No. 657,957. Patented Sept. 18, 1900.

H. L. PYLE.

ACETYLENE GAS GENERATOR.

(Application filed June 7, 1900.)

(No Model.) 2 Sheets—Sheet 1.

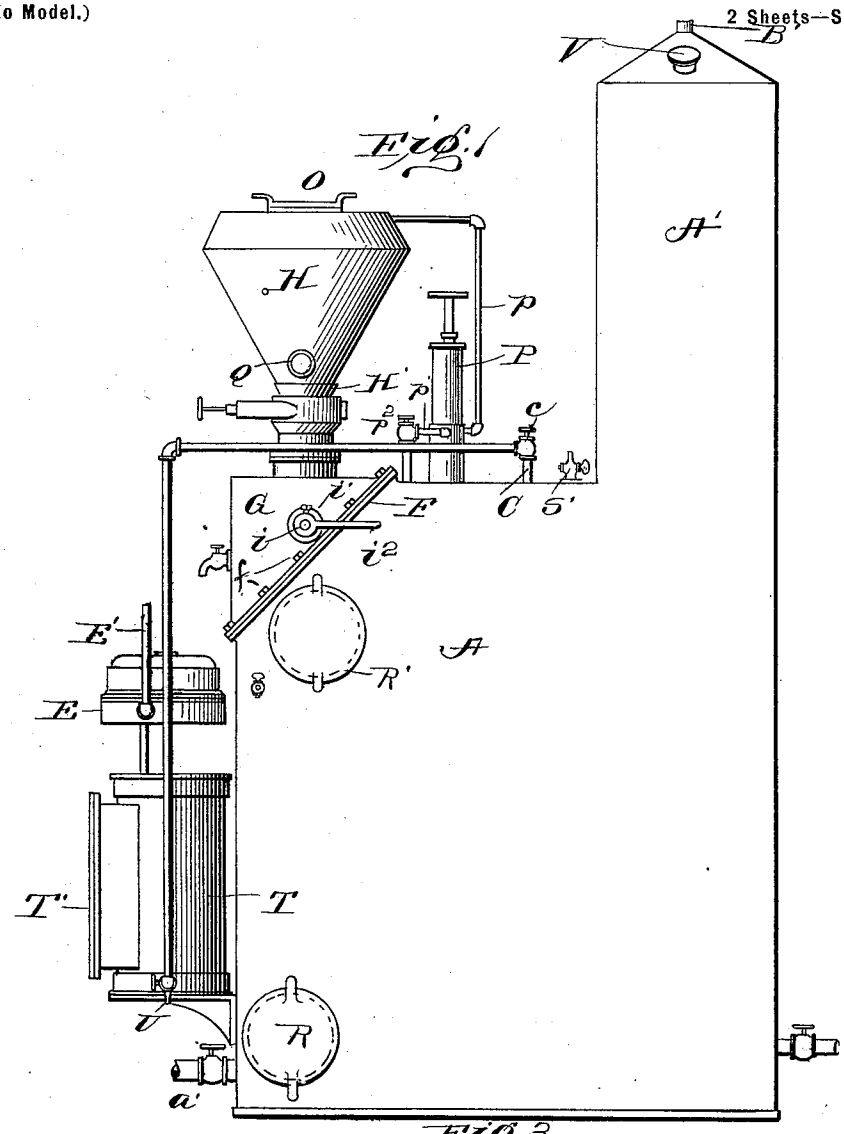


FIG. 1

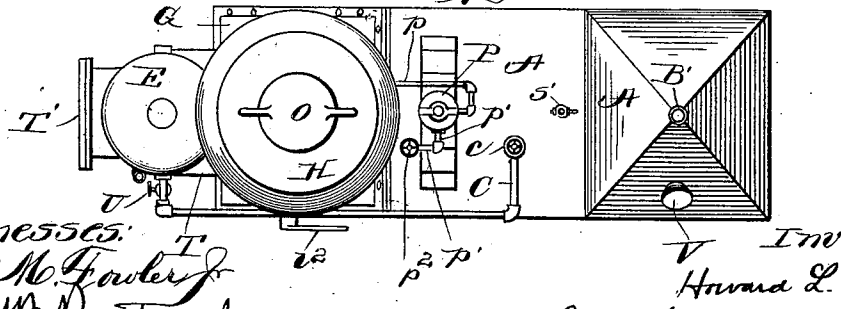


FIG. 3

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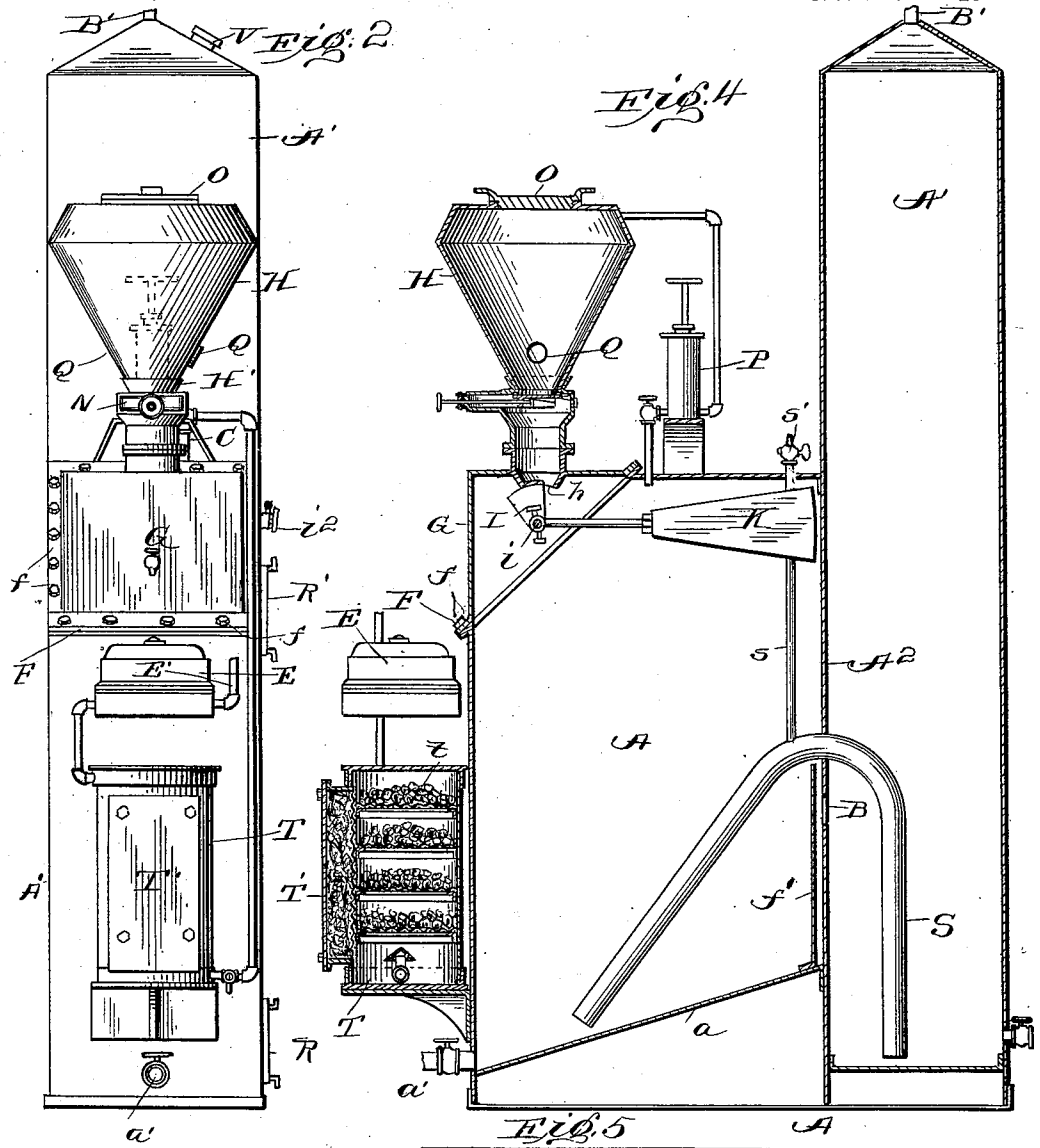
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UNITED STATES PATENT OFFICE.

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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 657,957, dated September 18, 1900.

Application filed June 7, 1900. Serial No. 19,449. (No model.)

To all whom it may concern:

Be it known that I, HOWARD L. PYLE, a citizen of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in Gas-Generating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in apparatus for generating gas, and more especially to that class of apparatus designed to utilize calcium carbid or like substances adapted to be decomposed in the presence of water to generate acetylene gas; and the invention has for one of its objects to provide an apparatus which may be charged without interrupting the generation of gas and without affecting the pressure in the service-main, the apparatus being especially, though not exclusively, designed for car-lighting, and therefore embodying a construction least liable to be injuriously affected by car vibration or motion, either in respect to mechanical injury or as affecting the production of gas and pressure in the service-main.

A further object of the invention is to produce an apparatus which may be readily removed for repairs or renewal in case of injury without dismantling the entire apparatus.

To the above ends the invention consists in certain novel details of construction and combinations and arrangements of parts, all as will be now described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a side elevation of a gas-generating apparatus embodying my present improvements. Fig. 2 is a front elevation of the same. Fig. 3 is a top plan view. Fig. 4 is a vertical section taken centrally of Fig. 2 and showing all the parts in section. Fig. 5 is a detail section, on an enlarged scale, taken vertically through the hopper-valve.

Like letters of reference in the several figures indicate the same parts.

In carrying this invention into practice a casing, preferably of sheet metal, is provided, which casing is divided into two compartments A and A′ by a central partition A^2, the compartment A′ extending upwardly some distance above the top of the compartment A and the areas of the two compartments preferably bearing a certain relation to each other, as will be hereinafter more fully explained. The compartment A is the generating-compartment, and it is preferably provided with an inclined bottom *a*, which will cause the spent lime or other material to seek the lowest point in the compartment, whereby it may be readily blown off through a cock or outlet *a*′. The compartment A′ constitutes the balance-compartment, the height of the water therein determining the gas-pressure in the compartment A, and communication between the two compartments is secured, primarily, through a narrow horizontal opening B in the partition A^2, which opening B is located some distance below the normal water-level in the compartment A. The opening B is preferably located such distance below the normal water-level in the compartment A as that when the water-level in the compartment A has been lowered until gas will escape through the opening B the water in the compartment A′ will have approximately filled the compartment, although the capacity of the compartment A′ may be increased, if so desired, without affecting the operation of the device. The condition last mentioned is an abnormal condition, however, and the gas escaping through the opening B is adapted to pass off into the atmosphere through a vent-pipe B′ in the top of the compartment A′. Gas generated in the compartment A is for service adapted to pass out at the top of the compartment through a pipe C, controlled by a valve *c*, and thence through a drier T, to be presently described, and from the drier through a regulator E and to the service-main E′.

The mechanism for feeding the carbid or gas-producing material, together with the mechanism for holding the same, is so mounted and connected with the casing as that these parts may be readily removed intact, and for this purpose in the preferred construction an inclined seat F is formed on the upper corner of the casing constituting the compartment

A, and a cap G, in or on which the working mechanism is mounted, is adapted to fit and be secured in place upon said seat by suitable bolts or fastenings *f*.

The working mechanism comprises a hopper H, having any desired capacity for the carbid or gas-producing material and mounted on or in connection with a duct or channel-way H′ for conducting the carbid down into the compartment A, while in such duct or controlling the entrance and exit thereof are two valves, the lowermost one being an automatic valve controlled in its operation by the water-level in the compartment A, while the other or upper valve is a manually-controlled valve and is adapted to be closed during the time the hopper is being refilled. The lower or automatic valve is preferably an oscillatory valve I, mounted on a shaft *i* and adapted to swing back and forth to open or close more or less an opening *h*, constituting the exit of the channel H′. The valve I is preferably adjustably connected with the shaft *i*, and in addition said shaft is provided with a float K, preferably of segmental shape and of relatively-large area, so as to have sufficient power to cut or crush any small particles of carbid which might become wedged between the valve and the seat. The float K is also adjustably connected with the shaft *i*, and the shaft itself is mounted to oscillate in bearings in the side walls of the cap G, one end being extended through a stuffing-box *i′* in one wall of the cap and provided with a handle or indicator i^2, which may be manipulated from the outside of the apparatus for admitting carbid or for indicating to the attendant the conditions existing within the compartment A.

The upper valve for closing the exit of the hopper is preferably a slide-valve L, adapted to be manipulated by a handle or rod M, extending through a suitable packed opening in the valve-casing, and in order that the valve L may be brought to a perfect seat, so as to prevent any possible escape of gas into the hopper when said valve is closed, a seating mechanism is provided consisting, in the preferred form of valve, of a wedge L′, which cooperates with a wedging-surface L^2 on the valve and rests on a cross-bar L^3, extending from side to side of the passage-way H′. The wedge itself is provided with a bearing, in which the end of the rod M turns, and the body of the rod is threaded and meshes with a threaded projection *l* on the valve L. In manipulating the valve a turn or two in a reverse direction will release the valve from its seat, when the rod may be drawn out, carrying the valve clear away from the opening in the bottom of the hopper and back into the recess N in the valve-casing, while to close said valve it is pushed inwardly as far as possible, thus wiping off the valve-seat or top face of the valve, and a turn or two of the rod M will bring the wedge or inclined faces L^2 into operation, forcing the valve firmly up against its seat and cutting off all communication with the hopper.

The hopper, it will be understood, is adapted to be normally sealed against the external atmosphere or the escape of gas from within by means of a cap or closure O, which may be screwed into place or otherwise securely clamped, and in order to prevent the escape of the gas which would be caught in the hopper when the valve L is closed I provide a pump or exhaust device which will force such gas back into the compartment A. The desired result is best secured by means of a hand-pump P, suitably mounted on the top of the compartment A and having its inlet-pipe *p* leading from the top of the hopper, while its outlet-pipe *p′* leads into the compartment A and is controlled by a stop-cock p^2. With this arrangement, now, when the attendant desires to refill the hopper H or when by an inspection through the sight-openings Q he finds that the carbid is becoming exhausted he may close the valve L, leaving sufficient carbid below said valve for consumption during the interim, and will then open the cock p^2 and by means of the pump P draw the gas from the hopper H and force the same into the compartment A. The hopper H may then be opened and filled with fresh material, the valve L opened, and the automatic feed will continue, as before. The carbid delivered by the automatic valve into the compartment A naturally gravitates to the bottom, and in order to prevent any possible bubbling of the rising gases through the opening B such opening B is preferably protected by a partition-wall *f′*, extending upwardly in the compartment A to a point somewhat above said opening. Hand-holes R and R′ are provided at bottom and top of the compartment A to facilitate the cleaning of such compartment should it become necessary at any time, and in order to clean the compartment A′ or free the lower portion thereof from sediment a siphon S extends from the bottom of that compartment over into proximity to the clean-out cock *a′* in the compartment A. Thus whenever said cock is opened it creates a suction through said siphon and draws a portion of the water, at least, from the bottom of the compartment A′. This siphon S may be freed from air or gas by means of a tube *s*, extending up through the top of the casing and provided with a suitable cock *s′*.

After passing from the compartment A the gas, as before stated, passes through a drier, which drier is in the form of a supplemental generator in that it is filled or partially filled with calcium carbid, through which the gas is caused to pass, and thus any moisture contained by the gas combines with such calcium carbid in the production of more gas, and the ultimate product is dried and free from moisture. This drier, lettered T in the accompanying drawings, is a simple compartment having a series of shelves of wire-mesh *l*, upon which calcium carbid may be placed

and through which the gas passes to the service-main. The drier or supplemental generator is filled through an opening in the front provided with a cap T', and in order to prevent the gas from passing around the carbid contained in the casing T after the cap has been put in position the inner side of said cap is filled with mineral wool or like neutral substance, which will bear against the carbid and close any passage around the same. Should there be any amount of condensation in the pipe leading from the compartment A to the casing T, it may be drawn off through a drip-cock U at the lowest point in said pipe.

As before explained, the apparatus is designed more especially for use on railway-cars, and it will be observed that in such use there is what might be termed substantially a "static" balance between the two columns of water in the compartments A and A', the two compartments being preferably of such cross-sectional area as to secure the best results in this respect and so that vertical vibration or motion of the car will not cause the water to surge back and forth through the opening B; but pressure on both sides of the central portion being substantially equalized there will be little or no fluctuation in gas-pressure from this cause. By increasing the height and reducing the cross-sectional area of the compartment A' a greater gas-pressure may be secured, or by adopting other proportions a less gas-pressure may be secured, and in order that there may be pure water in the compartment A' it is preferred that when it becomes necessary to supply additional water it be supplied through an opening V in this latter compartment, thus tending to keep it at all times clean, and consequently requiring but little, if any, cleaning because of sedimentation. The water may be added even while the apparatus is in use, and thus it is found that with an apparatus of this kind it is never necessary to reduce the pressure on the working mains so long as the apparatus is in working condition.

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

1. In a gas-generating apparatus, the combination with a casing separated by a partition into two compartments one extending above the other and communicating through an opening in the partition at a point near, but not at, the bottom, the taller compartment being open to the atmosphere at the top and the shorter compartment being closed to the atmosphere, of a closed carbid-holder communicating with the closed compartment, a valve controlling the feed of carbid, a float in the closed compartment controlling the valve, a gas-main leading from the closed compartment and a shield extending past the opening in the partition for preventing the entry of gas being generated into the open compartment; substantially as described.

2. In a gas-generating apparatus the combination with a casing constituting a water and gas holder, of a cap detachably secured on and forming one corner of said casing, a carbid-holder on the exterior of said cap and a valve controlling the feed of carbid and a float controlling the valve both pivotally mounted directly on and entirely supported by the cap within the casing; substantially as described.

3. In a gas-generating apparatus, the combination with a casing forming a gas-generating and water-holding compartment and having an inclined seat at the top extending diagonally across one corner of the casing, of a removable cap constituting the corner of the casing mounted on said seat and carbid-feeding mechanism including a float and valve both pivotally mounted directly on and removable with said cap; substantially as described.

4. In a gas-generating apparatus the combination with the generating-compartment adapted for the reception of a body of water and means for feeding carbid thereto and a second compartment communicating therewith below the water-level and near but not at the bottom, of a siphon connecting the bottom portions of the two compartments.

5. In a gas-generating apparatus the combination with the generating-compartment and means for feeding carbid thereto and a second compartment extending above the first-mentioned compartment into which water is supplied for both compartments, of a siphon connecting the lower portions of the two compartments and serving to allow the water to flow from either compartment into the other from points near the bottom and a blow-off cock for discharging sediment; substantially as described.

6. In an acetylene-gas generator, the combination with the casing having a vertical partition and extending upwardly to a greater height on one side of said partition than on the other to form a balance-chamber open to the air, said chambers being in communication through an opening in the partition located approximately midway of the height of the partition whereby the gas may escape when generated in excessive quantity and means for feeding carbid, of a bottom for the generating-chamber sloping away from the partition, a duct independent of said opening extending to a point in proximity to the lowest point in the generating-chamber for draining one chamber into the other and a liquid blow-off at the lowest point in the generating-chamber; substantially as described.

7. In an acetylene-gas generator, the combination with the casing and a removable cap-piece forming one corner of said casing, of a carbid-holder mounted on the top of said cap-piece, a transverse shaft journaled in the side walls of said cap-piece, a valve carried by said shaft for controlling the feed of carbid, a segmental float adjustably connected with said shaft and a handle connected with the

shaft and projecting on the exterior of the cap, whereby the position of the shaft and valve is indicated and the valve may be opened or closed manually; substantially as described.

8. In an acetylene-gas generator the combination with the casing, of an integral cap-piece forming a portion of both the top and side walls of said casing and carbid feeding and controlling mechanism including a float entirely mounted on and supported by the cap-piece said float being pivotally mounted between the side-wall portions of the cap-piece, whereby when the latter is removed it will carry with it the entire carbid-feeding mechanism; substantially as described.

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