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C. W. BECK.

ACETYLENE GAS GENERATOR.

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Fig. 1.

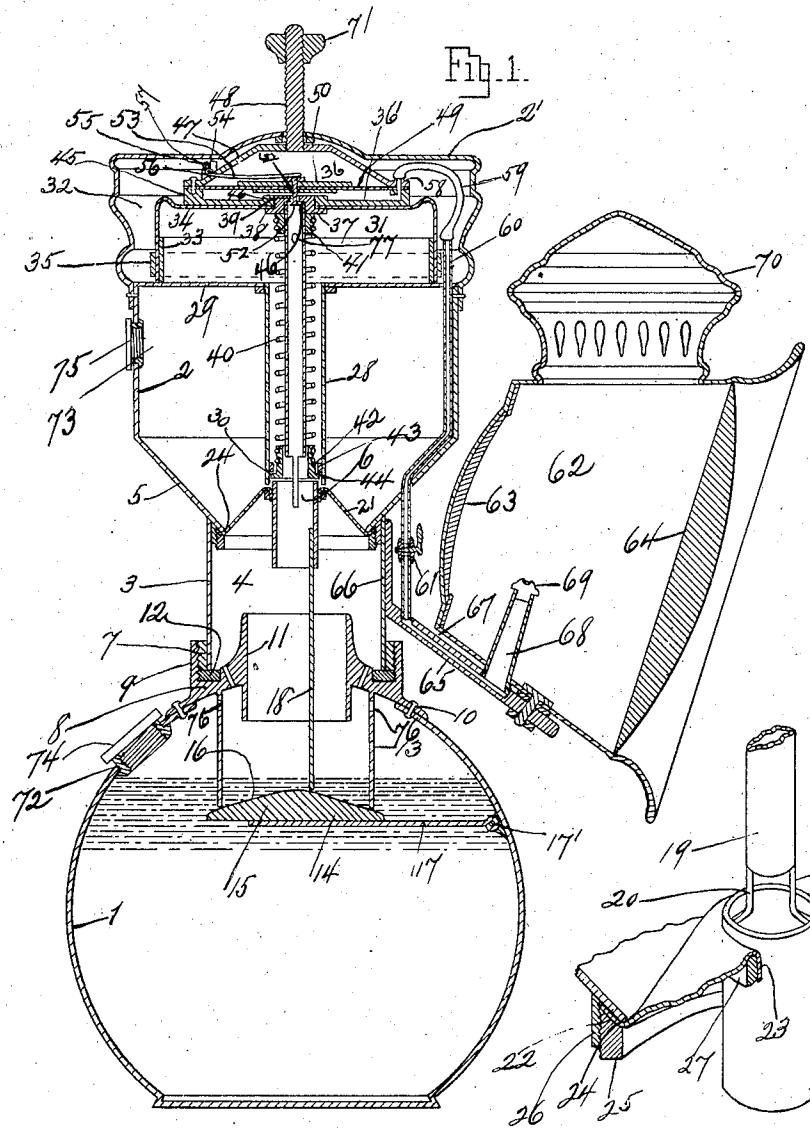


Fig. 2.

WITNESSES

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No. 790,277. Patented May 23, 1905.

UNITED STATES PATENT OFFICE.

CHARLES W. BECK, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO ELECTROLITE GAS LAMP COMPANY, OF NEW YORK, N. Y.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 790,277, dated May 23, 1905.

Application filed November 23, 1900. Serial No. 37,552.

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 a portable lamp of that type wherein pulverulent carbid is fed in regulated quantities to the saturating-chamber, the rate of feed being automatically governed and determined by the rate of consumption of the gas generated.

Among the salient objects of the present invention are to provide a generator of exceedingly compact form, so that it may be practically embodied in a vehicle-lamp or the like, while at the same time it is so constructed as to successfully maintain a proper oscillation of the gas-generating elements except as they are brought together by the operation of the feed mechanism; to provide in a construction of the character referred to means for completely closing the passage between the saturating-chamber and the source of carbid-supply except during the comparatively short intervals while the carbid is being actually introduced to the saturating-chamber; to provide a construction the operative mechanism of which will not be injuriously affected by the jarring and jolting to which a lamp of this type is subject; to provide a construction in which the lower part of the carbid-hopper, through which the feed-plunger or valve mechanism works, is in part composed of a movable portion which is actuated by the feeding operation and operates to render the flow of carbid more uniform and certain by the agitation thus caused; to provide a construction in which the passage through which the carbid is admitted to the saturating-chamber from the hopper is relatively large and unobstructed and is gradually moved relative to the body of carbid in such manner as to insure the greatest certainty of a free discharge of carbid, and in general to provide a generator of simple construction and reliable and convenient in operation.

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

Figure 1 is an axial sectional view of a generator embodying a preferred construction of my invention. Fig. 2 is a fragmentary perspective view, with parts in section, of the feed-plunger and parts immediately associated therewith.

Referring to the drawings, wherein the invention is shown as embodied in a bicycle or other portable vehicle lamp, 1 designates as a whole a lower saturating-chamber or font, 2 as a whole an elevated carbid-hopper, and 3 a reduced connecting portion uniting the hopper and associated parts with the upper part of the font or liquid-reservoir, the interior of said reduced portion forming a chamber 4, within which are arranged parts of the feed mechanism. The lower body 1 may be of any preferred and suitable construction adapted to contain a suitable supply of liquid, into which the pulverulent carbid is dropped from the hopper in graduated quantities, and likewise the upper member or hopper 2 may be of any suitable form provided with a converging or hopper-shaped lower end wall 5, which directs the carbid to the lower end thereof.

In the preferred construction shown herein the contracted portion 3 is cylindric and is permanently united at its upper end to the lower part of the carbid-hopper concentrically with that part through which the feed-plunger 6 extends and is detachably connected with the upper portion of the lower reservoir or font conveniently by being provided with an externally-threaded lower end portion 7, which is adapted to engage the correspondingly-threaded tubular portion 9 of a casting 8, forming the top portion of said font. Said casting 8, conveniently and as shown herein, has the form of a cap, secured at its periphery to the upper part of the main

body of the font, as indicated at 10, and provided at its center with a tubular passage formed by a tubular extension 11, arranged concentrically with the feed-plunger and forming an open communication between the upper part of the font or saturating-chamber and the chamber 4. Between the tubular extension 11 and the external tubular portion 9 of the casting 8 is an annular depression or groove, within which is arranged a packing-ring 12, against which the lower end of the threaded part 7 of the contracted portion 3 impinges to form a gas-tight joint. Upon the lower side of the cap member 8, concentrically with the central passage therethrough, is mounted a depending tubular housing 13, which extends at its lower end well down within the body of the reservoir and far enough so that the lower end will be at all times during the operation of the generator below the liquid-level therein.

14 designates a closure movably mounted to close the lower end of the housing 13 and yieldingly held in closed position, said closure consisting in the present instance of a main body 15, made of material of less specific gravity than water, preferably of cork, provided with a conical upper face 16 and supported in position in register with the housing 13 by means of an arm 17, pivotally connected, as at 17′, to the interior of the font, so as to be capable of swinging downwardly to open the lower end of the housing.

18 designates a tapping-rod secured at its upper end to the feed-plunger and arranged to extend thence downwardly within the housing 13, the lower end of said tapping-rod being arranged in proper relation to the float-closure 14, to engage the latter and force it downwardly into open position as the feed-plunger descends into feeding position.

Describing now more particularly the feed mechanism, the hollow feed-plunger 6 is arranged to reciprocate vertically throughout a limited distance and comprises, as best shown in detail, Fig. 2, a hollow cylindric or tube-like body open at both ends and united at its upper end with an operating-stem 19 by means of a pair of arms 20, connecting said parts in such manner as to interfere as little as possible with the entrance of carbid to the upper end of the plunger.

21 designates a flexible impervious diaphragm, preferably made of sheet-rubber, which forms that part of the lower end of the hopper through which the feed-plunger extends, said diaphragm having its outer periphery 22 hermetically united with the side walls of the cylindric housing 3 and having its inner periphery 23 united with the exterior of the feed-plunger, near the upper end thereof, so as to move with the plunger in the reciprocation of the latter. As a convenient means of securing said diaphragm in the manner described the outer edge thereof is arranged to underlie the lower margin 24 of the rigid portion of the bottom 5 of the hopper, and against said underlying portion is arranged to impinge a threaded ring 25, externally threaded to fit within a correspondingly-threaded portion 26 upon the interior of the member 3 of the generator. The inner periphery of the diaphragm is conveniently secured to the plunger by means of a clamping-ring 27, made of suitable diameter to fit tightly over the downturned portion 23 of the diaphragm and to clamp the latter upon the plunger, the friction between said parts being depended upon to maintain them in proper relation.

28 designates a cylindric housing or sleeve connected at its upper end with the top wall 29 of the hopper or with other suitable support and arranged to depend thence downwardly, so as to inclose the feed-stem and upper end portion of the feed-plunger when the latter is in elevated position, said housing being made of an internal diameter somewhat greater than the external diameter of the feed-plunger, so as to afford a free annular working space 30 between said parts. The lower end of said housing is arranged to terminate at a point approximately slightly below the upper end of the feed-plunger when the latter is in its most elevated position, in which position the flexible diaphragm 21 will be drawn upwardly into approximately the form of a truncated cone in the position indicated in Figs. 1 and 2 of the drawings, and when in this position the top surface of the diaphragm, which overlies the clamping-ring 27, will be carried into contact with the lower end margin of the housing 28, and thus form a substantially gas-tight seal between the interior of the hopper and the space within the cylindric housing 28 and gas-space below the diaphragm.

The feed-plunger is operated through the medium of an expansible and collapsible gas-holder (designated as a whole 31 and located in a chamber 32 in the upper part of the lamp above the partition 29 therein.) Conveniently and as shown herein said gas-holder comprises an inner rigid ring or cylindric wall portion 33, mounted upon and secured to the partition 29, and a collapsible inverted-cup-shaped sheet-rubber member 34, having its lower margin secured to the exterior of the ring 33 by means of an outer clamping-ring 35, this construction enabling the upper side of the gas holder or bag to descend or collapse until it rests in contact with the bottom wall of the holder formed by the said partition 29. Upon the upper side of the gas-holder is mounted a disk or rigid member 36′, forming in the present instance the bottom wall of a reducing-valve, (designated as a whole 36,) and with the center of this disk is connected the upper end of the stem of the feed-plunger. This connection is conveniently formed by means of a nut 37, externally threaded to

engage a correspondingly-threaded aperture in the lower side of the reducing-valve and provided with a radial flange portion 38, which serves to clamp the margins of the aperture in the gas-bag, through which said nut is inserted, against the under side of the superposed valve-body, so as to form a gas-tight union, said nut being provided with a central aperture threaded to receive the upper end of the feed-plunger stem, as indicated at 39.

The gas-holder is deflated and the connected feed-plunger caused to descend into feeding position by the action of a spring thereon, said spring consisting in the present instance of a coiled contractile spring 40, mounted upon the plunger-stem and having its upper end connected with a collar 41 upon the upper end of said stem and its lower end similarly connected with a collar 42, arranged within the lower end of the tubular housing 28 and held against upward movement therein by means of a ledge or flange 43 upon the inner wall of the housing, with which a radially-extending flange 44 of said collar engages.

Describing now the reducing-valve 36, its lower disk-shaped bottom wall 36′, hereinbefore referred to, is provided with a marginal upstanding rim 45, forming the side walls of a valve-chamber, and to the top margin of this upstanding rim is secured a convex top wall 47, provided at its center with a stem 48, which extends out through an unthreaded opening in the top-wall casing 2′ of the hopper. Between the periphery of the top wall 47 of the valve and the upper margin of the side wall 45 is secured the periphery of a flexible diaphragm 49, forming a hermetical partition between that part of the valve-chamber below said diaphragm and the portion above. With the central portion of this diaphragm is connected a rigid body or disk 50, with which in turn is connected a valve-stem 51, extending downwardly through the lower valve-chamber and provided at its lower end with a valve-plug 52, which controls a passage 46, extending through the nut 37 and forming a communication between the upper end of the hollow feed-plunger stem and the lower reducing-valve chamber.

53 designates a relatively long plate-spring having its inner end arranged to rest upon the upper side of the valve-diaphragm, so as to exert a downward tension thereon which tends to open the valve-passage leading thereto, and extending upwardly at its opposite end through the inclined top wall of the valve-chamber and connected with an adjusting block or support 54. In order that the tension of the spring may be varied or adjusted, it is provided with an arm portion 55, extending substantially at right angles to the main body of the spring and united with the latter by a coil or turn 56, which serves as an eye, whereby the spring is pivotally connected with the support 54. The arm portion 55 is engaged with an adjusting-screw 57, threaded into the support 54 at right angles to the arm, so that by adjusting the screw it will act upon the spring bell-crank fashion to vary the tension upon the valve-diaphragm.

The reducing-valve is provided at one side with a suitable nipple 58, communicating with the space below the diaphragm, and with this nipple is connected a flexible rubber tube 59, the opposite end of which connects with the upper end of a pipe 60, which extends downwardly through the hopper adjacent to one of the side walls thereof, out through the bottom wall of the hopper, and thence to a headlight, (designated as a whole 62,) said gas-pipe being provided at a point between the hopper and the headlight with a gas-cock 61.

The headlight 62 may be of any suitable or preferred construction, that shown herein consisting of an ordinary conical or bell-shaped chamber provided at its rear end with a suitable reflector 63 and inclosed at its outer flaring end by means of a suitable lens 64, the headlight being conveniently supported from the main generator by means of a bracket 65, attached to the waist portion 3 of the generator, as indicated at 66. The bracket 65 is provided with a gas-passage 67, forming a communication between the pipe 60 and a burner-nozzle 68, extending upwardly within the headlight-chamber and terminating in a suitable burner-tip 69. At its top side the headlight is provided with a suitable hood or chimney 70, which may be of any suitable or desired construction.

In order that the feed mechanism may be locked in closed position, so as to prevent the access of carbid to the saturating-chamber and at the same time relieve the gas-holder from the tension of the spring thereon, the stem 48 of the reducing-valve is constructed to reciprocate freely through the top wall of the generator and is threaded and provided with a nut 71, which may be adjusted downwardly thereon, so as to engage the upper side of the casing and hold the reducing-valve and connected feed-plunger in their uppermost positions.

The operation of the generator constructed and arranged as described may be briefly described as follows: Suitable quantities of water and carbid having been respectively charged into the saturating-chamber and hopper through their filling-apertures 72 and 73 and the screw-plugs 74 and 73 thereof returned to place, the generator is brought into operation by simply adjusting the lock-nut 71 upwardly on the stem 48 and opening the gas-cock, so as to permit the spring to carry the feed-plunger downwardly. As the feed-plunger descends it opens the space between the lower end of

the housing 28 and the upper surface of the flexible diaphragm 21, and as soon as the upper end of the feed-plunger passes below the lower end of the housing the pulverized carbid begins to flow into the feed-plunger and drop through the latter and into the liquid contained in the inside of the housing 13. The descent of the feed-plunger carries the tapping-rod 18 thereof into contact with the float 15 and depresses the latter, so that the carbid which is dropped in the feed operation is permitted to slip off from the conical upper face of the float and descend to the bottom of the chamber, it being understood that most of the gas will be generated before the carbid passes from the inside of the housing. However, in order to provide for the escape of such gas as is generated from the carbid after it escapes from the housing gas-passages 76 are provided in the upper part of the housing, affording communication between the spaces outside of and inside of said housing. The gas generated in the saturating-chamber rises through the hollow feed-plunger and thence through the tubular housing 28 into the gas-bag, from which latter it passes into the upper part of the hollow feed-stem through ports 77, formed therein, and thence passes into the lower chamber of the reducing-valve through the valve-controlled passage 46. From the reducing-valve the gas passes to the burner-nozzle within the headlight-chamber through the flexible pipe 59, the pipe 60, and the gas-passage 67. Owing to the small quantity of gas generated at a time, it being understood that the generation of gas occurs at very frequent intervals and in small quantities, the gas-cock 61, controlling the pipe 60, may be closed at will in order to extinguish the flame without danger.

From the foregoing description it will be seen that I attain the several objects of my invention and provide a simple, reliable, and convenient apparatus not easily gotten out of repair when subjected to the trying conditions incident to the use of a portable generator or vehicle-lamp, that the automatically-acting closure or float within the generator acting in conjunction with the tubular housing serves to effectually prevent the splashing of liquid upwardly into the feed mechanism, and that the flexible diaphragm constituting the central portion of the bottom of the carbid-hopper not only operates to effectually prevent the access of vapors and gas to the carbid within the hopper, but also conduces to secure a reliable and free feeding of the carbid.

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

I claim as my invention—

1. In a carbid-feed acetylene-generator, a diaphragm forming a support upon which the carbid rests, and feed mechanism connected to and operating to bodily reciprocate a portion of said diaphragm whereby the flow of carbid from the diaphragm to a discharge-passage is controlled.

2. In a carbid-feed acetylene-generator, the combination with a flexible diaphragm forming a support upon which the carbid rests, and feed mechanism connected to and operating to bodily reciprocate a portion of said diaphragm whereby the flow of carbid from the diaphragm to a discharge-passage is controlled.

3. In a carbid-feed acetylene-generator, the combination with a generating-chamber and a carbid-hopper supported above the same, and provided with a discharge-passage, of a flexible diaphragm forming a part of the bottom of said hopper, and feed mechanism acting upon said diaphragm to reciprocate a part thereof and thereby change the shape of that portion of the hopper formed by said diaphragm whereby the flow of carbid through the discharge-passage is controlled.

4. In a carbid-feed acetylene-generator, the combination of a generating-chamber, a carbid-hopper supported above said generating-chamber, a flexible diaphragm forming a portion of the bottom of said hopper and provided with a feed-aperture therethrough, feed mechanism operatively connected with that portion of the diaphragm containing the feed-aperture and arranged to raise and lower said portion, and a relatively fixed member to and from which said diaphragm is vibrated and forming a closure for said feed-opening when the diaphragm is brought into juxtaposition thereto.

5. In a carbid-feed acetylene-generator, the combination with a generating-chamber and a carbid-hopper supported above said generating-chamber, of a flexible diaphragm forming a portion of the bottom of said hopper, an annular valve member extending through said diaphragm and to which the diaphragm is connected, an operating-stem connected with said valve member, a relatively fixed housing inclosing the valve-stem, the lower end of which is arranged in position to meet the upper side of the diaphragm when the latter is in its elevated position, and feed mechanism operatively connected with said stem whereby the valve member and connected diaphragm are actuated, substantially as described.

6. In a carbid-feed acetylene-generator, the combination with a lower generating-chamber and a superposed carbid-hopper, of a flexible diaphragm forming a portion of the

bottom wall of said hopper, a tubular valve member extending through the central portion of said flexible diaphragm; the portion of said diaphragm through which said valve member extends being united to the valve member at a point near the upper end of the latter so as to rise and fall therewith, a tubular housing supported within the hopper concentrically with the valve member, and having its lower ends located in position to contact with the upper side of the diaphragm around the valve member when the latter is in its uppermost position, an operating-stem connected with said valve member and extending up through said tubular housing, an expansible and collapsible gas-holder operatively connected with said operating-stem, and a spring acting to collapse the gas-holder and lower the valve member into feeding position, substantially as described.

7. In an acetylene-generator, the combination with a generating-chamber provided at its upper side with an inlet-opening, of a tubular housing surrounding said inlet-opening and extending downwardly within the generator to a point below the normal level of liquid therein, a closure held yieldably in position to close the lower end of said housing, a feed mechanism arranged to feed carbid downwardly into said generating-chamber, and operative connections between said feed mechanism and said closure whereby the latter is forced open during the time the carbid is being fed into the generator, substantially as described.

8. In an acetylene-generator, the combination with a generating-chamber provided with a carbid-inlet, an open-ended feed-tube, means for reciprocating said tube to feed carbid, of a tubular housing extending from the upper side of the generating-chamber downward within the generating-chamber and below the normal liquid level therein and into which the carbid is fed through the feed-tube, and a downwardly-opening closure held yieldingly in a position to close the lower end of said tubular housing, whereby the liquid is prevented from being splashed up through the feed-tube.

9. In an acetylene-generator, the combination with a generating-chamber provided at its upper side with an inlet-opening through which carbid is introduced in graduated quantities, of a tubular housing or guard, surrounding said inlet-aperture and extending below the normal liquid-level of the generating-chamber, a float movably supported in position to rise by difference in specific gravity and normally close the lower end of said tubular housing, and means for forcing said float downwardly to open the lower end of the closure at determined intervals, substantially as described.

10. In an acetylene-generator, a carbid-holder provided with a bottom opening, a vertical body within the holder terminating above the bottom opening, a discharge-tube open at its ends, working in said bottom opening, and raised up beneath the vertical body to arrest the flow of carbid, and a flexible diaphragm connecting the discharge-tube with the walls of the holder and agitating the carbid as the discharge-tube moves.

11. In an acetylene-generator, a carbid-holder provided with a bottom opening, a vertical body within the holder terminating above the bottom opening, a discharge-tube open at its ends, working in said bottom opening, a pressure device above the holder controlled by the pressure of generated gas, and a connection extending from the discharge-tube upwardly through the vertical body to the pressure device by which the tube is raised up beneath the vertical body to arrest the flow of carbid.

12. In an acetylene-gas generator, the combination of a generating-chamber, a carbid-holder communicating through an opening in its bottom with the generating-chamber, a discharge-tube working upward and downward in the bottom opening of the holder, permitting the escape of the carbid when down, and a tubular body within the holder, over and protecting the discharge-tube to prevent escape of the carbid when it is raised up, and means for actuating said discharge-tube extending upwardly through the tubular body.

13. In an acetylene-gas generator, the combination of a generating-chamber, a carbid-holder communicating through an opening in its bottom with the generating-chamber, a discharge-tube working upward and downward in the bottom opening of the holder, and permitting the escape of carbid when down, a tubular body within the holder, over and protecting the discharge-tube to prevent escape of carbid when it is raised up and a gas-outlet communicating with said tubular body.

14. In an acetylene-gas generator, the combination of a generating-chamber, a carbid-holder communicating through an opening in its bottom with the generating-chamber, a discharge-tube working upward and downward in the bottom opening of the holder, and permitting the escape of carbid when down, a tubular body within the holder, over and protecting the discharge-tube, to prevent escape of carbid when it is raised up, an expanding gas-receiver above said tubular body, and a connection from a moving wall of the gas-receiver extending through the tubular body and secured to the discharge-tube.

15. The combination of the carbid-holder, the discharge-tube working in the bottom thereof, the diaphragm connecting the dis-

charge-tube to the holder, and the tubular body above the discharge-tube of larger diameter than the discharge-tube, and restricting the area of the vertical column of carbid imposed upon the diaphragm.

16. The combination of the carbid-holder, having a bottom, a discharge-tube moving vertically through said bottom, and the flexible diaphragm above said bottom connecting the discharge-tube to the side wall of the holder.

17. In a carbid-feed acetylene-gas generator, the combination of a carbid-holder, a flexible diaphragm therein and formed with a feed-opening, means for moving a portion of the diaphragm in one direction to permit carbid to flow through the feed-opening and in the opposite direction to prevent carbid moving through said feed-opening, and a generating-chamber and liquid-holder below the carbid-holder.

18. In an acetylene-generator, the combination of a carbid-holder, a flexible diaphragm therein and formed with a feed-opening, means operated by changes in gas-pressure for moving a portion of the diaphragm in one direction to permit carbid to flow through the feed-opening and in the opposite direction to prevent carbid moving through said feed-opening and a generating-chamber and liquid-holder below the carbid-holder.

19. In an acetylene-generator, a diaphragm forming a support upon which the carbid is adapted to rest, and feed mechanism operated by changes in gas-pressure and connected to said diaphragm to bodily reciprocate a portion thereof, whereby the flow of carbid from the diaphragm to a discharge-passage is controlled.

20. In an acetylene-generator, a diaphragm forming a support upon which the carbid is adapted to rest, and provided with a permanently-open feed-passage therethrough, and feed mechanism operated by changes in gas-pressure and connected to said diaphragm to bodily reciprocate the portion thereof surrounding the feed-opening, whereby the flow of carbid through the feed-opening of said diaphragm is controlled.

21. In an acetylene-generator, a diaphragm formed with a feed-opening, and mechanism operated by changes in gas-pressure to bodily reciprocate that portion of the diaphragm surrounding the feed-opening whereby the feed of carbid through the feed-opening is controlled.

22. In an acetylene-generator, a diaphragm provided with a permanently-open feed-passage, a rigid part above said opening, and adapted to close the feed-opening when the diaphragm is raised, and a gas-controlled mechanism connected to the diaphragm and adapted to elevate that portion of it surrounding the feed-passage to the fixed part whereby the feed of carbid is controlled.

23. An acetylene-gas generator comprising, a carbid-holder, a water-holder below the carbid-holder, a flexible diaphragm between the two holders, a second flexible diaphragm adapted to be raised by gas-pressure, means acting on said diaphragm to press against gas-pressure, a feed-valve connected to said second diaphragm and to the diaphragm between the water-holder and carbid-holder and means whereby when said feed-valve is elevated the flow of carbid to the water-holder will be stopped.

24. An acetylene-gas generator comprising, a water-holder, a carbid-holder above the water-holder, a movable gas-confining wall, a flexible carbid-supporting diaphragm across the bottom of the carbid-holder, a tubular feed-valve connected to said diaphragm and extending therethrough, means connecting said feed-valve to the movable wall, means normally acting to depress the movable gas-wall and means for interrupting the flow of carbid through the tubular valve when said valve is raised.

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