

H. ROWNTREE.
ACETYLENE GENERATOR.
APPLICATION FILED JULY 7, 1910.

1,046,651.

Patented Dec. 10, 1912.

3 SHEETS--SHEET 1.

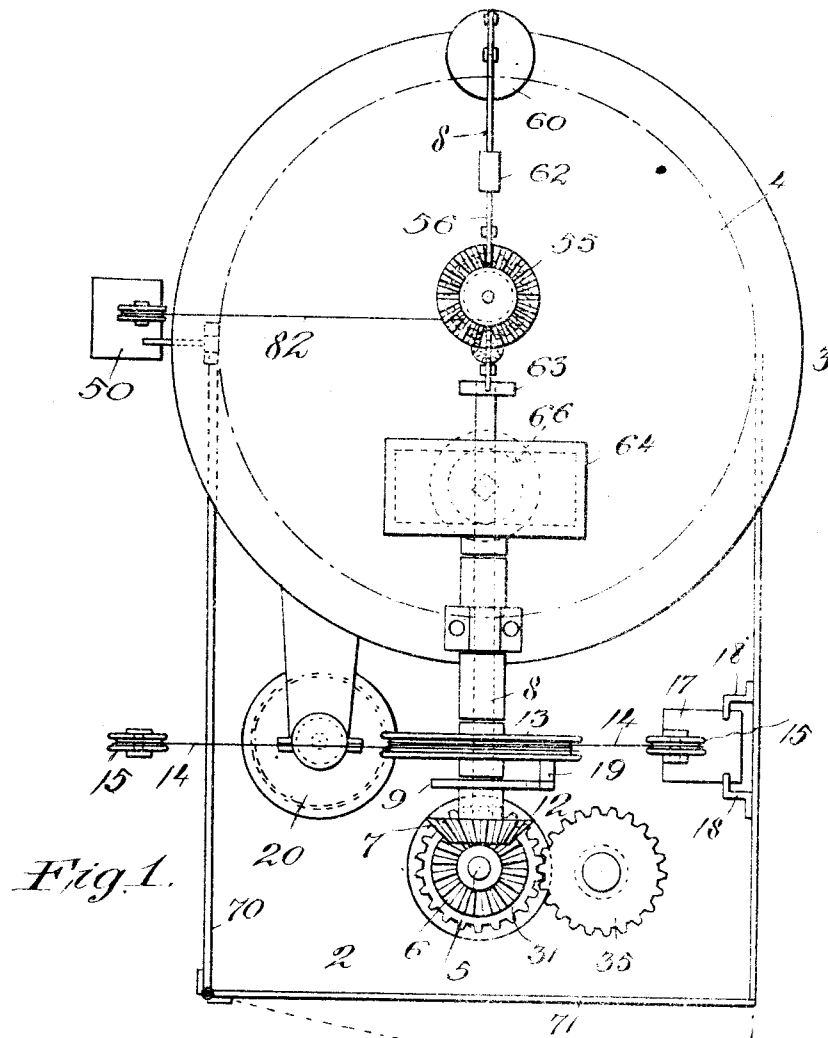


Fig. 1.

Witnesses
C. C. Amick
C. C. Amick

Inventor
Harold Rowntree
By his attorney
Samuel E. Parby

H. ROWNTREE.
ACETYLENE GENERATOR.
APPLICATION FILED JULY 7, 1910.

1,046,651.

Patented Dec. 10, 1912.

3 SHEETS—SHEET 2.

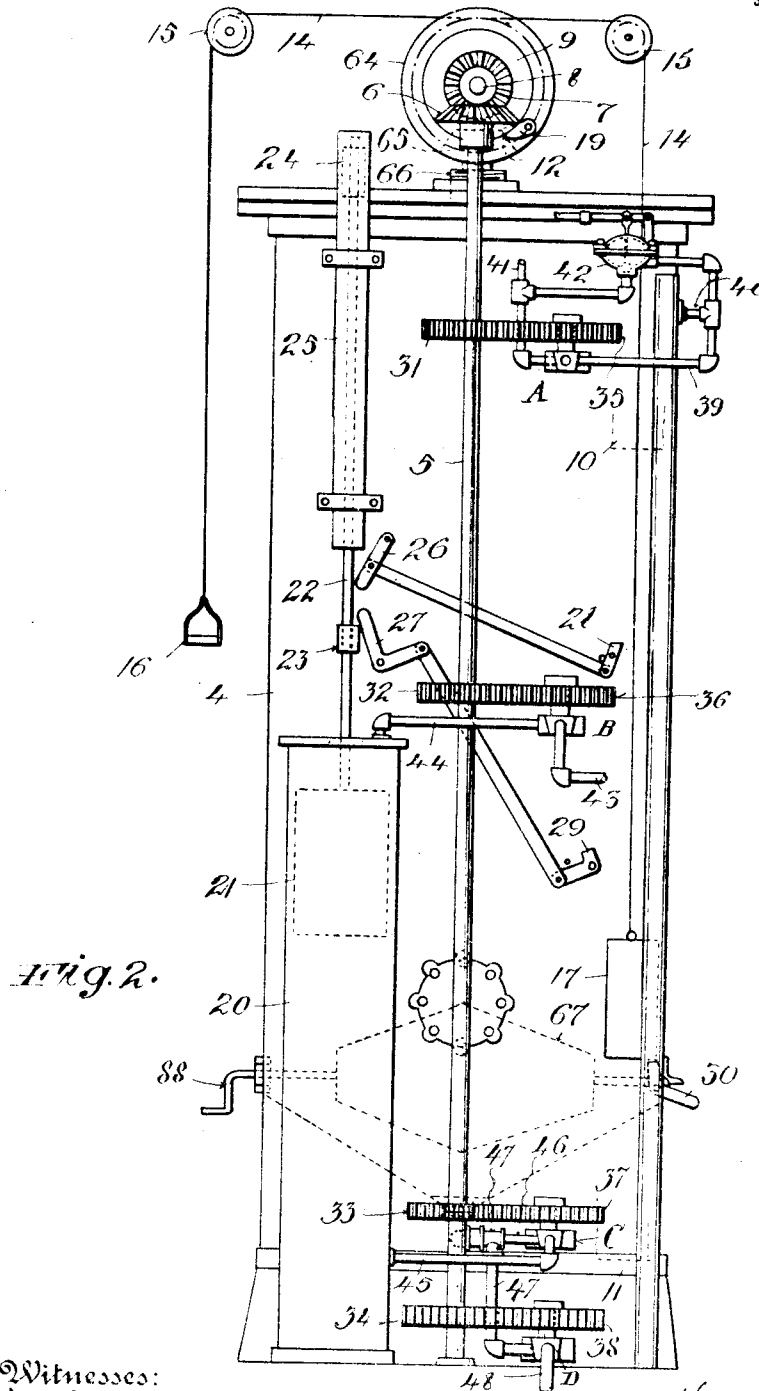


Fig. 2.

Witnesses:
Wm. J. Deane
C. C. Hummel

Inventor
Harold Rowntree
By his Attorney
Daniel C. Darby

H. ROWNTREE.
ACETYLENE GENERATOR.
APPLICATION FILED JULY 7, 1910.

1,046,651.

Patented Dec. 10, 1912.

3 SHEETS—SHEET 3.

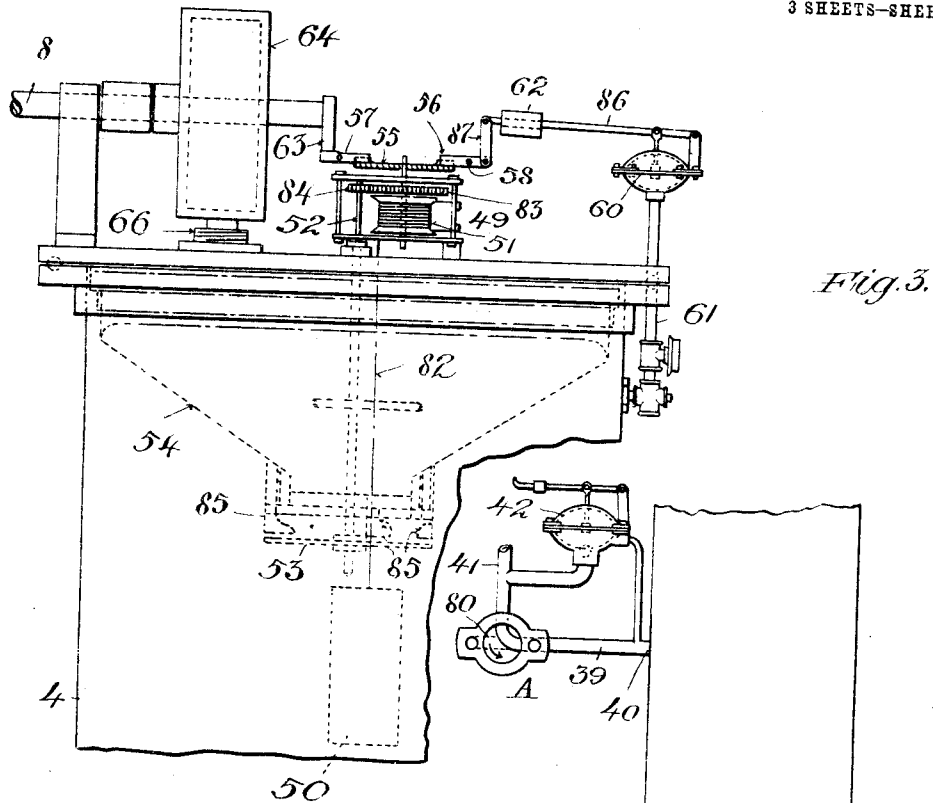


Fig. 3.

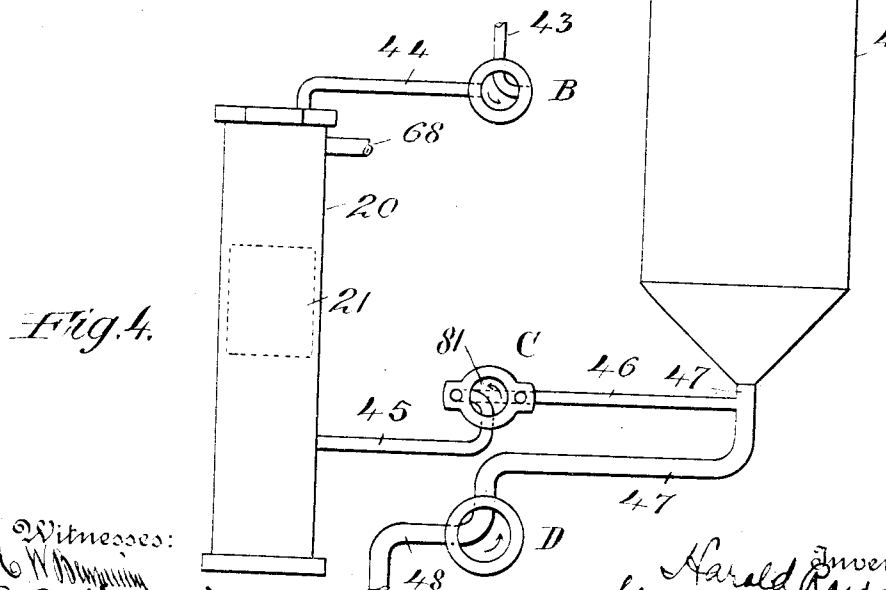


Fig. 4.

Witnesses:
C. C. Hunsicker

Inventor
Harold Rowntree
By *Samuel E. Barry*

UNITED STATES PATENT OFFICE.

HAROLD ROWNTREE, OF CHICAGO, ILLINOIS, ASSIGNOR TO NATIONAL PNEUMATIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

ACETYLENE-GENERATOR.

1,046,651.

Specification of Letters Patent.

Patented Dec. 10, 1912.

Application filed July 7, 1910. Serial No. 570,727.

To all whom it may concern:

Be it known that I, HAROLD ROWNTREE, a citizen of the United States, residing at Chicago, county of Cook, State of Illinois, have made a certain new and useful Invention in Acetylene-Generators, of which the following is a specification.

This invention relates to acetylene generators.

10 The object of the invention is to provide a construction and arrangement of acetylene generator and accessory mechanism, which is simple and efficient; wherein the operations are readily and easily controlled, and
15 wherein provision is made for preventing explosion, accident, or other disastrous results due to carelessness, neglect or disregard to instructions.

A further object of the invention is to provide a generator of the character referred to, wherein means are provided for preventing a further supply of carbid or other gas producing material to the generator, after a supply thereto has become exhausted, until
25 the generator tank has been completely emptied and refilled.

A further object of the invention is to provide a generator of the character referred to having means for preventing the
30 generator tank from being refilled until said tank has been first completely emptied and drained.

A further object of the invention is to provide means for automatically feeding the
35 gas producing material into the generator tank, and for rendering the automatic feeding means inoperative during the time the generator is being drained.

Other objects of the invention will appear
40 more fully hereinafter.

The invention consists substantially in the construction, combination, location, and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown
45 in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference signs appearing thereon,—Figure 1 is a view in
50 top plan of an acetylene generator embodying the principles of my invention. Fig. 2 is a view in elevation of the same taken

from the point marked 2 in Fig. 1. Fig. 3 is a broken view in elevation taken from the point marked 3, in Fig. 1. Fig. 4 is a
55 view in diagram showing the relative positions and operations of the controlling valves.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

Acetylene generators have been proposed, and are in use, in which calcium carbid, or other gas yielding material, is automatically
60 dropped into water contained in the generator tank in such manner as to preserve a constant pressure of generated gas in the tank. In the use and operation of acetylene generators of this class and character, as
65 heretofore carried out, dependence is placed upon the faithful observance of directions to be followed by the attendants in charge of the operation, in order to prevent and avoid
70 explosions or other accidents. Experience has shown that through ignorance, carelessness, inattention, or neglect, the directions for operating acetylene generators have not
75 been faithfully followed, sometimes causing disastrous results. Usually the carbid, or other gas yielding material, is delivered into a
80 hopper from which it is fed or delivered into the generator tank. After the hopper has been emptied, and the pressure of generated gas in the tank begins to fall, the
85 water in the tank has become charged with a residuum remaining after the generation of the gas, and the water, by reason of such residuum, is unfit for further use, and, together with the residuum, should be drawn
90 off from the tank before a fresh charge of carbid or other gas yielding material, is supplied to the hopper. If the water and residuum are not drawn off or drained from
95 the tank, or are only partially drawn off or drained therefrom, through carelessness, neglect, inattention, or otherwise, the succeeding supply of fresh carbid, or other gas yielding material, produces a dangerous
100 amount of heat. It is among the special purposes of my present invention to provide means whereby it is impossible to renew the supply of carbid to the hopper until after the tank has been completely emptied and drained and then properly refilled.

In order to carry out and accomplish the special objects and purposes of my invention, I propose to employ means whereby when a charge of carbid in the feeding hopper becomes exhausted by being fed into the generating tank, and the pressure of gas in the tank begins to fall, the gas contained in the generator is automatically liberated through a suitable vent while at the same time, the generator tank is opened to a suitable drain connection to permit the water and residuum to exhaust and drain therefrom. When all of the gas as well as the residuum and water have thus escaped or completely drained from the tank, the exhaust vent and drain connections are closed and a supply connection opened for a fresh supply of water into the tank. This opening of the water supply to the tank, in accordance with the principles of my invention, cannot be made, however, until after the gas exhaust vent and water and residuum drum connection have been closed. It is also important and necessary to prevent the supply of additional, or a fresh charge of the carbid to the hopper until the generator tank is again filled with a fresh supply of water to the proper level, and the fresh water supply connection is closed. It is also important that the automatic feed for delivering the carbid from the hopper into the generator tank be locked in inoperative position from the time when the gas vent and residuum drain connections are first opened until after the entrance for the fresh supply of carbid to the hopper is again closed.

In accordance with the principles of my invention I provide means for insuring the carrying out of these various operations in sequential order, and by means which are not dependent upon the care or attention of an attendant.

Referring to the drawings, reference sign 4 designates the generator tank. At one side of this tank is arranged a vertical shaft 5 carrying a bevel gear 6, at its upper end arranged to mesh with and drive a similar bevel gear 7, of equal size therewith, said gear 7, being carried by a horizontal shaft 8, suitably journaled in bearings mounted upon the upper end of the generator tank 4. Connected with the gear 7, to rotate therewith, is a disk 9, having an engaging shoulder 12. Loosely mounted on shaft 8, to revolve thereon, is a sheave or drum 13, around which is wound a chain or other suitable flexible connection, which passes over idlers 15, and having a handle 16, connected to one end thereof, and a weight 17, connected to the other end thereof, said weight being held and guided by the guides 18. The drum or sheave 13, carries a pawl 19, which coöperates with the shoulder or detent 12, of disk 9, the arrangement being such that

when the sheave or drum 13, is rotated in a direction contrary to the travel of the hands of a clock, the pawl 19, will travel over and freely pass the shoulder 12. When, however, the sheave or drum 13 rotates in the same direction as the travel of the hands of a clock, the pawl 19, will engage the shoulder 12, and cause coincident rotation of disk 9, and with it gear 7, and shaft 5. The arrangement is such that when the handle 16 is pulled downwardly, the pawl 19, is carried around with the sheave or drum 13, riding freely over shoulder 12, while at the same time the weight 17, is raised. This weight must be raised sufficiently high so that the drum 13 will make a complete revolution before the pawl 19, is brought into position to reengage the shoulder 12. Unless this is done, the release of handle 16, will not result in coupling drum 13 and disk 9 to revolve together, but when the weight 17, is raised to a sufficient height for the pawl 19, to engage and lock against shoulder 12, the release of handle 16, to permit the weight to again descend, causes rotative movement to be imparted to shaft 5, through the intermeshing gears 6 and 7, as above explained. I so arrange these parts that the movement of the weight 17, from its extreme upper position, indicated in dotted lines at 10, Fig. 2, to its extreme lower position indicated by dotted lines at 11, will cause one complete revolution to be imparted to shaft 5.

The descending movement of weight 17 is effected in four successive stages. The extreme upper position of the weight corresponding to the first or initial position of the parts in the cycle of sequential operation of the apparatus, as above indicated. The downward movement of the weight is arrested at the completion of its first stage of movement by a movable stop device 28, arranged in its descending path, the position of arrest of said weights by stop device 28, marking the second position of the parts in the cycle of operation, this first stage of movement of the weight effecting a one-quarter revolution of shaft 5. When the weight is released from stop device 28, it resumes its descending movement until it is arrested by movable stop device 29, arranged in its path, at the completion of its next stage of movement, leaving the parts in their third positions in the cycle of operation of the apparatus. During the movement of the weight from stop device 28, to stop device 29, another quarter revolution is imparted to shaft 5. When the weight 17, is released from stop device 29, it continues its downward movement until arrested by movable stop device 30, this being the completion of the next stage of movement leaving the parts in the fourth position, and imparting another one-quarter revolution to shaft 5. When the weight 17, is released from stop

device 30, it continues its downward movement to its lowermost limit as indicated at dotted lines 11, Fig. 2, thereby imparting the final one-quarter revolution to shaft 5, and completing the one entire revolution of said shaft necessary for the accomplishment of the full purposes and operations of the apparatus. Should the weight 17, be again raised from any one of its intermediate stops before reaching its extreme lower position, there will be no result, since such raising movement will not be sufficient to rotarily displace sheave 13, through the extent necessary for the pawl 19, to reengage with shoulder 12. The weight must reach its extreme lower position, and the drum 13, and shaft 5, must complete one entire revolution in order to bring the parts into their relative positions for repeating the cycle of operations in their sequential order.

I will now describe means for automatically, and at the proper time, removing the movable stops 28 and 29, from the path of the descending weight 17. Arranged at the side of the generator tank 4, is the auxiliary tank 20, in which operates a float 21. To this float is attached a rod 22, extending upwardly through the upper end of said auxiliary tank 20. Upon this rod are mounted collars 23 and 24, the upper collar 24, operating in a vertically arranged tube 25, which thereby forms a guide therefor. When the float 21, approaches its extreme lower position in auxiliary tank 20, the collar 24, on rod 22, will engage and rock a lever 26, and when the float 21, approaches its upper limit of movement the collar 23, thereon, will engage and move a lever 27. The levers 26 and 27, are operatively connected respectively to the movable stops 28 and 29, so that when said lever 26 is moved by the engagement therewith of collar 24, the stop 28, will be withdrawn from the path of weight 17, thereby releasing said weight from the position in which it had been arrested by said stop. Similarly when lever 27, is moved by the engagement of collar 23, therewith, stop 29 is moved out of the path of weight 17 to release said weight from the position in which it is arrested by said stop 29. Thus when auxiliary tank 20 is completely emptied, stop 28, is withdrawn from the path of weight 17, and when said auxiliary tank is completely filled, stop 29, is withdrawn from the path of said weight. Thus the movements of the weight 17, through two of its stages are controlled automatically by the filling and emptying of auxiliary tank 20.

The stop device 30, is manually controlled and all of the stops 28, 29 and 30, are normally in alinement with, or in the path of movement of, the weight 17.

From the foregoing description, it will be seen that the shaft 5, is rotatively actu-

ated to four distinct positions, each succeeding position being one-quarter of a revolution from the preceding position.

I will now explain the operation of the various controlling valves concerned in the operation of the apparatus in its various sequential stages as above explained. On shaft 5, are mounted four gear wheels 31, 32, 33 and 34, which mesh respectively with four gear wheels of equal size 35, 36, 37 and 38. The gears 35, 36, 37 and 38 are respectively mounted upon and operate to respectively control valve devices A, B, C, D. These valve devices include preferably, quarter-turn valves. Valve A connects through pipe 39 and pipe 40, with the interior of tank 4. It also connects to vent 41 which opens to the atmosphere. The outlet 40, from the tank also connects with the safety valve 42, which blows off through the vent 41, in case the pressure increases beyond the certain definite degree, predetermined by the adjustment of the safety valve 42, in the usual manner. As indicated in Fig. 4, the pipe 39 communicates with the valve casing of valve device A at diametrically opposite points as indicated by dotted lines at 80, so that pipe 39, will be opened to the vent 41, in two of the four positions to which the valve is actuated at each complete revolution of shaft 5, while in the other two positions of the cycle, the pipe 39 will be closed against communication with vent 41.

The water supply pipe 43 delivers to the casing of valve device B. This casing also communicates through pipe 44, to the top of auxiliary tank 20. It will be observed, see particularly Fig. 4, that there is only one position of valve device B which will open the water supply pipe 43 through pipe connection 44 to the auxiliary tank 20.

A pipe 45, delivers from the lower end of auxiliary tank 20, to the casing of valve C. A pipe 46, delivers to the valve casing of valve device C through two openings at diametrically opposite sides of said casing as indicated by dotted lines 81, Fig. 4. Said pipe 46, connects with a pipe 47, which delivers from the bottom of the generator tank 4. By this arrangement it will be seen that the pipe connections 45 and 46 are placed in communication with each other in two positions of the valve. The pipe connection 47, extends downwardly and enters the casing of valve device D, a drain pipe connection 48, delivering from the casing of valve device D. It will be observed that while the valve device C in two of its four positions effects a communication between pipe connections 45 and 46, as above stated, there is only one position in which valve device D opens communication between pipe connection 47 and the drain pipe connection 48.

In accordance with the principles of my

invention, I provide means for automatically feeding the calcium carbide into the generator tank, and for controlling the opening through which the carbide is introduced into the tank, in such manner that except at a predetermined stage of the sequential operation of the apparatus, the feed opening for the carbide, is maintained inaccessible, and I provide means for automatically controlling the feed of the carbide into the tank by the pressure of the generated gas, and means for automatically locking the feeding mechanism against operation when the feed opening for the introduction of the carbide is rendered accessible, thereby not only preventing the operation of the feeding mechanism while a fresh charge of carbide is being introduced to the feed hopper, but also controlling the operation of the feed mechanism by the pressure of the generated gas. I will now describe means embodying my invention for accomplishing these results. Reference numeral 49, Fig. 3, designates generally a clock-work mechanism arranged to be driven and actuated by a weight 50, the cord or chain 82, which suspends the weight 50, being wound upon a drum 51, to the axle or shaft of which is connected a large gear wheel 83, arranged to mesh with and to drive a pinion 84, carried by a shaft 52, which extends down into the generator tank through any suitable arrangement of stuffing-box and carries a feed disk 53 upon the lower end thereof. The weight 50 is raised after it runs down in the customary manner of winding up the weight of a clock.

Arranged in the upper end of the generator tank 4 is the feed hopper 54 into which the calcium carbide or other gas yielding material is introduced through an opening in the top of the generator tank arranged to be closed by a removable plug 66.

When the carbide is introduced into the hopper 54, it descends therein to the central opening in the lower end thereof. The disk 53, forms a bottom for the lower open delivery end of the hopper, but said disk is spaced downwardly below the extreme lower end of the hopper a sufficient distance to permit the carbide to be delivered from the hopper over the peripheral edge of the disk 53. In order to cause the carbide to be delivered over the edge of disk 53 so as to be dropped therefrom into the tank 4, I provide the lower end of the hopper with displacing plates 85, arranged around the edge of the opening or mouth of the hopper.

Attached to the shaft of drum 51, is a stop wheel or disk 55. In order to control the operation of the feeding disk 53, automatically, by the pressure of the generated gas, so as to maintain a uniform pressure of gas, I provide a pipe connection 61, to deliver from the upper end of the generator

tank into the casing of a diaphragm device 60, and I arrange this diaphragm device to control an arm 86, carrying an adjustable weight 62 and connected by means of a link 87 with one arm of a detent 56, pivoted at 58, intermediate its ends. The free end of said detent 56, is arranged to bear against the surface of the disk 55. By this arrangement it will be seen that when the gas pressure exceeds a predetermined degree in the generator tank, the lever 86 is raised by the diaphragm device 60 thereby rocking detent 56 into engagement with disk 55 and hence arresting the clock-work mechanism, and of the feeding disk 53. When the pressure in the generator tank falls again, the weight 62 will rock lever 86 downwardly thereby releasing the detent 56, and hence causing the clock-work mechanism to resume its operation, and consequently again resuming the feed of the carbide from the hopper into the generator tank.

In order to render inaccessible the feed opening through which the carbide is delivered into the hopper 54, except at a given stage in the cycle of operations, I mount on the shaft 8, a drum 64 to revolve therewith, the plug 66 being located immediately below said drum, so that said plug is rendered inaccessible for removal until said drum is rotatively displaced sufficiently for an opening indicated by dotted lines at 65, see Fig. 2, is brought into position directly over said plug. This opening is so located as to be brought into position over plug 66 to permit the removal of the latter only when the proper stage in the operation of the apparatus is reached. This point is reached when the weight 17 is resting on stop device 30.

It is desirable to arrest the operation of the clock work feeding mechanism during the time the plug 66 is accessible for removal. To accomplish this result I mount a cam arm 63 on the end of shaft 8, and arrange the same to engage a detent 57, and lift the same out of locking engagement with the disk 55, at the proper time in the operation of the apparatus. The arrangement of these parts is such that the detent 57 is placed in detaining relation with respect to disk 55, and is only liberated therefrom when the weight 17 is in its top or bottom position.

In the lower part of the generator tank is an agitating device 67, operated by a crank 88, outside of the tank to facilitate the cleaning out of the tank while it is being drained.

In order to insure a proper level of fresh water supply to the tank, I provide the upper end of the auxiliary tank 20 with an overflow pipe connection 68, see Fig. 4.

If desired, the various devices and mechanisms may be inclosed within the walls of a chamber indicated at 70 and provided

with a door 71 for access to the gearing and connections, see Fig. 1. This casing is omitted from Figs. 2 and 3.

The operation of the apparatus is as follows:—When the attendant finds that the gas pressure in the tank is falling, due to the fact that the carbid or other gas producing material has become exhausted, which fact will also be revealed by the weight 50 of the motor mechanism which operates the feed disk 53, being in its lower position showing that the motor mechanism 49 is run down. The attendant however, cannot supply additional carbid to the hopper 54 because, at this time, the plug 66 which covers the opening through which the carbid is introduced to the hopper 54, is inaccessible for removal, on account of the drum 64 being in the way. All the attendant can do is to pull down the handle 16 thereby raising the weight 17 to its highest limit as indicated at 10, Fig. 2, and then release said handle 16. It should be noted that while the generator is in operation under normal conditions, that is, while the weight 17 is in either its upper or lower limits of movement, the four valve devices A, B, C and D are all in cutoff position, and the float tank 20 and the generator tank 4 are filled with water to the desired and definite level slightly below the safety overflow pipe connection 68. When the weight 17 is raised to the top limit of its movement and been liberated it begins to descend until it reaches stop 28. During this movement the sheave 13 and disk 9 are coupled together to rotate in unison by the engagement of pawl 19 with shoulder 12, thereby imparting a one-quarter revolution to shaft 5. Through the gear connections of said shaft with the valve devices A, B, C, D, this first one-quarter revolution of said shaft moves the valves into the positions shown in Fig. 4, that is it connects the top of the generator tank to the exhaust vent 41, thereby permitting the exhaust of all the gas in the generator tank, through the one-quarter turn imparted to valve device A. The one-quarter turn imparted to valve device B, however, at the same time therewith, still leaves said valve device in closed position. At the same time the valve device C is opened thereby connecting the float tank 20 with the bottom of the generator tank. At the same time the valve D is opened to permit the draining of the float tank and generator tank. This same movement of the weight 17 from its upper limit down to stop 28 causes lug 63 to be withdrawn from detent 57, thereby allowing said detent to fall into engagement with disk 55 thereby stopping any further motion of the feeding mechanism.

The position of the valves just described permits the contents of the auxiliary tank

20 to exhaust therefrom thereby lowering the float 21 therein, said float reaching its lower limit by the time the auxiliary and the generator tanks are emptied. As this float approaches its lower limit the collar 24 strikes against lever 26 thereby withdrawing stop 28 and permitting the weight 17 to descend therefrom until it is arrested by stop 29, thereby imparting another one-quarter revolution to shaft 5 and another one-quarter turn to the valve devices A, B, C and D. This still leaves the valve device A in position to open the upper end of the generator tank to the exhaust vent 41 for the gas. It also now opens the valve device B to permit a fresh supply of water to be admitted through pipes 43 and 44 to the auxiliary tank 20. It leaves valve device C still open so as to maintain open communication between the lower end of auxiliary tank 20 to the lower end of generator tank 4. The same movement closes the drain controlling valve D. The water therefore thus supplied will proceed to fill the auxiliary and generator tanks until the proper level is again reached thereby causing the float 21 to rise in tank 20. When this float approaches its upper limit the collar 23 on the stem 22 thereof will strike lever 27 thereby withdrawing stop 29 and releasing the weight 17. Thereupon the weight descends until it is again arrested by stop device 30. This movement imparts another one-quarter revolution to shaft 5 and another one-quarter turn to the various valve devices A, B, C and D. This action will close valve device A. It will also close the water supply valve device B. It will also close the tank connection valve device C and still leaves the valve device D closed. This last position of the weight 17 also renders plug 66 accessible as indicated in dotted lines in Fig. 2 by bringing the aperture 63 in the drum 64 over said plug 66. The attendant can now remove plug 66 and charge the hopper with carbid, the generator having been properly emptied and refilled. After recharging the hopper and replacing the plug 66 the attendant moves the detent 30 to withdraw the same from the path of weight 17 thereby releasing the latter and permitting it to descend to its extreme lowest position indicated at 11. This action imparts the final one-quarter turn to the valve devices, still leaving them all closed, and also moving drum 64 so as to again render plug 66 inaccessible and also moving lug 63 to release detent 57 thereby permitting the feeding motor to resume its operation. Thereupon the cycle of operations above described may be resumed in the sequential order above explained by the attendant again drawing down on handle 16.

While I have shown and described the specific structures and arrangements of appa-

ratus embodying the principles of my invention I desire it to be understood that many changes and variations in the structure, details and arrangements thereof might readily occur to persons skilled in the art and still fall within the spirit and scope of my invention. But

Having now set forth the object and nature of my invention and a construction embodying the principles thereof and having described such construction its purpose function and mode of operation, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent is,—

1. In an acetylene generator, a tank, and means for supplying charges of gas generating material thereto, in combination with means for preventing the supply of an additional charge of gas generating material to the tank until said tank has been completely emptied of its previous charge of material.

2. In an acetylene generator, a tank, and means for feeding gas generating material thereto, in combination with means for arresting the feeding means to prevent the feed of additional material to the tank until said tank has been completely emptied of its previous supply of material.

3. In an acetylene generator, a tank, means for supplying gas producing material to said tank, and automatic means for preventing the supply of more than a definite amount of gas producing material until the tank has been completely emptied and refilled.

4. In an acetylene generator, a tank, means for supplying gas producing material to the tank, means for supplying water to charge the tank and means for preventing the supply of additional water charge after the tank is once charged therewith, until the tank is emptied of the previous charge.

5. In an acetylene generator, a tank, adapted to contain water, means for automatically feeding gas producing material into the water, and means for preventing more than a definite amount of gas producing material from entering the water when the tank is once charged therewith until the tank has been completely drained of said charge and refilled.

6. In an acetylene generator, a tank, adapted to contain water, means for feeding carbid into the water to generate gas, and means for preventing the introduction of the carbid to the water, after the tank is once charged therewith, until the tank has been drained of said charge and refilled.

7. In an acetylene generator, a hopper to receive a charge of carbid, a tank adapted to receive a charge of water, automatically controlled means for draining the tank, motor operated means for feeding the carbid from the hopper into the tank, and means arranged to be brought into active relation

coincidentally with the operation of the draining means for rendering the feed of carbid inoperative during the time the tank is being drained.

8. In an acetylene generator, a tank adapted to receive a charge of water, a hopper to receive carbid, motor driven means for automatically feeding the carbid from the hopper into the tank, means for draining the tank, and means arranged to be brought into active relation coincidentally with the operation of the draining means for arresting the operation of the automatic carbid feeding means during the time the tank is being drained.

9. In an acetylene or other generator, means for supplying gas producing materials to the generator, means for bringing the gas producing materials into contact with each other and means for preventing said materials from being brought into contact with each other after a predetermined amount of said materials are brought into contact, until the generator has been emptied.

10. In a generator, a tank, a hopper, means for filling the hopper, means for draining the tank, and means for rendering the hopper filling means inoperative until the tank has been drained.

11. In a generator, a tank, means for generating gas within said tank, a pipe connection for delivering the gas from said tank, means for draining the residuum from said tank, and means for arresting the generator after a definite amount of generation has been accomplished until the residuum has been drained out from the tank.

12. In a generator, a tank, a hopper having an opening for admitting a charge of gas producing material thereto, means for feeding the gas producing material from the hopper into the tank, and means for rendering inaccessible the charge opening of the hopper during the time the tank is being emptied and refilled.

13. In a generator, a tank adapted to contain water, a hopper, an opening for introducing a charge of gas producing material into the hopper, means for feeding the gas producing material from the hopper into the water contained in the tank, means for rendering inaccessible the charge opening into the hopper until the tank has been drained of the residuum left by a previously admitted charge.

14. In a generator, a tank, a hopper delivering into the tank and having a charge opening for the introduction of gas producing charge to the hopper, and means for rendering said charge opening inaccessible until the tank has been emptied of the previously admitted charge.

15. In a generator, a tank having water supply and drain connections, automatic

means for controlling said connections, said means operating to first open the water supply connection, and then the drain connection, and means for feeding gas producing material to the tank.

16. In a generator, a tank having water supply and drain connections, automatic means for controlling said connections to first open the water supply, and then the drain connection, and means controlled by the amount of water supply for feeding gas producing material to the tank.

17. In a generator, the combination with a tank, having gas exhaust, water supply and drainage connections, and automatic means for preventing the operation of said connections except in sequential order.

18. In a generator, a tank having gas exhaust, water supply and exhaust connections, valve devices for controlling said connections and automatic means for operating said valve devices in sequential order.

19. In a generator, a tank having water supply and drainage connections, means for supplying carbid to said tank and automatic means for controlling said connections and supply means and acting to prevent the operation of the same except in sequential order.

20. In a generator, a tank having water supply and drainage connections and a feed opening for carbid, and automatic means for controlling said connections and feed opening and acting to prevent the operation of the same except in sequential order.

21. In a generator, a tank having water supply and drainage connections, and means for admitting carbid in combination with means for controlling said connections and admitting devices and automatic means for preventing the operation of said controlling devices except in sequential order.

22. In a generator, a tank having water supply and drainage connections, operating mechanism therefor and automatic means

for controlling said operating mechanism and arranged to prevent the operation thereof except in successive stages of operation.

23. In a generator, a tank having water supply and drainage connections, means for operating said connections, and automatic devices for preventing the operation of said operating means except in sequential order.

24. In a generator, a tank having carbid supply, water and drainage connections, means for operating said connections and automatic means for preventing the operation of said operating means except in sequential order.

25. In a generator, a tank having carbid supply, water supply and drainage connections, means for operating said connections in sequential order, and means operated by the water supply for controlling said sequential operations.

26. In a generator, a tank having water supply and drainage connections, an auxiliary tank arranged in the water supply connections, means for operating said connections and means arranged in the auxiliary tank for controlling said operating means.

27. In a generator, a tank having carbid supply, water supply and drainage connections, means for controlling said connections, an auxiliary tank arranged in the water supply connection, means for inaugurating operation of said controlling means, a float in an auxiliary tank and means operated by said float for rendering the operation of said controlling means sequential in operation.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 13th day of June A. D., 1910.

HAROLD ROWNTREE.

Witnesses:

LEMUEL M. SHIELDS,
D. M. SELOVER.

Commission