No. 627,796. Patented June 27, 1899.

C. W. BECK.

ACETYLENE GAS GENERATOR.

(Application filed Oct. 18, 1897.)

(No Model.)

FIG. 1

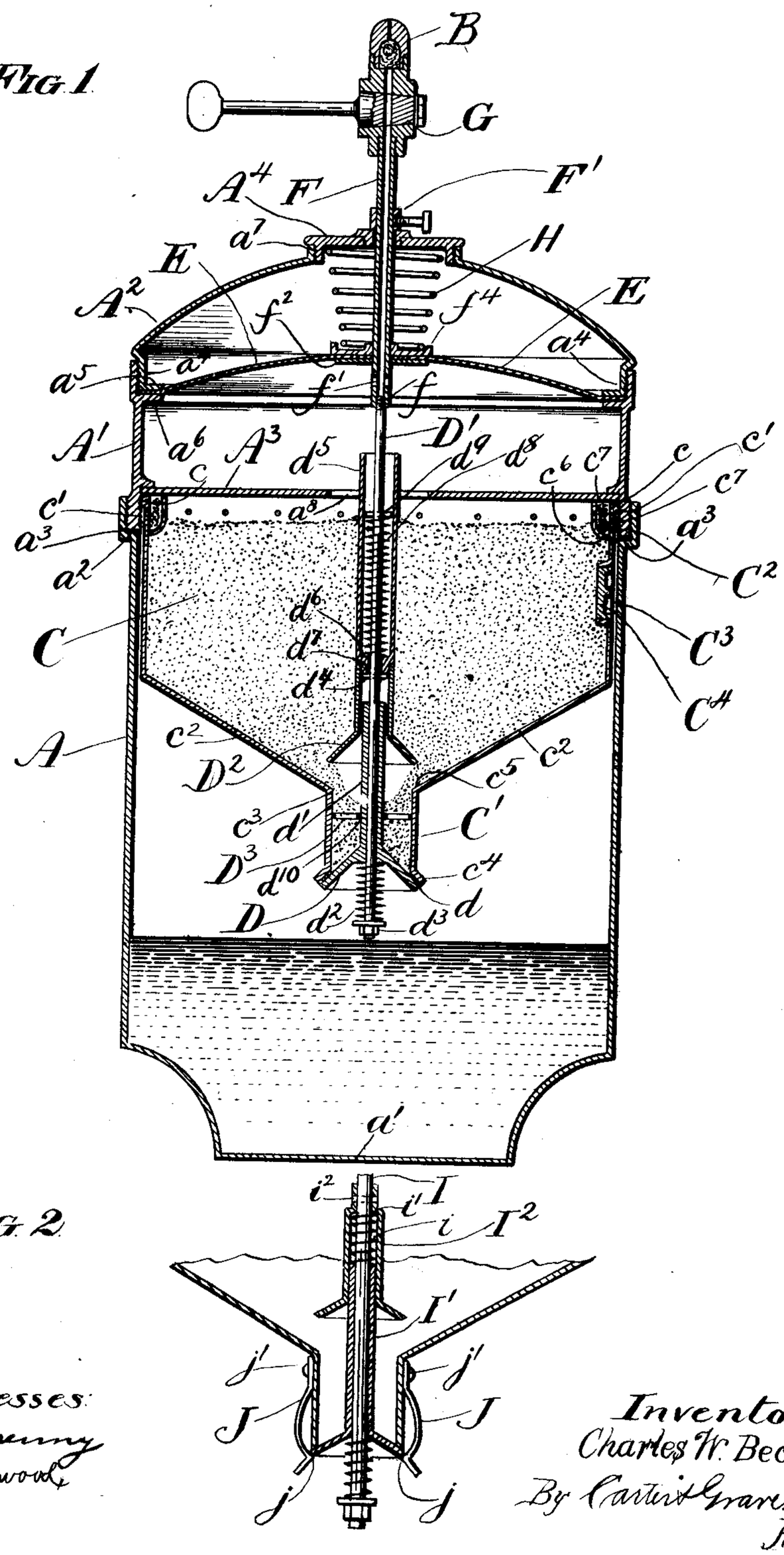

FIG. 2

Witnesses:
J. Halpenny
E. C. Westwood

Inventor:
Charles W. Beck,
By Cartwright Graves
Atty's.

UNITED STATES PATENT OFFICE.

CHARLES W. BECK, OF CHICAGO, ILLINOIS.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 627,796, dated June 27, 1899.

Application filed October 18, 1897. Serial No. 655,532. (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 Generators, of which the following is a specification.

This invention relates to improvements in acetylene-gas generators, and refers more specifically to an improved generator wherein the carbid is fed into a saturating-chamber in graduated quantities and in such manner that the generation of gas is practically continuous.

Among the objects of the invention are to provide improved means for controlling the conflux of gas-generating elements, whereby the rate of generation is kept substantially equal to the rate of consumption and whereby the generation may be arrested almost instantly, thus avoiding waste and at the same time permitting the generator to be made very compact, to render such control or regulation automatic and dependent upon the consumption of the gas, and to provide an apparatus of generally simplified, improved, and more effective construction and one which requires no special skill in order to render its use safe and satisfactory.

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

Figure 1 illustrates a preferred embodiment of my invention, the view being taken in axial section; and Fig. 2 is a fragmentary detail view in axial section, showing a modified form of the feed mechanism.

Referring to the drawings, the generator is therein shown as desirably made of generally cylindric form and as consisting of three principal outer parts, a main body or fount A, forming the lower part of the generator and the lower portion of which constitutes a saturating-chamber *a*, an upper part or section A′, suitably united with the upper end of the fount, and a removable upper end cap A^2, closing the upper end of the generator and through the central part of which projects a burner-nozzle B.

The fount is shown as provided with an integral and ornamental-shaped lower end wall *a′*, the central portion of which is preferably made flat to form a base upon which the generator may stand. At its juncture with the part A′ the upper end of the fount is slightly enlarged annularly, so as to form an internal ledge or shoulder a^2, and the said enlarged part is internally screw-threaded to receive the correspondingly-threaded lower end of the upper section. A packing a^3 is interposed between the lower end margin of the upper part and the shoulder a^2, so as to insure a gas-tight joint.

C designates a hopper-shaped carbid-receptacle arranged to occupy the upper part of the fount, said hopper having cylindric sides and being made of slightly-less external diameter than the internal diameter of the fount, so as to fit easily within the latter, and having at its upper end an externally-threaded rim portion *c*, which engages with a suitable screw-thread *c′*, formed in the interior of the lower end of the upper section, so that when the latter is removed from the fount the hopper will also be removed therewith.

To now describe the automatically-controlled feed mechanism, the hopper C is provided with a funnel-shaped bottom c^2, having a central outlet c^3, with which is connected a short vertically-arranged cylindric chute C′. At its lower end the chute is provided with an outturned rim or made slightly bell-mouthed, as indicated at c^4, this portion forming a valve-seat, with which is adapted to cooperate a conical valve plate or plug D. In order to afford a close fit between the valve-plate and its seat, the latter is preferably and as herein shown provided with a surfacing of soft rubber or the like *d*. The valve D is mounted to reciprocate vertically upon and with a valve-stem D′, being to this end provided at its center with a sleeve *d′*, which fits upon the stem and is of sufficient length to rise some distance above the upper end of the chute, as indicated clearly in the drawings. In order to hold the valve normally uplifted in contact with its seat, a coiled spring d^2 is interposed between its lower side and a nut d^3, threaded upon the lower end of the valve-stem, and in order to force the valve open positively when the valve-stem has been moved downwardly a certain distance, in a manner hereinafter explained, a stud or tap-

pet d^4 is inserted through said valve-stem at a point a short distance above the upper end of the sleeve d' in position to engage the latter. In order that the amount of carbid permitted to escape to the saturating-chamber at any one time may be definitely limited, a cut-off valve D^2 is so mounted upon the valve-stem as to control the inlet to said chute, said cut-off valve being shown as also made conical and arranged with its larger end downward and as being of slightly-larger diameter than the diameter of the chute, so that when lowered by the downward movement of the valve-stem it will completely close the upper end of the chute and rest upon the angle c^3 formed at the juncture of the chute with the bottom of the hopper. This latter valve is also provided with a sleeve d^5, which is of sufficient internal diameter to telescope over the upper end of the sleeve d' and is of such length as to extend slightly above the level of the top of the hopper when the valve is in its lowermost position, the purpose of both of said sleeves being to prevent the access of pulverulent carbid to the working joints between the valves and valve-stem, as well as to guide and center the valves accurately upon the stem. The sleeve d^5 is made in two sections, united by a screw-threaded union, in order to facilitate the assembly of the parts, the upper section being reduced at its lower end and threaded into the lower one. In order to impart such movement to the cut-off valve in the reciprocatory movement of the valve-stem that the inlet of the chute will always be closed before the outlet is opened and will remain thus closed until after the outlet has been closed by the return of the lower valve to its seat, lost motion is provided between the valve-stem and cut-off valve as follows: The reduced portion of the upper section of the sleeve d^5 is so shaped as to form internal annular upper and lower shoulders d^6 d^7, respectively. The stud d^4 upon the valve-stem by engagement with the lower shoulder serves to lift the cut-off valve positively in the upward movement of the valve-stem beyond a certain point, and the downward movement of the said valve, with the valve-stem, until the valve rests upon and closes the upper end of the chute is insured by the action of a coiled spring d^8, interposed between the shoulder d^6 and a second stud d^9, inserted through the valve-stem a short distance below the upper end of the sleeve d^5. It will be obvious that this construction permits the valve-stem to continue its downward movement after the cut-off valve reaches its seat sufficiently to open the lower valve, as hereinbefore explained, the spring d^8 being meantime compressed. In order to guide the valve-stem and valve mounted thereon into accurate engagement with their seats, a spider or guide D^3 is arranged to extend across the chute and is provided at its center with a guide-aperture d^{10}, through which the valve-stem reciprocates.

A^3 designates a rigid horizontal partition, secured in the upper section A' immediately above the hopper, so as to form a cover for the latter, which prevents the carbid from escaping from the hopper in case the generator should be overturned or shaken violently. The space immediately above the partition constitutes the gas-chamber of the generator, and in order that the pressure of gas generated may be utilized to operate the valves through the valve-stem means are provided, constructed and arranged as follows: The upper end cap A^2 is provided at its periphery with a depending cylindric flange a^4 of considerable depth, which is externally threaded and arranged to fit within the corresponding upper end of the generator. At its lower edge said flange is provided with an inturned portion a^5, which is adapted to coöperate with an internal annular ledge or shoulder a^6, formed upon the interior of the generator to clamp and hold the periphery of a flexible and preferably elastic diaphragm E, which divides the upper part of the generator into two compartments, the space below the diaphragm being subject to the internal gas-pressure, while the space above the diaphragm is open to atmospheric pressure. At a point below the diaphragm the valve-stem is connected, conveniently by means of a screw-threaded union f, with a tube F, which forms, in effect, an extension of said valve-stem and extends upwardly through the diaphragm and out through a suitable aperture in the upper end cap of the generator, the size of said aperture being such as to permit the tube to reciprocate freely therethrough. Said aperture also serves to place the space above the diaphragm in communication with the atmosphere. The tube is provided at its lower end, below the diaphragm, with one or more gas-inlets f' and carries at its upper end the burner-nozzle B, hereinbefore referred to, which latter may be of any suitable or preferred construction and which is herein shown as provided with a cock G, whereby the gas-duct may be closed or restricted. At a point immediately below where the tube passes through the diaphragm it is provided with an integral radial flange f^2 and immediately above this flange with a clamping-disk f^1. The diaphragm is clamped between said flange and disk and is thus united to the valve-stem, so that the latter is made to move with the diaphragm.

H designates a coiled spring interposed between the clamping-disk upon the upper side of the diaphragm and the upper end cap, so as to tend to force the diaphragm downwardly in position to open the lower valve and to permit the carbid to discharge into the saturating-chamber. In order that the tension of said spring may be adjusted and to afford easy access to the spring and to facilitate the assem-

bling of parts of the generator, the central part of the upper end cap A^2 is made in the form of a secondary screw-threaded cap or closure A^4, which may be adjusted up or down in its seat a^7, and in order that the valve-stem may be drawn up and held positively in position to hold the lower valve closed against the seat a collar is mounted loosely upon the tube F, immediately above its part which extends through the closure A^4, which collar is provided with a thumb-screw F', which impinges against the stem and whereby the latter may be secured in its lifted position.

In order to provide passage for the gas from the saturating-chamber wherein it is generated to the gas-chamber beneath the diaphragm and at the same time to prevent the liquid from readily passing into the hopper in case the generator is shaken or overturned, the upper end of the hopper is provided upon its interior with an interlining-ring C^2, having an outturned lower edge c^6, which is secured to the inner wall of the hopper in such manner as to form an open-topped annular chamber c^7, which is filled with absorbent filling material, such as felt or the like. The upper edge of the ring C^2 is made flush with the upper edge of the hopper, so that when the latter is in position the cover-plate A^3 closes the annular filtering-chamber. The wall of the hopper opposite said chamber and the inner ring forming the inner wall of said chamber are each provided with a plurality of apertures through which the gas finds its way into the upper part of the hopper and thence to the gas-chamber through an opening a^8 in the cover-plate surrounding the valve-sleeve.

In order that the hopper may be replenished when the fount is removed without removing it from the upper section, it is provided with a filling aperture C^3, conveniently located in its side and closed by a screw-cap C^4.

The operation of the device thus constructed is obvious, but may be briefly described as follows: The collar having been adjusted so as to hold the lower valve closed, the fount is unscrewed from the upper part of the generator, the hopper charged with pulverized carbid, and a suitable charge of liquid placed in the fount and the latter returned to place. The generator is now in readiness for operation and may be started by unscrewing the thumb-nut, whereupon the coiled expansion-spring acting upon the diaphragm will force the latter and the connected valve-stem downwardly, opening the lower valve and permitting carbid to discharge into the liquid. As the valve-stem moves downwardly to open the lower valve the cut-off valve will be carried to its seat, so as to prevent the escape of more carbid into the chute until the cut-off valve has been again lifted. The pulverized carbid falling into the saturating-chamber will rapidly generate gas, which passing into the gas-chamber below the diaphragm will force upwardly the latter, thereby closing the lower valve against its seat and shutting off the flow of carbid. A further upward movement of the diaphragm will raise the cut-off valve, so as to allow more carbid from the hopper to take the place of that discharged by the previous opening of the lower valve. As soon as the gas begins to generate the cock will be opened and the gas ignited, it being understood that the rate of generation will be greater than the rate of escape through the burner, so that the diaphragm will be effectively operated without interfering with the operation of the burner. It will be further understood that inasmuch as the pulverized carbid generates gas very rapidly when saturated it is not likely that the entire quantity contained in the chute in any one charge will be discharged at one time, but that the lower valve will open but slightly and admit but a small quantity of carbid at any one time before the pressure rises sufficiently to again close the valve, so that the generation of gas will be practically continuous. The cut-off valve being thus caused to vibrate up and down in the body of pulverized carbid will act as an agitator to prevent the carbid from packing and to insure its proper flow into the chute. It will be further obvious that as soon as the cock is turned so as to shut off the escape of gas the pressure will immediately rise sufficiently to hold the valve closed, and that the additional small quantity of gas which may be generated after the supply of carbid has been thus cut off will be amply accommodated in the expansive gas-chamber formed in part by the flexible and elastic diaphragm.

In Fig. 2 I have shown a modified form of the feed mechanism, which may be preferred in some instances, the purpose of this modified form being to insure that a charge of carbid of considerable quantity shall be discharged together, so that the action of the diaphragm shall be more pronounced and certain. Referring to the figure, I designates the valve-stem, upon which is mounted a lower valve I', constructed and operated substantially like that hereinbefore described, with the exception that instead of being forced downwardly by a stud or shoulder upon the valve-stem in the downward movement of the latter it is acted upon by an expansion-spring i, surrounding the valve-stem and interposed between the upper end of the valve-sleeve and an annular shoulder i', formed upon the interior of the upper or cut-off member I^2. This latter member is in the present instance fixed rigidly upon the valve-stem by means of a pin i^2, which is inserted through the contracted upper end of the sleeve thereof and through the valve-stem. J J designate a pair of plate-springs secured upon the exterior of the chute near the upper end thereof, as indicated at j', arranged to extend vertically downward and provided near their lower ends with inwardly-projecting angles j, which are adapted to hook beneath and engage the lower valve, so as to tend to hold the latter from opening, the portions of the springs be-

low the angles being arranged to diverge, so as to form guides which will direct the springs into proper engagement with the edge of the valve as the latter is carried to its seat. The operation of the construction thus described is the same as that of the previously-described device, except that in this instance the lower valve will not open until the pressure of the spring acting upon the diaphragm and transmitted to the sleeve of the lower valve through the expansion-spring *i* is sufficient to overcome the frictional engagement of the hook-shaped springs J; but upon the release of these springs the tension of the spring *i* will force the valve down suddenly, so as to open it a considerable distance, and thus discharge a quantity of carbid at once. This carbid thus thrown down will immediately generate a considerable volume of gas, which will promptly force upwardly the diaphragm and again close the valve. It is further to be noted that the valve-stem will be positively limited in its downward movement as soon as the cut-off member contacts with the upper end of the chute.

While I have herein shown and described what I deem to be preferred constructions, yet I do not wish to be understood as limiting myself to the precise details illustrated except as specifically claimed.

I claim as my invention—

1. A feed mechanism for feeding pulverulent carbid and the like comprising a chute, a valve arranged to control the outlet of the chute, a cut-off arranged to control the inlet to the chute, and interconnected means operated by the pressure of gas generated from the carbid discharged for automatically moving said controlling members independently of each other whereby the inlet to the chute will be maintained closed at all times while its outlet is open and will be opened to admit carbid while the outlet is closed.

2. In a gas-generator, means for feeding pulverulent carbid comprising a carbid-receptacle, a chute or charge chamber communicating with said carbid-receptacle, a valve-stem arranged to extend longitudinally within said chute, a pair of valves movably mounted upon said stem and arranged to control the inlet and outlet ends of the chute, and means for moving said valves independently of each other whereby the inlet to the chute will be maintained closed at all times while its outlet is open but will be open to admit carbid to the chute when the outlet is closed.

3. In a gas-generator, means for feeding pulverulent carbid comprising a carbid-receptacle, a chute or charge chamber communicating with said carbid-receptacle, a valve-stem arranged to reciprocate longitudinally within said chute, a pair of valves movably mounted upon said stem and arranged to control the inlet and outlet ends of the chute, spring connections between each of said valves and the valve-stem whereby the latter is permitted to move in either direction beyond the position in which the valves engage their respective seats, and means for operating said valve-stem comprising a movable member subject to the pressure of gas generated from the carbid discharged.

4. In a gas-generator, means for feeding pulverulent carbid comprising a carbid-receptacle, a chute or charge chamber communicating with said receptacle, a valve-stem arranged to reciprocate longitudinally within said chute, a pair of oppositely-seating valves movably mounted upon said stem and arranged to control the inlet and outlet ends of the chute, spring connections between each of said valves and the valve-stem whereby the latter is permitted to move in either direction beyond the position in which the valves engage their respective seats, and a stop upon the valve-stem adapted to engage the valves and move them positively away from their respective seats.

5. In a gas-generator, means for feeding pulverulent carbid, comprising a carbid-receptacle, a chute or charge chamber communicating with said receptacle, a valve-stem arranged to reciprocate longitudinally within said chute, a pair of conical oppositely-seating valve-plates movably mounted upon said stem and arranged to control the inlet and outlet ends of the chute, each of said valves being provided with a sleeve inclosing the valve-stem and the end of the sleeve of one valve being arranged to telescope within the sleeve of the other valve, spring connections between each of said valves and the valve-stem whereby the latter is permitted to move in either direction beyond the position in which the valves engage their respective seats, and a stop upon the valve-stem adapted to engage the valves and move them positively away from their respective seats.

6. In an acetylene-gas generator, the combination with a fount the lower portion of which forms a saturating-chamber and the upper portion of which is occupied by a carbid-receptacle having a valve-controlled, liquid-tight outlet leading from the carbid-receptacle to the saturating-chamber, of means for permitting the passage of gas from the saturating-chamber to the carbid-receptacle while the carbid-outlet is closed comprising a filtering-chamber arranged in the wall of said carbid-receptacle and filled with absorbent material and a plurality of minute apertures in the opposite walls of said filtering-chamber permitting the gas to pass from the saturating-chamber through the filtering-chamber and into the carbid-receptacle.

7. A feed mechanism for feeding pulverulent carbid and the like, comprising a feed duct or chute, a closure arranged to control the outlet of said duct, a gas-chamber, a movable member operable by pressure of gas generated, means whereby the movement of said movable member operates the closure, and a detent arranged to retard the opening of the closure.

8. A feed mechanism for feeding pulverulent carbid and the like, comprising a feed duct or chute, a closure arranged to control the outlet of said duct, a gas-chamber, a movable member operable by pressure of gas generated, a spring arranged to act in opposition to the movement of the movable member under gas-pressure, means whereby the movement of said movable member operates the closure, and a detent arranged to retard the opening of the closure.

9. In an acetylene-generator, the combination of a saturating-chamber, a carbid-receptacle provided with an outlet leading to the saturating-chamber, a valve controlling said outlet, a movable member subject to, and adapted to be actuated by, pressure of the gas generated, operative connections between the valve and movable member whereby the valve is operated by the movable member, and a yieldable detent arranged to engage the valve when in closed position to hold the latter closed until the opening force has increased sufficiently to overcome the detent and cause the valve to open suddenly.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two subscribing witnesses, this 16th day of October, A. D. 1897.

CHARLES W. BECK.

Witnesses:
ALBERT H. GRAVES,
J. B. HALPENNY.