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ACETYLENE GAS GENERATOR.

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Fig. 1.

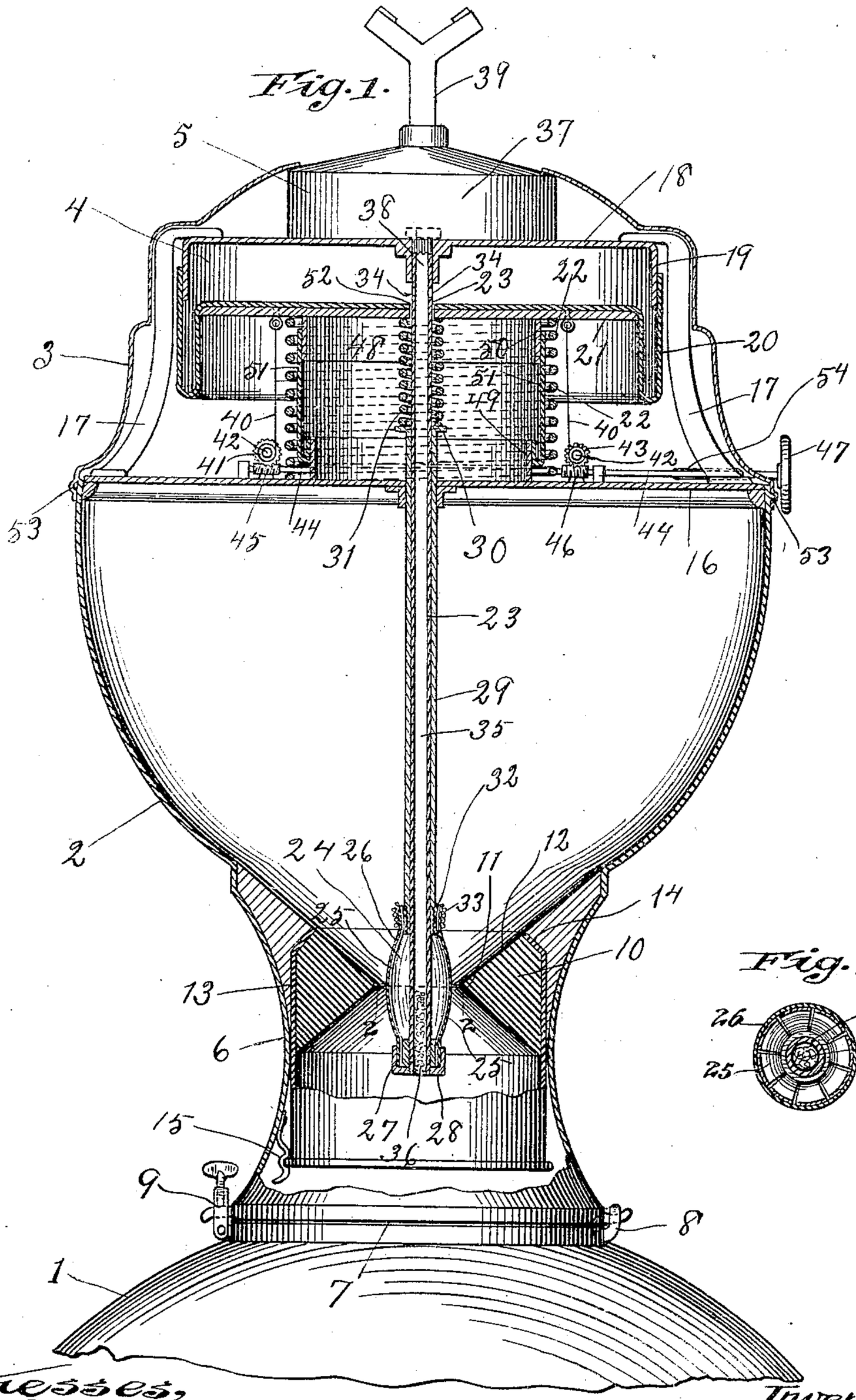

Fig. 2.

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ACETYLENE-GAS GENERATOR.

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To all whom it may concern:

Be it known that I, ALBERT H. GRAVES, a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Acetylene-Generators, of which the following is a description.

This invention relates to improvements in acetylene-generators, and refers more specifically to improvements in that type of generators in which one of the gas-producing agents is fed to the other automatically and under control of the pressure of the gas generated.

Among the salient objects of the invention are to provide an improved construction in which the pressure of the gas generated operates automatically to effect a dilation or expansion of the valve member which controls the conflux of the gas-producing elements; to provide a construction in which the movement of the valve relatively to the feed-opening is reduced to a minimum, (being practically confined to the dilation and contraction of the valve member,) thereby avoiding to a large degree the difficulty of maintaining rubbing-surfaces in operative condition; to provide a construction in which that portion of the valve member which seats against the coöperating portions of the port or feed-opening is simple, cheap, and readily renewable; to provide an improved construction and arrangement of the several parts of the generator contributing to ease and certainty of operation, durability, and convenience of manipulation; to provide a construction in which the operation of the valve member to close the feed-opening occurs promptly as soon as each fresh supply of gas is fairly inaugurated, while the parts movable with the expanding gas-chamber, which effects such operation of the valve, are free to move to accommodate the gas generated after the valve has actually closed; to provide a construction in which the valve member remains fully closed until each supply of gas has been substantially consumed thereby, in conjunction with the prompt closing of the valve after generation has commenced, insuring that the feed-port shall have closed during the maximum portion of the time practicable; to provide a construction in which the expanding or dilating valve member coöperates with a feed-port, the margin of which takes the form of a relatively sharp edge, so that the expansion or dilation of the valve operates to effectively cut off the flow of carbid, and the liability of the closure being held partly open by lumps of carbid or other obstructions is reduced to a minimum; to provide a construction in which access to the expansible gas-chamber and greater part of the operative mechanism may be had by simply removing a detachable cap or casing and without disturbing all the operative parts, and, in general, to provide a simple and improved construction of the character referred to.

To the above ends the 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 represents in axial sectional view so much of an ordinary portable generator-lamp as is necessary to an understanding of the invention, and Fig. 2 is a cross-sectional detail taken approximately through the center of the expansible valve member.

While I have herein shown the invention as embodied in a portable generator or lamp, yet it is to be understood that this is only one application of the invention, and it may readily be embodied in stationary generators, in vehicles, lamps, and otherwise. Within its broader aspect also the invention is not limited to a generator of that type wherein the carbid is fed to the water as in the particular embodiment of the invention illustrated.

Referring to the drawings, 1 designates as a whole a liquid-receptacle, (the upper part of the latter only being shown.)

2 designates a carbid receptacle or hopper, and 3 a removable casing or cap applied to the upper end of the carbid-receptacle and within which is housed an expansible gas-bag 4, a reducing-valve 5, and certain operative mechanism hereinafter described. The carbid-receptacle is mounted upon and united with the liquid-receptacle by means of a reduced or waist-like extension 6, shown in the present instance as formed integrally with the lower end of the carbid-receptacle and detachably united with the liquid-receptacle by means of a packed joint, (indicated at 7.) The upper and lower members of the generator are detachably united at the joint 7 by means of interlocking ears 8 and 9 of familiar construction. Within the reduced extension 6 is removably seated an annulus 10, preferably of rubber or other yieldable and non-impervious material, the cross-sectional form of which is such that the inner periphery forms a blunt edge, as indicated at 11, while

the upper side thereof, 12, is inclined downwardly in continuation of the downwardly-converging sides of the carbid-receptacle. As a convenient means of mounting and supporting said annulus the latter is arranged within a tubular casing 13, open at its lower end and slightly contracted at its upper end, as indicated at 14, to form a seat against which the annulus rests, the casing being conveniently held in position by means of a spring-snap 15.

16 designates the top wall of the carbid-receptacle, and upon the outside of this wall are mounted a plurality of lugs or standards 17, which serve to support the gas-bag 4, the upper side of the latter taking the form of a rigid cap-shaped member 18, with the downturned rim 19 of which is connected the flexible side 20 of said gas-bag. To the under side of the flexible part of the gas-bag is secured a disk or plate 21, which is acted upon by a coiled expansion-spring 22, interposed between said disk 21 and the top wall of the carbid-chamber and tending to normally collapse the gas-bag.

23 designates a rod or stem, made tubular in the present instance, rigidly connected at its upper end with the top wall 18 of the gas-bag and extending thence downwardly through the feed-opening, forming the outlet of the carbid-receptacle. Upon the lower end of the supporting-stem 23 is mounted an expansible valve member, (designated as a whole 24,) said valve member being in its contracted condition smaller in diameter than the feed-opening through the annulus 10, but adapted to be expanded or dilated, so as to occupy and close said opening. In the particular construction herein shown said expansible valve member consists of a plurality of longitudinally-extending spring-strips 25, disposed symmetrically around the access of the valve member, as best indicated in detail, Fig. 2, and covered by a rubber or other suitable elastic and impervious covering 26. The spring-strips are, as clearly shown in the drawings, each bowed outwardly between their ends and united at their lower ends to a suitable collar 27, threaded upon the lower end of the supporting-stem 23. The elastic covering 26 is secured at its lower end by a cap 28, likewise threaded upon the end of the supporting-stem and telescoping over the flexible covering and spring-strips.

In order to effect an expansion of the valve member, the upper end thereof is moved up and down relatively to the stem-supported lower end, thus expanding the bow-shaped springs and elastic covering outwardly and bringing the valve member into a more nearly spherical shape. To this end an actuating member 29 of tubular form is mounted to reciprocate upon the stem 23, the lower end of said actuating member being connected to the upper end of the expansible valve member and the upper end thereof extended up through the top wall 16 of the carbid-receptacle and terminating in an annular flange or seat 30, between which and the plate 21 of the gas-bag is interposed an expansion-spring 31. The upper end of the expansible valve member is conveniently connected with the actuating member 29 by means of a collar 32, which is secured upon the actuating member and to which in turn the springs and flexible covering are secured by means of a wrapping 33. The expansion-spring 31 is constructed to have a limited extent of expansion, being shown in the drawings as practically fully expanded, so that upon further collapsing of the gas-bag 4 all pressure upon the upper end of the expansible valve member would be relieved. It may be noted at this point, however, that the valve member is shown contracted and in feeding position, and inasmuch as the generation of the gas occurs very promptly the gas-bag will in use seldom, if ever, approach more nearly a fully-collapsed condition than that shown in the drawings.

In order to provide a passage for the gas from the liquid or generating chamber to the interior of the gas-bag, the supporting-stem 23 is conveniently of tubular form and is provided at a point within the gas-bag with one or more perforations 34. The lower end of the tubular passage 35 thus formed is loosely filled with filtering material, as indicated at 36, to prevent vapor or dust from passing upwardly into the gas-bag.

Upon the upper side of the plate 18 of the gas-bag is mounted a reducing-valve 37, which is in communication with the interior of the gas-bag through an extended end 38 of the supporting-stem 23, and with the upper side of the reducing-valve chamber is connected a burner-nozzle 39. In order to interrupt the operation of the generator at any time, it is only necessary to lock the movable side of the gas-bag in that position in which the valve member is held expanded. For the purpose of thus drawing down and securing the lower side of the gas-bag I have provided a pair of cables 40, connected with the gas-bag at opposite sides of the main expansion-spring 22 and leading thence downwardly and around winding-drums 41. These winding-drums are each mounted upon a shaft 42, journaled in suitable bearings and carrying a worm 43, which is in turn engaged by a worm-shaft 44, provided with a pair of reversely-threaded worms 45 and 46. It will be understood that the worm-shaft 44 is located at right angles to the winding-shafts 42 and to one side of the main expansion-spring 22, the remote side as viewed in the present drawings. The worm-shaft extends out through the side of the casing 3 and is provided with a thumb-nut, as indicated at 47. The gas-bag is provided upon its under movable side with an extension, designated as a whole 48 and arranged within the

main expansion-spring 22. This extension comprises an upstanding annular flange or rim 49, secured to the upper side of the wall 16, a similar rim or flange 50 upon the under side of the plate 21, and a flexible connecting fabric 51. The extension 48 is in communication with the main gas-bag through an annular opening 52, surrounding the stem 23.

The top casing 3 is conveniently made detachable in order that it may be readily removed to expose the principal working mechanism of the generator for inspection or adjustment. To this end the lower edge of the casing 3 is arranged to telescope upon the upper end of the carbid-chamber and is united therewith by a bayonet-joint, as indicated at 53. In order to provide for the slight rotary movement necessary to effect the bayonet-joint and connection, the casing is slotted horizontally, as indicated at 54, where the worm-shaft 44 extends therethrough.

The operation of the generator is probably entirely obvious from the foregoing description, but may be briefly explained. In order to charge the generator, the parts are separated at the joint 7, water placed in the liquid-receptacle 1, and the carbid-receptacle inverted and charged with carbid through the feed-opening, or, if preferred, the casing 13 may be slipped out and the carbid more readily filled in. The carbid and liquid having been charged into the respective parts of the generator, the latter are connected, care being taken that the feed-valve is closed before the carbid-receptacle is returned to upright position. The generator is brought into action by simply rotating the worm-shaft to release the gas-bag and allow the latter to collapse, whereupon the pressure upon the spring 31 is relieved and the expansible valve collapses or contracts and the carbid begins to feed through the feed-opening. This generates gas, which, filling the interior of the generator, passes up through the passage 35 of the supporting-stem and into the gas-bag, expanding the latter, and thus expanding the valve member and shutting off the feed. The gas will continue to generate for some moments after the feed is interrupted, and this additional gas will be accommodated by the further expansion of the gas-bag, such expansion being permitted by the compression of the spring 31 without further expanding the valve. In this connection it will be noted that as soon as the bow-shaped springs of the valve member impinge against the edges of the annular valve-seat the further expansion of the valve member will be substantially prevented, although owing to the fact that the annulus 10 is of soft rubber and the expansible valve member likewise covered with soft rubber a practically hermetical closure of the valve will be effected when the latter is closed.

While I have herein shown what I deem to be the preferred embodiment of my invention as applied to portable lamps for domestic and analogous purposes, I do not limit myself to this particular application or to the details of construction shown and described herein.

I claim as my invention—

1. In an acetylene-generator, a liquid-receptacle and a carbid-receptacle in communication with each other through a feed-passage, and means for controlling the conflux of gas-producing materials comprising an expansible valve member, a gas-confining wall movable under the pressure of gas, a movable member for effecting the expansion of the valve member and connection between said movable wall and movable member.

2. In an acetylene-generator, a liquid-receptacle and a carbid-receptacle in communication with each other through a feed-passage, an annular valve member surrounding the feed-passage, a second valve member within the feed-passage, an expansible gas-chamber, a movable member for effecting the expansion of one of the valve members, and means operatively connecting said expansible gas-chamber with said part which effects the expansion of the valve member.

3. In an acetylene-generator, a liquid-receptacle and a carbid-receptacle in communication with each other through a feed-passage, an expansible valve member controlling said feed-passage, a movable gas-confining wall subject to the pressure of gas generated, a support holding one part of said expansible valve member and operative connections between another part of said valve member and said movable gas-confining wall, whereby the movement of the latter effects an expansion and contraction of the valve member during its movements.

4. In an acetylene-generator, a liquid-receptacle and a carbid-receptacle above the liquid-receptacle and in communication with the latter through a feed-passage, an expansible valve member fixed within said feed-passage, an expansible gas-chamber communicating with the generating-space of the liquid-receptacle and a movable connecting member operatively engaging one side of said valve member and connected with a movable part of said expansible gas-chamber whereby the expansion of the gas-chamber operates to effect an expansion of the valve member.

5. In an acetylene-generator, the combination of a liquid-receptacle and an elevated carbid-receptacle in communication with the liquid-receptacle through a feed-passage, an annulus arranged within said feed-passage, the inner periphery of which constitutes a blunt edge, an expansible valve member fixed within said annulus, a part subject to, and movable under pressure of the gas generated, a valve-actuating member operatively engaging said expansible valve member and connected to

move with the gas-actuating movable part, and a spring acting upon said valve-actuating member in opposition to the gas-pressure.

6. In an acetylene-generator, the combination of a liquid-receptacle, a superposed carbid-receptacle communicating with the liquid-receptacle through a restricted feed-opening, an expansible valve member supported against bodily movement within said feed-opening, an expansible gas-bag in communication with the generating-space of the generator, a spring tending to normally collapse said gas-bag, and an actuating-rod operatively engaging one side of said expansible valve member and at its other end operatively connected with a movable part of the gas-bag.

7. In an acetylene-generator, the combination of a liquid-receptacle and a carbid-receptacle in communication therewith through a feed-passage, an expansible valve member supported against substantial bodily movement in said feed-passage, a part subject to, and movable under the pressure of gas generated, a movable part engaging the expansible valve member to effect an expansion of the latter and operatively connected with said gas-actuating part, said connection between the gas-actuated part and valve member being yieldable, whereby the movement of the gas-actuated part may continue after the valve member has been expanded.

8. In an acetylene-generator, the combination of a liquid-receptacle, a superposed carbid-receptacle communicating with the liquid-receptacle through a feed-passage, an annular valve member in the feed-passage forming a valve-seat and an expansible valve member arranged within said annular member, an expansible gas-bag supported above and outside of the carbid-receptacle, a tubular support connected with the upper wall of the carbid-receptacle extending downwardly therefrom and supporting the upper end of said expansible valve member, an actuating-rod connected with a movable part of said gas-bag, extending therefrom through said tubular support, through the expansible valve member and engaging the remote side of the latter, a spring tending to normally collapse said gas-bag, and means tending to normally collapse said expansible valve member, said expansible gas-bag being in communication with the generating-space of the generator.

9. In an acetylene-generator, the combination with a receptacle provided with a feed-opening, of an expansible valve member controlling said feed-opening and comprising a relatively-fixed support, a series of axially-extending and circumferentially-disposed bowed spring-strips secured at one end to said support and at their other ends connected with a common movable member, an impervious covering upon the skeleton frame formed by said spring-strips, and an actuating member operatively connected with the movable member of the skeleton frame remote from said fixed support.

10. In an acetylene-generator, the combination of a liquid-receptacle and a carbid-receptacle in communication with each other through a feed-passage, and means for controlling the conflux of gas-producing materials comprising an expansible valve member, a member movable under the pressure of gas generated, and operative connections between said movable member and the expansion valve member for effecting the expansion of the valve member under a change of gas-pressure upon said movable member.

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