No. 627,795. Patented June 27, 1899.

C. W. BECK.

ACETYLENE GAS GENERATOR.

(Application filed Oct. 11, 1897.)

(No Model.)

FIG. 1.

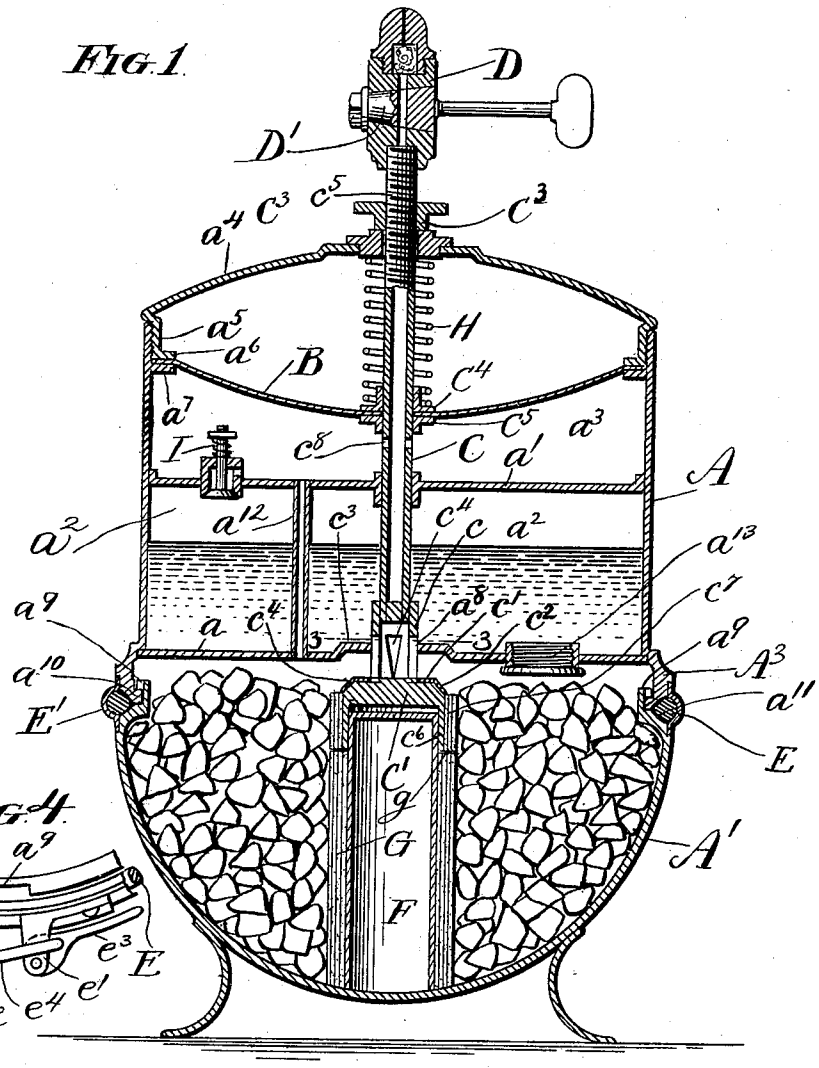


FIG. 4.

FIG. 2.

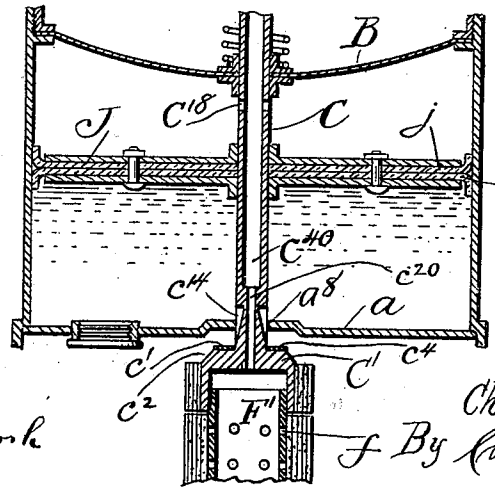
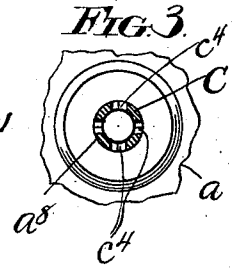


FIG. 3.



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ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 627,795, dated June 27, 1899.

Application filed October 11, 1897. Serial No. 654,861. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. BECK, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Acetylene-Gas Lamps, of which the following is a specification.

This invention relates to improvements in generating and burning acetylene gas, and refers more particularly to a generator of that class wherein the gas is consumed directly or practically as fast as generated as distinguished from generators which are provided with gasometers adapted to hold a considerable body of gas.

Among the objects of the invention are to provide improvements in the construction and arrangement of the regulating devices whereby the rate of generation is controlled, to make a more compact and convenient device, and to simplify and improve the construction generally, as will more fully appear from the description.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and will be readily understood, reference being had to the accompanying drawings, in which—

Figure 1 is an axial sectional view showing a preferred embodiment of my invention. Fig. 2 is a fragmentary similar sectional view showing a modification of certain of the parts. Fig. 3 is a horizontal sectional view taken on line 3 3 of Fig. 1 and looking downwardly. Fig. 4 is a fragmentary detail of the packing-ring clamp.

Referring to the drawings, the generator is shown as comprising two main or principal members, an upper cylindric part A and a lower hemispherical part A′, said parts being separated by a horizontal partition *a*, which forms the lower end wall of the upper member. About midway of the height of the upper member the latter is provided with a rigid horizontal partition *a′*, that part immediately below said partition forming the liquid-receptacle a^2 and the part above the partition a^3 forming the gas-space of the generator.

The upper end of the body A is closed by a somewhat convex or crowning end cap a^4, provided at its periphery with a depending cylindric flange a^5 of considerable depth and which is externally screw-threaded and adapted to fit within the correspondingly-threaded upper end of the said body A. The extreme lower margin of the flange a^5 is turned inwardly, as indicated at a^6, and is adapted to cooperate with an opposing shoulder a^7, formed upon or secured to the inner wall of the chamber immediately subjacent to said flange to clamp and hold the periphery of a flexible diaphragm B. The said diaphragm is of sufficiently larger area than the area of the chamber it divides to allow it to sag at its central part or assume the concave position shown and obviously to assume the correspondingly convex position when forced upwardly by pressure of gas, as hereinafter described.

C designates a valve-stem arranged to extend axially through the part A and provided at its lower end with a valve-plug portion *c*, arranged to reciprocate through a suitable port or opening a^8, formed in the horizontal partition *a* and provided at its lower end, below the valve-plug portion, which reciprocates through said partition *a*, with an enlarged part or valve-disk C′, provided at its upper surface with a flat annular portion *c′* and a beveled portion c^2, which are adapted to cooperate with a correspondingly-shaped depression or valve-seat c^3, formed in the under surface of the partition *a* immediately surrounding said valve-plug. That portion of the valve-plug which reciprocates through the partition *a* is made hollow and is provided with a plurality (in this instance four) of longitudinally-extending triangular slots c^4, said slots being arranged with their larger ends uppermost and being of decreasing cross-sectional area from said upper ends downwardly and terminating at a point approximately at the juncture of the valve-plug with the body C′.

By means of the foregoing construction it will be seen that ports or passages are afforded for the flow of liquid through the valve-plug which will be gradually closed or opened by the upward or downward movement, respectively, of the valve-plug and that when the valve-stem is lifted so as to bring the valve-disk thereof into engagement with the valve-seat c^3 said ports will be completely closed and the escape of the liquid further

prevented by the contact of the valve-disk with said seat. In order to insure a more perfect fit between said latter parts, the surfaces c' c^2 are provided with a covering c^4, of rubber or analogous material.

The stem C is arranged to fit snugly where it passes through the diaphragm or partition a' and also at its point of exit through the cap a^4; but sufficient room is provided at this latter point to afford a restricted passage of air, so that the space above the diaphragm is subject to atmospheric pressure. Immediately above the stuffing-box the stem is screw-threaded, as indicated at c^5, and provided with a thumb-nut C^3, which may be screwed down against the upper end of the stuffing-box in such manner as to lift the valve-stem and hold the valve-ports closed positively.

D designates a jet-nozzle which may be of any suitable or usual construction and which is shown in this instance as provided with a stop-cock D', by means of which the gas-passage may be closed.

The lower chamber A' constitutes the carbid-receptacle and is shown in the present instance as made to separate in a horizontal plane a short distance below the partition-wall a. Said parts are united by means of a bayonet-joint, the upper margin a^9 of the lower part A^2 being to this end contracted and arranged to telescope within the other part A^3 and provided with locking-lugs a^{10}, which engage suitable slots in the upper member in a well-understood manner. In order to render the joint thus formed gas-tight, the meeting edges of the parts are beveled, so as to form an external V-shaped groove a^{11}, within which is arranged a circular soft-rubber or analogous packing-strip E. The strip E extends entirely around the receptacle and is held compressed within the groove and overlying the joint by means of a strap metal clamp E', which encircles the bowl and is provided at its meeting ends with ears e e', one of which is notched, as indicated at e^2, while to the other is pivoted a toggle-lever e^3, provided with a link e^4, adapted to engage the notches of the opposite ear, thus affording means of adjustably and removably clamping the packing-strip over the joint.

It is found in practice that where the admission of liquid to the carbid is localized to any one particular point the carbid has a strong tendency to form into a cake or compact mass around the inlet, thus shutting off or in a great measure interfering with the diffusion of the liquid to the unslaked portion. To obviate this difficulty, I have provided a wick-support F, consisting of a hollow tubular body closed at its upper end and secured to the bottom of the carbid-receptacle, so as to stand vertically beneath the valve-disk C'. Upon this support is mounted a tubular wick or covering of fibrous material G, which, however, terminates some distance below the upper end of the support, as indicated at g, thus leaving the upper end of the support uncovered. The valve-disk body C' is provided with an annular depending flange c^6, which is adapted to telescope over the support in the downward movement of the valve-stem, and this flange is also provided with a wick-covering c^7, which receives the liquid passing downwardly over the valve-disk and conveys it to the wick G.

The gas generated in the carbid-receptacle is permitted to pass up through the liquid-receptacle through a pipe a^{12}, having its ends secured in the partitions a and a', and from the gas-chamber a^3 enters the hollow valve-stem through apertures c^8, formed in the latter.

In order that the flow of liquid to the carbid may be regulated by the pressure of the gas generated, the diaphragm B is connected at its center with the valve-stem, so that the gas admitted below said diaphragm tends to raise the valve-stem, and thus restrict or shut off the flow of liquid. The connection between the valve-stem and diaphragm is conveniently formed by a pair of collars C^4 C^5, secured rigidly to the stem and between which the diaphragm is clamped. H designates a coiled expansion-spring arranged on the valve-stem and interposed between the upper collar and the inner surface of the cap or end wall a^4, so as to act in opposition to the movement of the valve-stem under the gas-pressure.

In order that the pressure may be equalized between the gas and liquid chambers, so as to prevent the formation of a vacuum in the latter, a spring-pressed downwardly-opening check-valve I is seated in the partition a', this arrangement serving to permit access of water to the gas-chamber in case the generator be inverted or tipped over. A filling-aperture is provided in the partition a, closed by a screw-cap a^{13}, through which the liquid-reservoir may be filled when the carbid-receptacle is removed.

The operation of the device has been sufficiently indicated to make it obvious in the foregoing description and need not therefore be further detailed.

In Fig. 2 I have shown a slight modification. In this instance the valve parts c^{14} are substantially the same in form as the parts c^4 of the first-described device, but are merely recesses formed in the side wall of the valve-plug and do not extend through said wall so as to open into the hollow of the stem. In this case also the wick-support F' is perforated, as indicated at f, to permit gas to enter said support, thus constituting a gas-collecting chamber. From this chamber the gas enters the hollow valve-stem c^{40} through a passage c^{20}, formed through the valve-disk, and thence to the burner, thus dispensing with the pipe leading from the carbid-chamber to the gas-chamber, as before. Apertures C^{18}, formed in the valve-stem at points within the gas-chamber A, permit the entrance of gas to the chamber, so that it may act upon the flexible diaphragm in the same manner as

described in the previous construction. Said chamber also obviously acts as an expansible reservoir and to equalize and render more uniform the gas-pressure.

In the present construction a movable partition in the form of a piston J is substituted for the partition a' of the former construction. This piston is made to fit closely and slide upon the valve-stem and is provided with a pair of oppositely-disposed cup leathers or packings $j\,j'$, which insure a close joint at its periphery whether the pressure be from above or below. By means of this construction the check-valve is dispensed with, inasmuch as the piston moves downward with the fall of the liquid. In other respects the constructions and operation of the devices are the same.

I claim as my invention—

1. In a lamp for generating and burning acetylene gas, the combination, of a carbid-compartment, a gas-chamber, a diaphragm dividing said gas-chamber, subject at one side to the gas-pressure and open at its opposite side to atmospheric pressure, a source of liquid-supply and means for controlling the flow of liquid to the carbid comprising a valve-port, a valve-plug having a part of uniform size arranged to reciprocate through said port and provided in its part of uniform size which coöperates with said port with a longitudinally-arranged slot of decreasing cross-sectional area from one end toward the other, said valve-plug being operatively connected with the diaphragm, a valve-seat surrounding said port, a valve-disk upon the valve-plug surfaced with a rubber packing and adapted to coöperate with said seat, means acting to normally hold the valve-disk away from its seat and means for positively forcing and holding the valve-disk against its seat.

2. In a generator, the combination of a carbid-chamber, a liquid-reservoir and a gas-chamber arranged in superposed relation to each other, a valve-port in the partition separating the liquid and carbid receptacles, a valve-plug arranged to reciprocate through said port and provided with a hollow stem arranged to extend through the gas-chamber and project outside the generator, a flexible diaphragm dividing the gas-chamber and connected with said valve-stem so as to reciprocate the latter when the diaphragm is vibrated, a gas-passage from the carbid-chamber to the gas-chamber, an aperture in the hollow valve-stem located at a point within the gas-chamber, and a burner-jet connected with valve-stem.

3. In a generator the combination of a carbid-chamber, a liquid-reservoir and a gas-chamber arranged in superposed relation to each other, a valve-port in the partition separating the liquid and carbid receptacles, a valve-plug arranged to reciprocate through said port and provided with a hollow stem arranged to extend through the gas-chamber and project outside the generator, a valve-seat surrounding said valve-port, a valve-disk upon the valve-stem adapted to coöperate with the valve-seat, a thumb-nut threaded upon the valve-stem externally to the generator, whereby the valve-disk may be clamped positively against its seat, a flexible diaphragm dividing the gas-chamber and connected with said valve-stem so as to reciprocate the latter when the diaphragm is vibrated, a gas-passage from the carbid-chamber to the gas-chamber, an aperture in the hollow valve-stem located at a point within the gas-chamber, and a burner-jet connected with valve-stem.

4. In a generator the combination of a carbid-chamber, a liquid-reservoir and a gas-chamber arranged in superposed relation to each other, a valve-port in the partition separating the liquid and carbid receptacles, a valve-plug arranged to reciprocate through said port and provided with a hollow stem arranged to extend through the gas-chamber and project outside the generator, a wick-support arranged to project freely into the carbid-chamber and provided with a wick-covering arranged to receive the liquid admitted through the port and diffuse it to the carbid, a flexible diaphragm dividing the gas-chamber and connected with said valve-stem so as to reciprocate the latter when the diaphragm is vibrated, a gas-passage from the carbid-chamber to the gas-chamber, an aperture in the hollow valve-stem located at a point within the gas-chamber, and a burner-jet connected with valve-stem.

5. In a generator, the combination of a carbid-chamber, a liquid-reservoir and a gas-chamber arranged in superposed relation to each other, a valve-port in the partition separating the liquid and carbid chambers, a valve-plug arranged to fit and reciprocate within said port and provided in its sides with slots of decreasing cross-sectional area from top to bottom forming passages for the liquid, a hollow valve-stem connected with said valve-plug, extending up through the liquid and gas chambers and through the upper end closure of the latter, so as to form a gas-passage from the carbid-chamber, a gas-burner connected with the upper end of said valve-stem, a flexible diaphragm dividing the gas-chamber horizontally and connected at its central part with the valve-stem, a gas-passage affording communication between the hollow of the valve-stem and the gas-chamber below the diaphragm, a spring arranged to act upon the diaphragm in opposition to the gas-pressure, and a movable piston forming the partition between the gas-chamber and liquid-chamber.

6. In a generator, the combination of a carbid-chamber, a liquid-reservoir and a gas-chamber arranged in superposed relation to each other, a valve-port in the partition separating the liquid and carbid chambers, a valve-plug arranged to fit and reciprocate within said port and provided in its sides with slots of decreasing cross-sectional area from top to bottom forming passages for the liquid, a hol-

low valve-stem connected with said valve-plug, extending up through the liquid and gas chambers and through the upper end closure of the latter, so as to form a gas-passage from the carbid-chamber, a gas-burner connected with the upper end of said valve-stem, a flexible diaphragm dividing the gas-chamber horizontally and connected at its central part with the valve-stem, a gas-passage affording communication between the hollow of the valve-stem and the gas-chamber below the diaphragm, a spring arranged to act upon the diaphragm in opposition to the gas-pressure, and a movable piston forming the partition between the gas-chamber and liquid-chamber, a hollow perforated wick-support extending freely within the carbid-chamber, and a wick covering said support and arranged to receive and diffuse the liquid admitted to the chamber, said hollow valve-stem being arranged to communicate at its lower end with the hollow wick-support.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 7th day of October, A. D. 1897.

CHARLES W. BECK.

Witnesses:

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