No. 868,988. PATENTED OCT. 22, 1907.

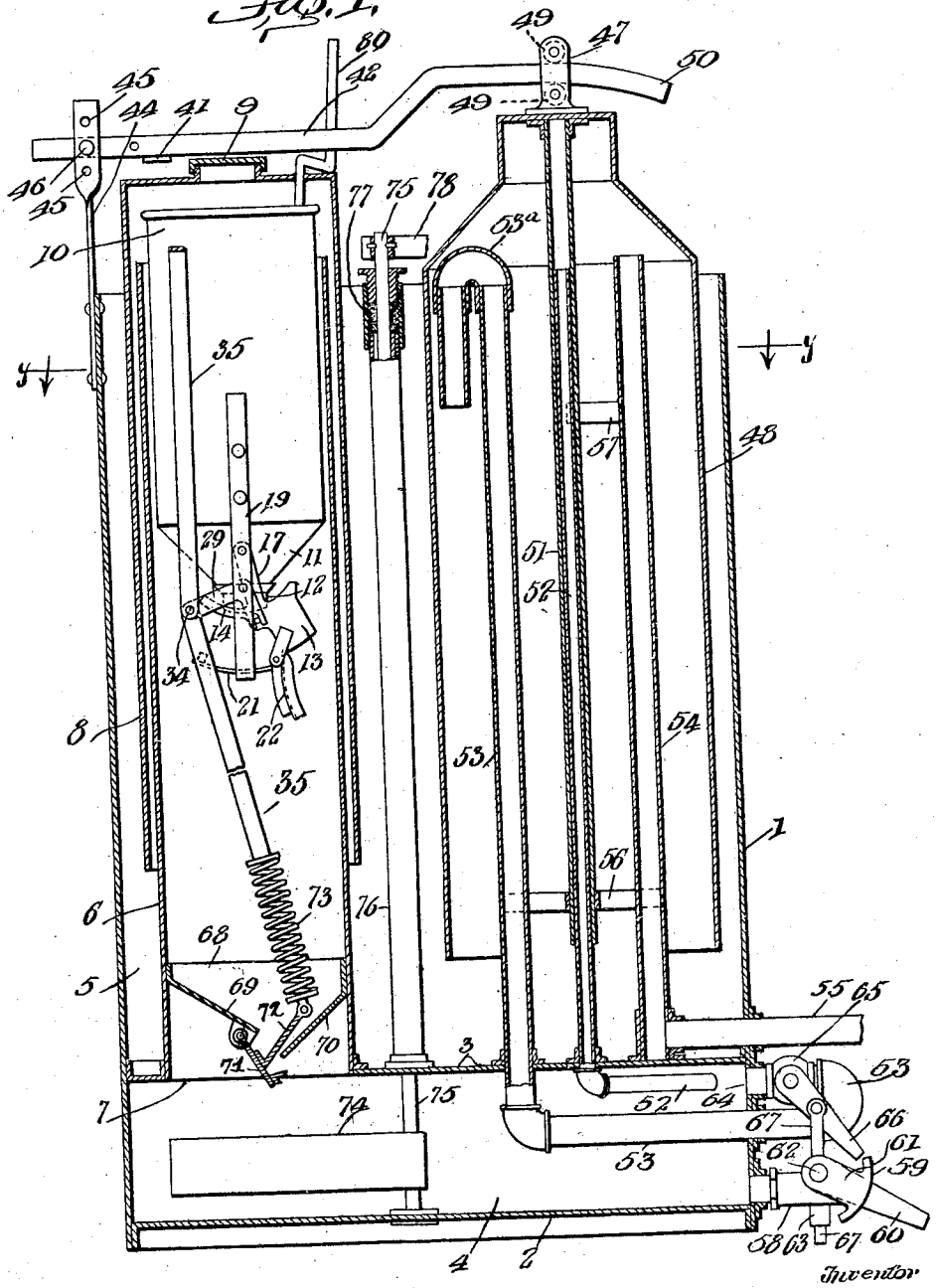
C. W. HOLM.

ACETYLENE GAS GENERATOR.

APPLICATION FILED APR. 2, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 7.

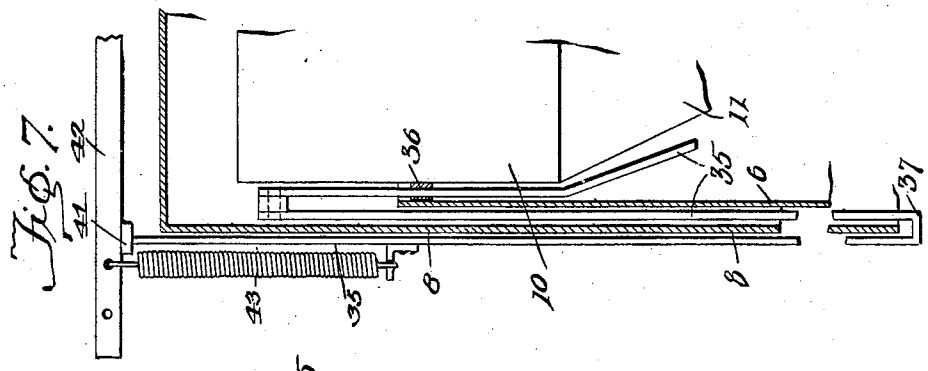


Fig. 8.

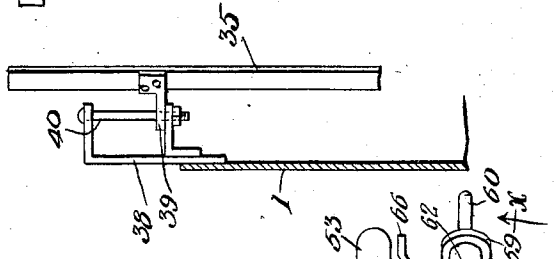
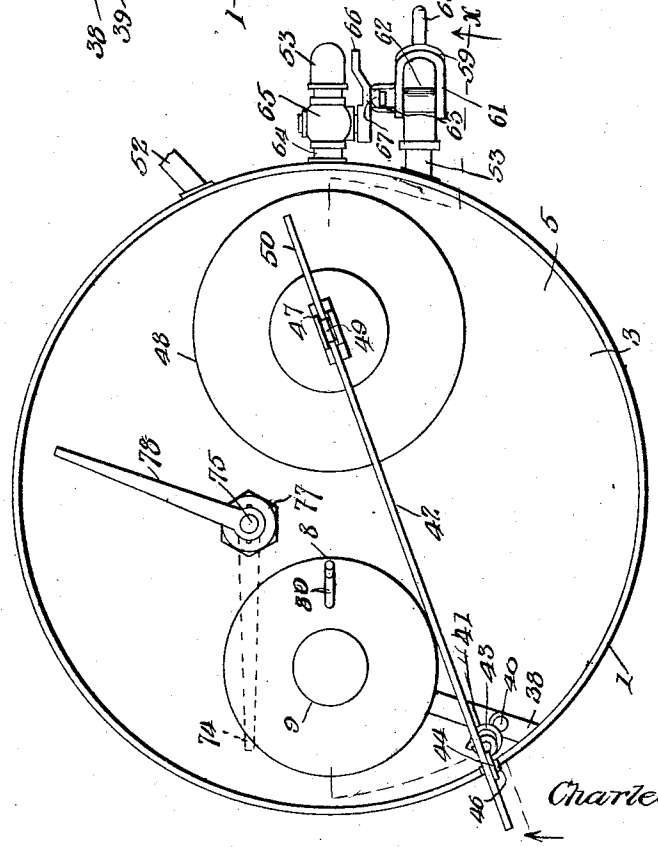


Fig. 2.



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4 SHEETS—SHEET 3.

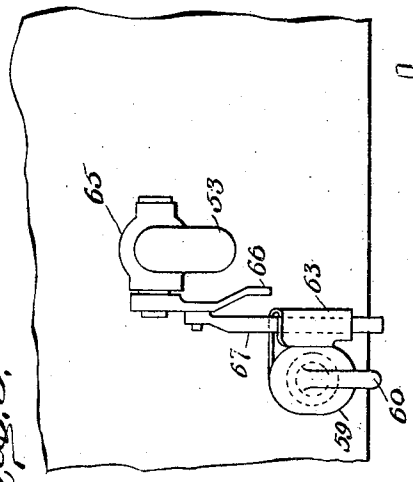

Fig. 9.

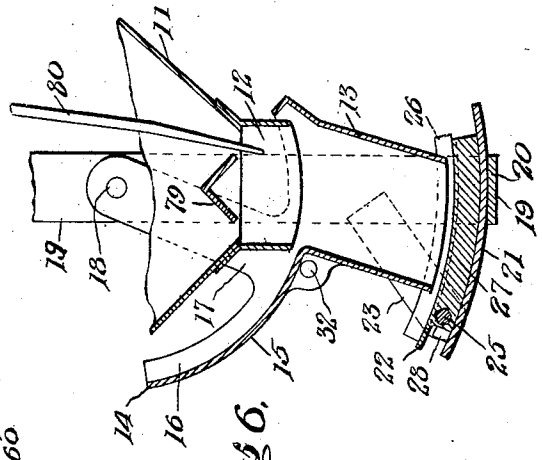

Fig. 6.

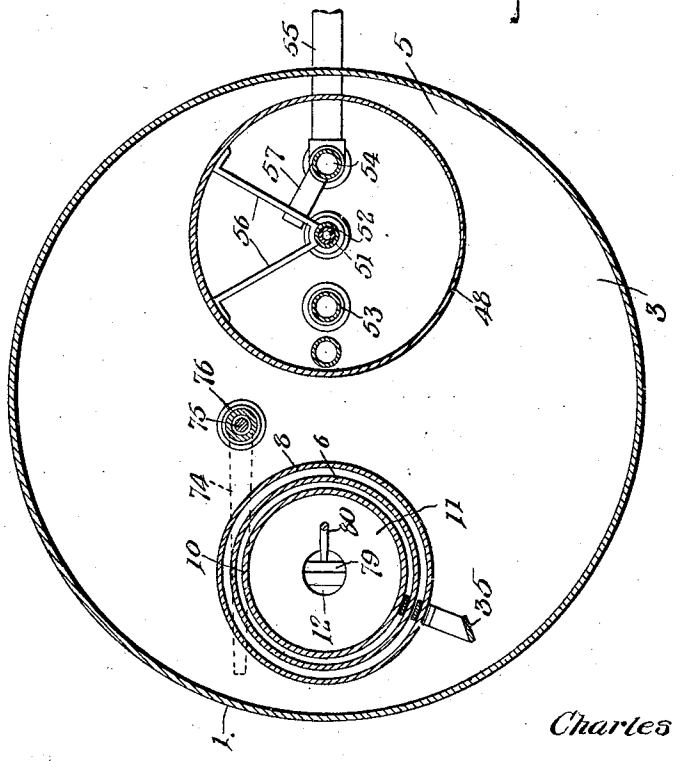

Fig. 5.

Witnesses

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4 SHEETS—SHEET 4.

Fig. 5.

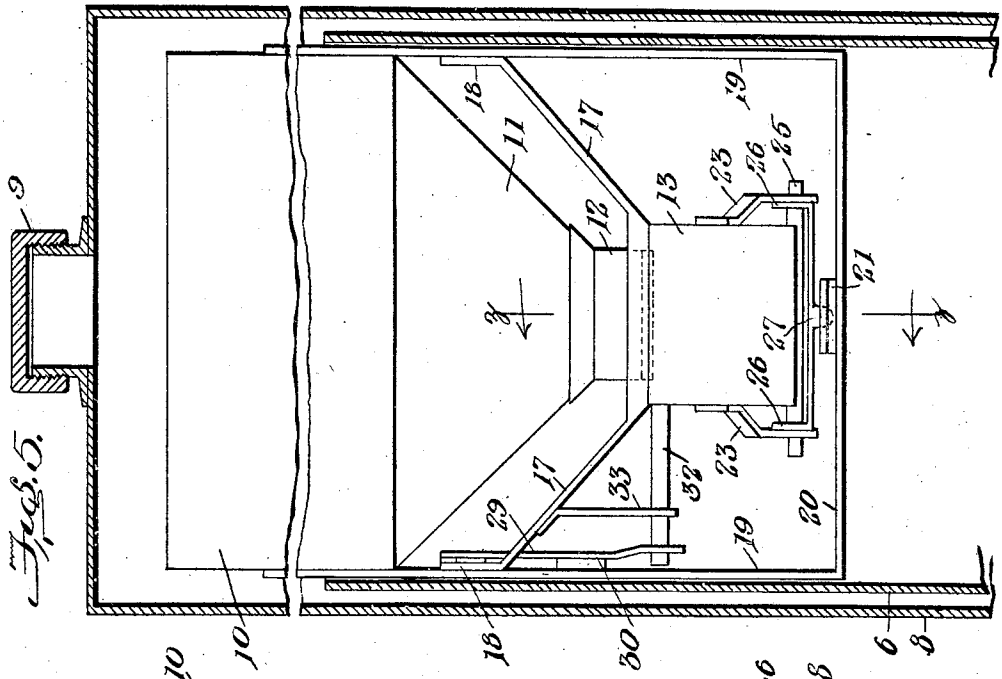
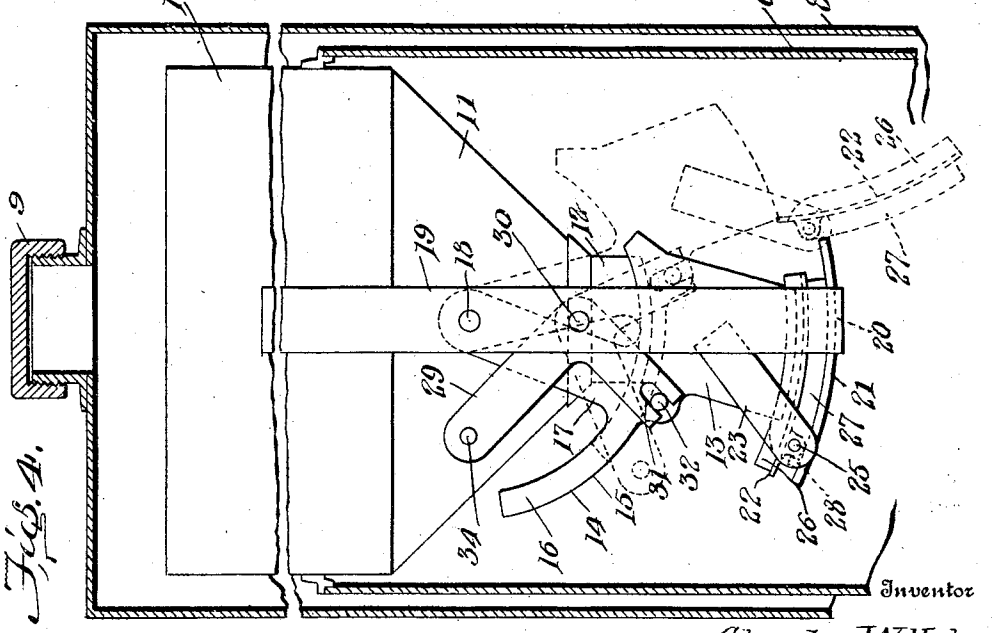


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES W. HOLM, OF TROY, OHIO.

ACETYLENE-GAS GENERATOR.

No. 868,988. Specification of Letters Patent. Patented Oct. 22, 1907.

Application filed April 2, 1906. Serial No. 309,298.

To all whom it may concern:

Be it known that I, CHARLES W. HOLM, a citizen of the United States, residing at Troy, in the county of Miami and State of Ohio, have invented certain new and useful Improvements in Acetylene-Gas Generators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to acetylene gas generators, and more particularly to that class in which the carbid of calcium is automatically dropped into water as required to renew the supply of gas.

The object of my invention is to provide a simple, compact and inexpensive generator, which shall be safe and economical in operation, and requiring a minimum of attention, so as to be particularly adapted for use in small isolated lighting plants, such as are used for domestic or factory lighting.

To this end my invention consists in certain novel features which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional view of an apparatus embodying my invention in one form, the same being taken on the line $x\ x$ of Fig. 2 and looking in the direction of the arrows; Fig. 2 is a plan view of the same; Fig. 3 is a plan section, taken on the line $y\ y$ of Fig. 1 and looking in the direction of the arrows; Fig. 4 is a side elevation, partly broken away, of the hopper and feed mechanism, the surrounding parts being shown in section; Fig. 5 is a similar view, showing a front elevation of the hopper and feed mechanism; Fig. 6 is a detail vertical sectional view, taken on the line $z\ z$ of Fig. 5 and looking in the direction of the arrows; Fig. 7 is a detail vertical sectional view, showing the feed-bar and its relations to the surrounding parts; Fig. 8 is a detail vertical sectional view, illustrating the means for limiting the vertical movement of the feedjbar; and Fig. 9 is a detail front elevation, showing the valves which control the generating chamber outlet and gas bell inlet pipes.

In the said drawings, the structure as a whole is shown as mounted in an open topped receptacle or tank, comprising a cylindric wall or body 1, having a bottom 2, above which is located a diaphragm or partition 3, forming below the same a generating chamber 4, in which a suitable supply of water is maintained, and above the same a sealing chamber 5, in which a supply of water independent of and cut off from that of the generating chamber is maintained. In this sealing chamber are located the carbid hopper and its inclosing tank, and also the gas receiving and storing bell, which, by its rise and fall as the gas is generated and consumed, operates the carbid feed in the manner hereinafter set forth.

Referring first to the carbid feeding mechanism, the inclosing tank therefor comprises a fixed cylindric wall 6, the lower end of which fits around an aperture 7 in the diaphragm 3, through which it communicates with the generating chamber 4. Over this cylinder fits loosely an outer cylinder 8, detachably secured to the main wall 1 of the tank, said outer cylinder terminating above the diaphragm 3, so as to permit the sealing liquid to rise between the cylinders 6 and 8 and prevent the escape of gas between them. The cylinder 8 is closed at its top against the escape of gas, being there provided with a closure 9, through which the carbid receptacle 10 may be inspected and refilled. This latter receptacle is removably secured at its upper end to the upper end of the cylinder 6, and extends down into the same a considerable distance, so as to permit the receptacle to be made of a length sufficient to give it ample storage capacity without unduly increasing the height of the apparatus, thus adapting it for convenient use in places of limited height, such as cellars, and at the same time reducing the distance which the carbid has to fall when discharged from the receptacle.

The lower end of the receptacle 10 has a hopper-shaped or sloping bottom 11, terminating in a circular discharge mouth 12. Below this mouth there is provided a swinging measuring receptacle or discharge bucket 13, closed at its sides, front and back, provided with a pivoted bottom, and open at its top, below which the discharge mouth of the carbid receptacle extends or is located. The rear wall of this bucket is somewhat shorter than the side and front walls, being of a height such as to just swing under the mouth 12 of the receptacle 10, and from this rear wall there extends rearward a cut-off 14, composed of a body portion 15, which closes the mouth 12 when the bucket is swung forward, and lateral upstanding flanges 16, which prevent any escape of the carbid at the sides of the cut-off.

The bucket 13 is pivotally suspended by means of arms 17, which are pivoted at 18 to a yoke 19, secured to and depending from the receptacle 10. The bottom cross bar 20 of this yoke extends across the space below the bucket 13, and is provided with a cross piece or shoe 21, which normally supports the pivoted bottom 22 of the bucket 13. This latter is pivoted at the rear of the bucket in any suitable manner, as, for instance, by means of ears or straps 23 on the bucket, through which the pivot 25 passes. The bottom is provided with lateral flanges 26, to prevent the escape of carbid at the sides of the bottom, and is preferably supported on the shoe 21 by means of a central rib 27, while the shoe is provided with a stop 28, which, by its contact with the rear end of the rib, limits the rearward motion of the bucket, and insures its arrest on its return movement in a position proper to receive the next charge without spilling any carbid.

The swinging movement of the bucket is immediately effected by means of a bell-crank lever 29, pivoted at 30 on the yoke 19. One end of this lever

is slotted, as shown at 31, to engage a pin 32 on the bucket 13. This pin is shown as supported and braced by a bracket 33 from one of the arms 17. The other end of the lever 29 is pivoted at 34 to a feed bar 35. This latter from the point of pivotal connection 34 passes up through a suitable guide 36 on the receptacle 10, and thence downward between the cylinders 6 and 8, being bent upon itself below this latter, as indicated at 37, and extending thence upward between the cylinder 8 and main tank wall 1 to a suitable connection with the feed-lever. The upper end of the feed-bar 35 passes through a double bracket 38, mounted on the tank wall 1, and is provided with a stop-lug 39, which travels on a guide pin 40 between the arms of said bracket, said arms serving to limit the movements of the feed-bar to the extent necessary to give the proper range of motion to the feed bucket 13. The upper end of the feed-bar lies in the path of a bearing plate 41 on the feed-lever 42, with which it is held in contact throughout the range of movement of the feed-bar by a spring 43, secured at its upper end to the feed-lever and at its lower end to the feed-bar. The feed-lever is pivoted at one end, adjacent to its connection with the feed-bar, to a bracket 44, mounted on the main tank wall 1. This bracket has a plurality of pivot-holes 45, arranged at different heights, to receive the pivot-bolt 46, thus permitting vertical shifting of the fulcrum of the feed-lever to suit varying conditions. The other end of the feed-lever passes through a bracket 47 on top of the gas-bell 48, said bracket being provided with bearing rollers 49 above and below said lever, so as to prevent lost motion and at the same time avoid excessive friction and binding of the parts. This extremity of the feed lever is bent or curved, as indicated at 50, to reduce the movement of the lever during that portion of its travel which does not affect the feed-bar.

The bell 48, in which the gas from the generator is stored, is mounted in the sealing tank 5, in which it has a limited vertical movement, rising and falling as the gas accumulates or is withdrawn from the bell. It is guided by a central depending tube 51, which fits somewhat loosely over a fixed escape pipe 52, acting as a safety device to prevent excessive accumulations of gas from so lifting the bell as to permit the escape of gas around the same. When the bell reaches a predetermined height, the water seal between the tubes or pipes 51 and 52 no longer prevents the passage of gas, and the gas from the top of the bell passes up between the two pipes, enters the top of the escape pipe, through which it is conducted to a safe point of discharge.

Within the bell 48 there are located an inlet pipe 53 and outlet pipe 54. These pipes are secured on the diaphragm 3, the latter communicating with the supply pipe or main 55. The former passes down through the diaphragm and communicates with the generating chamber 4. The bell is supported relatively to the guide pipe 51 by being secured at its top to the upper end of said pipe, which it closes, while a brace 56 connects the lower end of the bell to the said guide pipe. A fixed stop projection 57, preferably secured to the outlet pipe 54, lies in the path of the brace 56, and serves to limit the upward movement of the bell, preventing its displacement by excessive gas pressure.

In order to provide for a washing of the gas as it comes from the generating chamber and before it enters the gas space at the top of the bell, the upper end of the inlet pipe 53, which is carried above the water line within the bell to prevent the water entering said pipe, is provided with a return bend 53^a, which brings the discharge mouth of said pipe below the water line, as clearly shown in Fig. 1 of the drawings. The gas is thus compelled to pass through the water before eccaping into the bell, and is thereby washed and purified.

Provision is made for automatically preventing backflow of gas from the bell or the main system supplied therefrom when the generator discharge pipe is opened for cleaning purposes. To this end, the generator discharge pipe 58 is provided with a cut-off valve 59 at its outer end, of the swinging gate type, provided with an operating handle 60, and connected by arms 61 with a pivot 62 on top of the pipe 58. A guide 63 carried by these parts is arranged at right angles to the pivot 62. The inlet pipe 53, instead of communicating directly through the diaphragm 3 with the generating chamber 4, is extended horizontally outward through the side wall of the latter and provided with a return bend, its receiving mouth opening into the generating chamber as indicated at 64. In this external part of the inlet pipe there is provided a stop cock or shut-off valve 65, the stem whereof has an operating handle or lever 66. To this lever is pivoted the upper end of a connecting rod 67, the lower end of which slides in the guide 63. From this construction it will be seen that when the discharge valve of the generator chamber is opened to wash out said chamber and discharge the water and sludge therefrom, the valve in the inlet pipe will be automatically closed, so that no gas can flow back from the bell, or from the lighting system connected therewith, into the generating chamber, and the escape of this gas from said chamber when its discharge pipe is open is thus prevented. When the said discharge valve is again closed, the inlet pipe valve is automatically opened, and communication between the generating chamber and the bell is reëstablished.

In order to prevent undue access of moisture to the carbid in the receptacle 10, the cylinder 6 is provided near its lower end with a hopper 68, having oppositely inclined bottom discharge walls 69 and 70, the space between the adjacent margins of which forms an outlet, controlled by a valve 71, pivoted to the part 69. The stem 72 of this valve is connected by a spring 73 with a downward extension of the feed-bar 35, so that, while the valve 71 is normally closed, preventing the moisture from the generating chamber from rising to the carbid in the receptacle 10, said valve 71 will open when the bucket 13 discharges, thereby permitting the passage of the carbid to the generating chamber, and will again close when the carbid has passed. This construction also aids in breaking the fall of the carbid and diminishes the splashing caused by the fall thereof into the water in the generating chamber.

As the spent carbid accumulates in the generating chamber under the cylinder 6, provision is made for the removal of same to make way for the succeeding charges of fresh carbid. To this end I provide a sweep 74, working over the space below the opening 7 and secured to a rock-shaft 75. This rock-shaft extends upward through a tubular housing or bearing 76, mounted on the diaphragm 3 and provided at its upper end with

a stuffing-box 77, to prevent the escape of gas. The rock-shaft extends upward beyond this stuffing-box, and its projecting upper end is provided with an operating handle 78, by means of which said shaft may be operated to swing the sweep across the space below the carbid cylinder and clear away the spent carbid.

Within the carbid receptacle 10 there is located at the top of the hopper bottom a bridge-piece 79, of inverted V-shape, to prevent bridging of the carbid at this point. 80 indicates an indicating rod, which is fastened to or mounted in the top of the cylinder 8 in such a way as to be capable of vibrating. Usually, I prefer to form this connection by securing the rod directly to the top where it passes through, the top being sufficiently thin and flexible to permit the necessary vibration of the rod. The lower end of said rod extends down below the bridge-piece 79 toward the discharge mouth of the receptacle, while its upper end is visible above the top of the apparatus. When the receptacle is empty, or practically so, the upper end of the rod assumes its normal position, which is, for instance, the inclined position shown in full lines. When the receptacle is charged with carbid, the pressure thereof against the lower end of said rod moves the same over until its upper end is in, say, a vertical position, thereby indicating the presence of carbid in the receptacle, and this position is maintained until the passing out of the carbid permits the rod to move back to its normal position, thereby indicating the necessity of a new charge.

The detailed operation of the separate mechanisms has already been described in connection with their construction. The general operation, which will be readily understood, is, briefly stated, as follows, assuming that the apparatus has been properly charged and gas generated therein. As the supply of gas in the bell is withdrawn, said bell moves downward, and actuates the feed-lever 42, moving the same downward until it comes into contact with the upper end of the feed-bar 35. This latter then moves downward with the lever, swinging the charging or measuring bucket 13 forward and moving the cut-off 14 under the discharge mouth of the receptacle 10, to prevent the further discharge of carbid therefrom. The bucket 13 continues to move forward until the bottom 22 thereof is no longer supported by the shoe 21, whereupon the said bottom swings down, the position of the parts at this time being shown in dotted lines in Fig. 4 of the drawings, and a definite, measured quantity of carbid, the contents of the bucket 13, is discharged. The valve 71 is now open, and the charge of carbid passes down into the water in the generating chamber, generating acetylene gas. This gas passes through the inlet pipe 53 into the bell 48, causing said bell to rise and move the feed-lever 42 upward. Since the spring 43 holds the feed-bar 35 in contact with said lever, said feed-bar also moves upward, closing the valve 71 and moving the bucket 13 and its associated parts back to the position shown in full lines in Fig. 4. The bucket now receives another charge of carbid. The feed-bar continues to move upward with the feed-lever until the stop provided for that purpose arrests it, whereupon the spring 43 permits the continued movement of the lever until the bell ceases to rise. Upon a proper decrease in the amount of gas in the bell, the same cycle of operations renews the supply.

It will be seen that by the employment of a bucket or receptacle of the character described, I am enabled to feed a definitely measured charge of carbid at each operation, and to use carbid in lumps of relatively large size. Various other advantageous features have been pointed out in the preceding portion of this specification, and from a consideration of the foregoing, it will be understood that the apparatus is compact, simple, automatic in its feeding operations, easily attended by unskilled persons, and provided with the necessary safeguards to prevent accident and insure the proper handling thereof.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a gas generator of the character described, a carbid receptacle having a downwardly directed discharge mouth, in combination with a measuring receptacle in the form of a swinging bucket located normally below said mouth and pivoted to said receptacle above said mouth, a cut-off carried by said bucket and adapted to close said mouth when the bucket is swung away therefrom, a hinged bottom for said bucket, and means for first swinging said bucket away from said mouth and dropping said bottom, and for then returning said bucket to its normal position and closing said bottom, substantially as described.

2. In a gas generator of the character described, a carbid receptacle having a downwardly directed discharge mouth, in combination with a measuring receptacle in the form of a swinging bucket located normally below said mouth, provided with a cut-off to close said mouth when the bucket is swung away therefrom, and having a hinged bottom, a fixed shoe supporting said bottom when the bucket is in normal position, and means for swinging said bucket from and to said mouth, said bottom dropping when the bucket is clear of the mouth and the bottom clear of the shoe, to drop the charge, said shoe acting to restore the bottom to closed position as the bucket begins to return to normal position, substantially as described.

3. In a gas generator of the character described, a gas-receiving bell, in combination with a carbid receptacle having a downwardly directed discharge mouth, a swinging measuring bucket located normally below said mouth, provided with a cut-off to close said mouth when the bucket is swung away therefrom, and having a hinged bottom, a fixed shoe supporting said bottom when the bucket is in normal position, and mechanism connecting said bell and bucket to swing the latter away from said mouth when the bell falls, said bottom falling when the bucket is clear of said mouth, said mechanism acting to swing the bucket back to normal position when the bell rises, and said shoe acting to restore the bottom to closed position as the bucket begins to return to normal position, substantially as described.

4. In a gas generator of the character described, a gas bell, and a feed-lever operated thereby, in combination with a carbid-receptacle, a discharge device therefor, a feed-bar operatively connected with said discharge device, a spring connecting said feed-bar and feed-lever, a fixed bracket having a guide-pin, and a stop-lug on the feed-bar engaging said pin and coöperating with the bracket arms to limit the movement of the feed-bar, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLES W. HOLM.

Witnesses:
E. O. HAGAN,
HARRIET HAMMAKER.