-conduit leading out of the upper part of the receptacle into the upper part of the gas-holder, and a service-pipe leading out of the latter.

6. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle depending from its top with a suitable closure thereat, said receptacle adapted to contain a pail or can of calcium carbid and having a restricted water-inlet at its upper part communicating with the tank through the gas-holder, a valve-plug controlling said inlet and having a spigot adapted to conduct the restricted flow of water to a point over the pail of calcium carbid and to swing to one side when the valve-plug is turned to close the inlet so as to permit the removal of said pail, a handle on the valve-plug projecting therefrom correspondingly with the spigot so as to extend over the closure of the calcium-carbid receptacle when the water-inlet to the latter is open, a valved gas-conduit leading out of the upper part of the receptacle into the upper part of the gas-holder, and a service-pipe leading out of the latter.

7. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle with a restricted water-inlet at the top supplied from the tank, a gas-conduit leading out of the upper part of the calcium-carbid receptacle into the upper part of the inverted gas-holder, service-piping leading out of the latter, and an escape branch pipe having a safety-valve and means for opening the same operated by the gas-holder in rising, substantially as described.

8. In acetylene-gas-generating apparatus, the combination of a water-tank, an inverted gas-holder therein having a calcium-carbid receptacle with a restricted water-inlet at the top supplied from the tank, a gas-conduit leading out of the upper part of the calcium-carbid receptacle into the upper part of the inverted gas-holder, service-piping leading out of the latter, and a waste-water pipe communicating with the tank at an elevated point and connected with the service-piping, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HECKERT.

Witnesses:

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