C. W. BECK.

ACETYLENE GENERATOR.

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971,346. **Patented Sept. 27, 1910.**

Fig. 1.

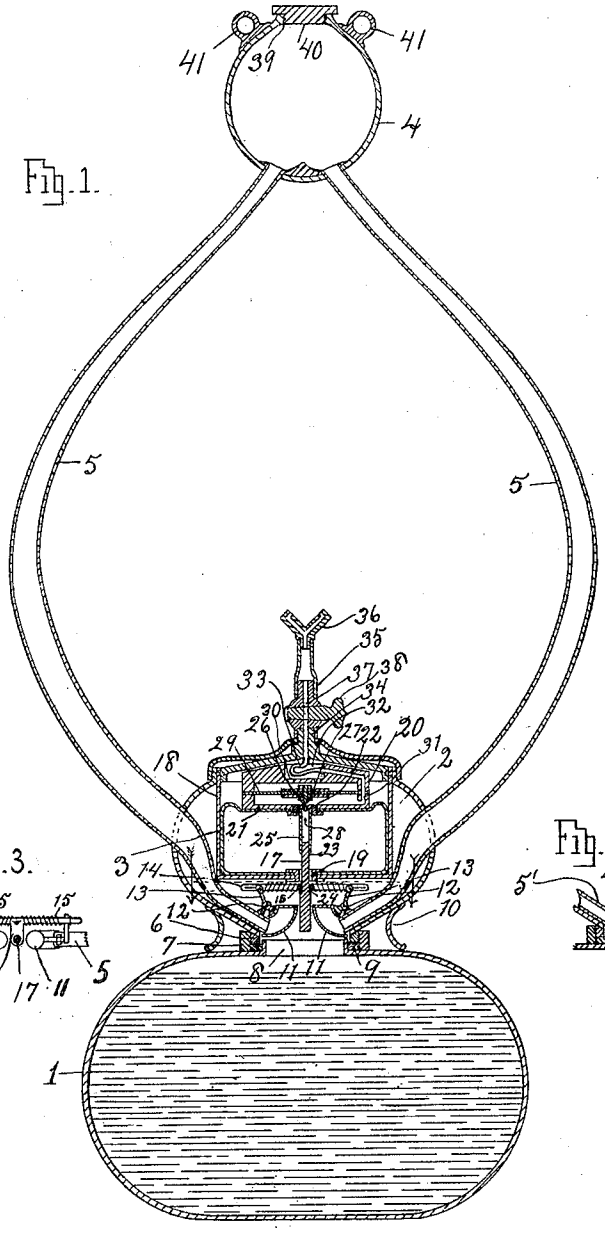
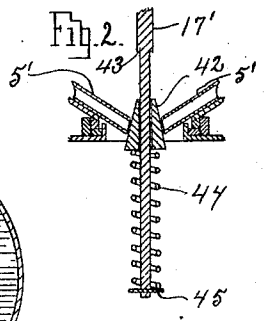


Fig. 3.

Fig. 2.



WITNESSES.

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ACETYLENE-GENERATOR.

971,346. Specification of Letters Patent. Patented Sept. 27, 1910.

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To all whom it may concern:

Be it known that I, CHARLES W. BECK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Acetylene-Generators, of which the following is a specification.

This invention relates to improvements in acetylene generators, and refers more specifically to improvements in that type of generators wherein pulverulent or granulated carbid is fed to a saturating chamber wherein the generation of gas takes place.

Among the objects of the invention are to provide a construction in which the saturating generating chamber and that part of the generator in which the feed mechanism is arranged, form the main body of the chamber or generator, the carbid hopper is elevated at a considerable distance above said main body, and said hopper and body are united by and arranged to communicate with each other through tubular arms, thus providing a construction particularly suitable for a hanging lamp; to provide an improved feed mechanism arranged to control the flow of carbid through the tubular arms to the generating chamber; and, in general, to provide improvements in the details of construction of a generator of the character referred to.

To this end this invention consists in the matters hereinafter described and more particularly pointed out in the appended claims, and the same will be readily understood from the following description, reference being had to the accompanying drawings, in which,

Figure 1 is an axial sectional view, taken in the plane of the harp-shaped arms of the generator; Fig. 2 is a fragmentary detail, in axial section, of a modified form of feed mechanism; and, Fig. 3 is a horizontal sectional view, taken on line X—X, of Fig. 1, and looking downwardly.

Referring to said drawings, 1 designates as a whole, a lower closed font constituting a generating chamber adapted to contain a body of liquid; 2 an upper receptacle, detachably connected with the upper part of the font, within which is arranged an expansible and collapsible gas bag, 3, and feed mechanism controlling the flow of carbid to the generating chamber.

4 designates an elevated carbid hopper, arranged at some distance vertically above the main body of the generator and united therewith by means of tubular arms, 5, which not only serve the function of suspending the main generator body from the lower part of the carbid hopper, but also serve as ducts through which the pulverulent carbid is fed from the hopper to the generating chamber.

In the preferred construction shown herein, the upper chamber 2 is provided at its lower side with a central opening, surrounded by a cylindric flange, 6, which is externally threaded to fit within a corresponding flange, 7, upon the upper side of the font and concentric with a corresponding opening, 8, in the latter. In order to form a gas-tight union between said members, a packing gasket, 9, is interposed between the meeting parts, as indicated clearly in the drawings, and in order to conceal the joint thus formed a concave annular petticoat flange, 10, is provided upon the underside of the upper member.

The tubular arms 5 are arranged to extend at their lower ends obliquely, downwardly and inwardly, through the side walls of the upper chamber 2, and terminate at a short distance from each other in position to discharge into the central opening 8 of the generating chamber and at diametrically opposite sides of said opening, as shown clearly in the drawing.

11, 11, designate a pair of hollow or cup-like valve members, arranged to respectively control the discharge ends of the tubular arms 5; each of said valve members being pivoted at a point above the discharge end of the duct it controls, as at 12, in position to swing downwardly to telescope its mouth over the end of said duct, and vice versa to be swung upwardly to carry it out of alinement with the end of the duct and permit the free discharge of the carbid therefrom. In order to control the positions of said valves, each is provided with a rigid operating arm, 13, arranged in such angular relation to its pivotal axis that a direct downward pressure upon the end of said arm will operate to oscillate the valve member upwardly so as to open the feed passage. The arrangement of the pair of valve members and their operating arms is symmetrical, and with the upper ends of said arms is connected a hori-

zontal presser-bar, 14, having slot-and-pin connections with said arms, and provided at each end with a spiral contractile spring, 15, which springs are respectively engaged with the arms 13 in such manner as to tend to draw the latter toward each other or in a direction to close the valves. At its center the presser-bar 15 is provided with a lateral projection, 16 (see detail Fig. 3), through which is arranged to extend an operating rod, 17, whereby the presser-bar is lifted or depressed to close or open the valves, in the manner now to be described.

Within the upper part of the chamber 2 is arranged a cylindric or cup-shaped receptacle, 18, within which is placed the expansible and collapsible gas bag 3 hereinbefore referred to; the lower side of said gas bag being placed in communication with the gas space of the generator through an opening, 19, formed centrally in the lower side of the cup-shaped receptacle 18. The operating rod 17 is arranged to extend loosely up through said aperture 19, and is connected at its upper end with the upper side of the gas bag so as to be reciprocated vertically by the inflation and deflation of said bag. In the particular instance shown, a reducing-valve, 20, of relatively large size and of substantial mass so as to act as a weight as well as perform its function as a reducing valve, is mounted upon the upper side of the gas bag, and the upper end of the rod 17 is operatively connected with the bottom wall, 21, of said reducing valve conveniently by means of a suitable connecting nut or union, 22. The operating rod 17 is arranged to slide freely through the extension 16 of the presser-bar, but is provided at points above and below the latter with shoulders, 23, 24, respectively, which engage said presser-bar and carry it with the operating rod when the latter is reciprocated in either direction beyond the extent of lost motion afforded between said shoulders; the arrangement being such that the upper shoulder 23 will engage the presser-bar and open the valves when the gas bag approaches complete deflation, and in the return movement of the operating rod the lower shoulder 24 will engage the presser-bar and lift the latter so as to close the valves positively when the gas bag approaches complete inflation. Owing to the action of the contractile springs 15 upon the arms of the valves, however, the valves will be closed as soon as the operating rod is lifted so as to permit the presser-bar to rise and before the lower shoulder of said rod engages and lifts the presser-bar positively.

The upper part of the operating rod 17 is of tubular construction, and the passage, 25, therethrough, communicates at its upper end with a valve port, 26, formed through the bottom wall of the reducing valve and controlled by a valve plug, 27. Gas is admitted from the gas bag to the hollow operating rod through a suitable aperture, 28. The interior of the reducing valve is divided by means of a flexible impervious diaphragm, 29, with the central portion of which the valve plug 27 is operatively connected; the space below said diaphragm constituting the pressure chamber of the reducing valve, and the space above the latter being in communication with the atmospheric pressure through vents, 30. From the pressure chamber below the diaphragm a gas passage 31 extends upwardly and through the body of the top wall of the reducing valve to a central cavity 32 formed in the upper side of said valve. At the point where the passage 31 opens into said cavity 32, a nipple is provided with which is connected a flexible gas pipe 33. The top portion of the generator is provided with a threaded projecting nipple 34 upon which is arranged to fit a burner nozzle 35 terminating in a suitable gas tip 36, both the nipple 34 and the burner nozzle being provided with the usual axial gas passage 37. Desirably also the nozzle is provided with a stop cock 38 whereby the passage therethrough is controlled. The flexible gas pipe 33 is connected with the lower or inner end of the nozzle 37 and it is to be noted that said flexible pipe is of sufficient length to permit the reducing valve, which in the present instance constitutes a weight, to rise and fall to the extent required to permit the gas bag 3 to completely deflate.

The carbid holder 4 is provided with a suitable filling aperture 39 closed by a screw plug 40 and inasmuch as the generator is designed as a suspension lamp, the upper portion of the hopper is conveniently provided with a pair of suspending eyes or ears 41.

The operation of the apparatus constructed as described has been quite fully indicated in connection with the description of the mechanism, but may be briefly described as follows: Suitable quantities of carbid and liquid having been charged into the hopper and font respectively, the carbid flows down by gravity through the hollow arms 5 and begins to escape into the generating chamber, it being understood that when the generator is empty and the gas bag deflated, the operating rod 17 will be in its lowermost position and the valve members thereby held open. As soon, however, as sufficient gas has been generated to fill the interior of the generator and gas holder, the inflation of the gas holder will, through the medium of the operating rod, oscillate the valve members into closed position and thus interrupt the flow of carbid and consequent generation of gas. The cock may now be opened and the gas lighted at the tip and

the operation will thereafter become automatic, it being obvious that as the gas holder is deflated the valve members will be gradually oscillated upwardly eventually opening far enough to permit the carbid to begin to escape to the generating chamber. As soon as sufficient carbid has escaped to replenish the volume of gas, the gas holder will be reinflated and the valve mechanism thereby closed.

A feed mechanism constructed in accordance with the present invention possesses the important advantage of extreme freedom from liability to become clogged, this being due to the fact that the interruption of the feed or control of the discharge outlets by the valve members is effected by the telescoping of the valve members over the end of the discharge chutes and not by the accurate fitting together of parts such as valve plugs, slide valves and the like. The result of this construction is that there is little or no liability of lumps of carbid becoming wedged into the feed mechanism and the mechanism is not at all affected by variations in the size of grains or lumps of carbid so long as the latter are sufficiently small to pass through the hollow arms. Moreover the upward oscillation of the valve members serves to complete the inversion of the latter so that they empty themselves each time they are opened, and thus tend to keep themselves free from carbid or residue which might otherwise tend to adhere thereto. By reason of the construction and arrangement of the valve members and their relation to the inclined discharge outlets which they control, it will be obvious that the feeding of the carbid will begin very gradually after each interruption and be gradually accelerated until the rate of feed has been increased sufficiently to generate gas more rapidly than it is being consumed, such action avoiding marked fluctuations in the rate of generation of gas and resulting in a very uniform pressure at the burner.

The arrangement of the hopper supported above and free from the body of the generator and connected to communicate therewith through the hollow arms is a feature of obvious importance inasmuch as it enables those parts of the generator other than the hopper to be made exceedingly compact and therefore well adapted for a suspension lamp or generator, while the elevation of the hopper above the generator assists very materially in securing a prompt flow of the carbid to the feed mechanism by gravity.

In Fig. 2 I have shown a modified feed mechanism well adapted for embodiment in a generator in other respects substantially like that illustrated in Figs. 1 and 3. In this instance the operating rod 17′ is connected and constructed substantially like that previously described except that it is extended a substantial distance below the valve member which latter in the present instance takes the form of a tapered upwardly-closing conical plug 42. The discharge ends of the hollow arms 5′ are arranged to converge downwardly substantially as in the preceding instance, except that they are brought somewhat more nearly together at their ends and have their ends cut off at a suitable inclination to correspond to the tapered sides of the valve plug 42 which seats itself between said ends to form a closure for said ducts. In order to retract the valve plug to open the feed ducts, said valve plug is mounted to slide freely on the reduced portion of the operating rod 17′ and the latter is provided at a point above the upper end of said plug with an annular shoulder 43 which when the operating rod approaches the lower limit of its movement, engages the valve plug and carries the latter downwardly away from the discharge ducts. Lost motion is provided between the operating rod and the valve plug so that the latter will be opened only when the gas holder approaches complete deflation; such lost motion being conveniently provided by interposing a light coiled expansion spring 44 between the under side of the valve plug and a suitable retaining head 45 upon the lower end of the operating stem. The operation of this mechanism will be entirely obvious when taken in connection with the previous description and need not, therefore, be detailed at length.

While I have herein shown and described what I deem to be a preferred embodiment of my invention, yet it will be obvious that the details thereof may be modified without departing from the invention and I do not, therefore, wish to be limited to the details shown, except as they are made the subject of specific claims.

I claim as my invention:

1. In an acetylene generator, the combination of a lower generating chamber, a gas holder chamber communicating with the upper part of said generating chamber, a pair of tubular arms discharging at their lower ends into the upper part of the generating chamber, a carbid hopper supported upon the upper ends of said tubular arms and communicating with the latter, valve mechanism arranged to simultaneously control the discharge ends of said tubular arms, said valve mechanism consisting of a pair of pivotal spring pressed valves, a movable gas confining wall within said gas holder chamber and operative connections between said valve mechanism and the movable gas wall, whereby the gas generated simultaneously actuates the double valve mechanism.

2. In an acetylene generator, the combination with a generating chamber, an elevated carbid hopper and a pair of carbid ducts affording communication between the hop-

per and generating chamber and having their discharge ends arranged to approach each other in downwardly inclined convergent relation, of a pair of cup-like valve members respectively pivoted adjacent to and above the discharge ends of the several ducts, with their open ends arranged to move into and out of register with the respective ducts, a vertically reciprocatory operating rod and interconnections whereby the reciprocation of said rod operates to oscillate said valve members into open or closed position simultaneously, substantially as set forth.

3. In an acetylene generator, the combination of a lower generating chamber, an upper chamber superposed thereon and in communication therewith, an expansible and collapsible gas holder arranged within said upper chamber, an elevated hopper, a pair of tubular arms supporting said elevated hopper and affording communication between the hopper and generator, the lower ends of said arms being arranged to extend obliquely downward through the side walls of the upper chamber in convergent relation with each other, a cup-shaped valve member pivotally mounted adjacent to the upper side of the discharge end of each of said tubular arms, having its mouth arranged to swing into and out of telescopic relation to the end of the arm it controls, a horizontally arranged presser bar extending between said valve members, lever arms rigidly connected with the valve members and having slot and pin connections with the presser bar whereby the raising and lowering of the latter serves to oscillate the valve members into and out of register with the discharge ends of the respective tubular arms, an operating stem operatively connected with the expansible and collapsible gas holder extending loosely through the presser bar, shoulders upon said operating stem above and below the presser bar and respectively adapted to engage and actuate the latter as the operating stem approaches its limit of vertical movement in each direction and a controlled gas outlet from the gas holder, substantially as described.

4. In an acetylene generator, the combination of a lower generating chamber, an upper chamber superposed thereon and in communication therewith, an expansible and collapsible gas holder arranged within said upper chamber, an elevated hopper, a pair of tubular arms supporting said elevated hopper and affording communication between the hopper and generator, the lower ends of said arms being arranged to extend obliquely downwardly through the side walls of the upper chamber in convergent relation with each other, a cup-shaped valve member pivotally mounted adjacent to the upper side of the discharge end of each of said tubular arms, having its mouth arranged to swing into and out of telescopic relation to the end of the arm it controls, a horizontally arranged presser bar extending between said valve members, lever arms rigidly connected with the valve members, and having slot and pin connections with the presser bar whereby the raising and lowering of the latter serves to oscillate the valve members into and out of register with the discharge ends of the respective tubular arms, springs acting upon said valve members to normally hold the latter in closed position, an operating stem operatively connected with the expansible and collapsible gas holder extending loosely through the presser bar, shoulders upon said operating stem above and below the presser bar and respectively adapted to engage and actuate the latter as the operating stem approaches its limit of vertical movement in each direction and a controlled gas outlet from the gas holder, substantially as described.

5. In an acetylene generator, the combination of a carbid holder, a water holder below the carbid holder, a feed chute or passage between the two, a cup-shaped valve telescoping over the lower end of the feed chute to close the same, an expansible and collapsible gas holder, means connected to said holder and working against the gas pressure therein, means connected to the movable wall of said holder for opening the valve when the gas holder is deflated, a spring for preliminarily closing the valve during the inflation of said holder, and means connected to the movable wall of the holder for positively closing the valve when the said holder has been inflated to a predetermined point.

6. In an acetylene generator, the combination of a carbid holder, a water holder below the carbid holder, a pair of feed chutes between the two, a pair of cup-shaped valves telescoping over the lower ends of said chutes to close the same, an expansible and collapsible gas holder, means connected to said holder and working against the gas pressure therein, means connected to the movable wall of said holder for opening the valves when the gas holder is deflated a spring for preliminarily closing the valves during the inflation of the said holder, and means connected to the movable wall of the holder for positively closing the valves when the feed holder has been inflated to a predetermined point.

7. In an acetylene gas generator the combination of a water holder, an elevated carbid holder, a pair of discharge chutes connecting the carbid holder to the water holder, valve mechanism for controlling the lower ends of said chutes, gas actuated means for moving said valve mechanism, a burner below the carbid holder and above

the water holder, and means for leading gas to the burner.

8. An acetylene gas generator comprising a water holder, an elevated carbid holder, a pair of chutes connecting the carbid holder to the water holder and supporting said holder, an expansible gas holder above the water holder and carried thereby, a valve mechanism for controlling the discharge ends of the chutes, means actuated by the expansible gas holder to move said valve mechanism, a burner carried by the water holder, and a pressure regulator between the gas holder and the burner.

9. An acetylene gas generator comprising an elevated carbid hopper, a pair of carbid chutes depending therefrom, a water holder connected to the lower ends of said chutes, a pair of valves for the lower ends of said chutes, an expansible gas holder above the water holder, a burner above the gas holder, and directly below the carbid holder, a pressure regulator between the burner and the gas holder, and means connected to the gas holder to actuate the valves.

10. An acetylene gas generator comprising a carbid holder, a feed chute connected thereto, a water holder connected to the feed chute, a swinging valve pivoted above the lower end of the chute and adapted to swing below it to interrupt the flow of carbid, a gas holder of variable capacity, means for preliminarily closing the valve when the gas holder is partly inflated and means to positively force the valve closed when the holder is inflated to a certain degree.

11. An acetylene gas generator comprising an elevated carbid holder, a lower water holder, a feed chute connecting them and a burner located between the said holders.

12. An acetylene gas generator or lamp comprising an elevated carbid holder, a water holder, a gas holder of variable capacity, a burner connected to said gas holder directly below the carbid holder, means operated by the expansion and contraction of the gas holder to control the feed of carbid, whereby the heat from the burner will keep the carbid in the carbid holder dry.

13. An acetylene gas generator comprising a carbid holder provided with a discharge chute, a cup-like valve member pivotally supported adjacent to the discharge end of said chute and adapted to telescope over said chute to close the same, an expansible and collapsible gas holder, means connecting the movable wall of said holder to the valve whereby said valve will be opened and closed by variations in gas pressure in the gas holder, and a casing inclosing said gas holder and valve and the discharge end of the chute.

14. An acetylene gas generator comprising a carbid holder provided with a discharge chute, a cup-like valve member pivotally supported adjacent to the discharge end of said chute and adapted to telescope over said chute to close the same, an expansible and collapsible gas holder, means connecting the movable wall of said holder to the valve, whereby said valve will be opened and closed by variations in gas pressure in the gas holder, a casing inclosing said gas holder and valve and discharge end of the chute, a water holder, and means for connecting said water holder to the lower end of said inclosing casing, whereby the carbid will be discharged through the lower end of said casing into the water holder.

15. An acetylene gas generator comprising a carbid holder, a pair of discharge chutes leading therefrom, a water holder, a pair of cup like valve members pivotally supported adjacent the discharge end of each chute, a bar loosely connecting said valve members, a spring connecting said valve members and normally tending to close said members over the ends of the discharge chutes, an expansible and collapsible gas holder, a rod connected to the movable wall thereof, stops on said rod adapted to engage the valve bar to forcibly open the valves and to forcibly close the same when the gas holder is inflated.

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Witnesses:
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