

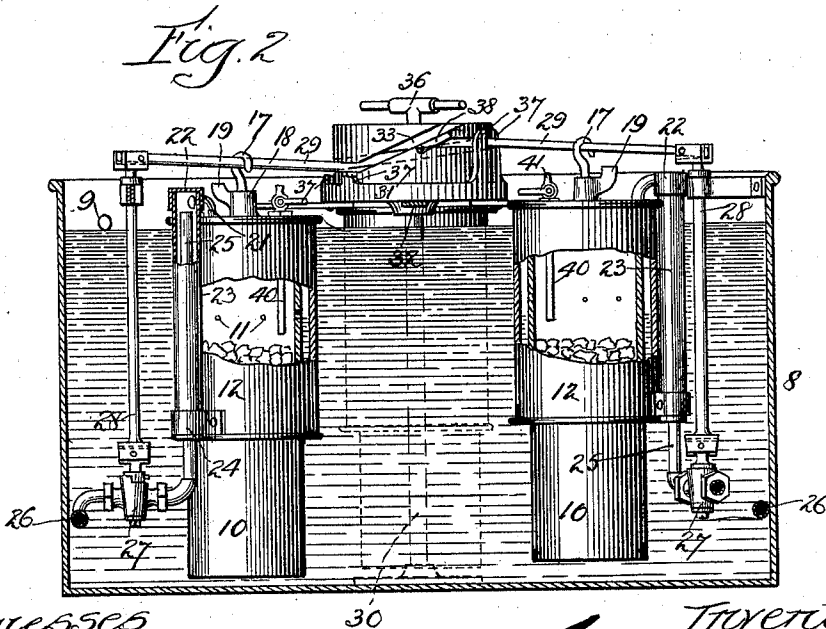
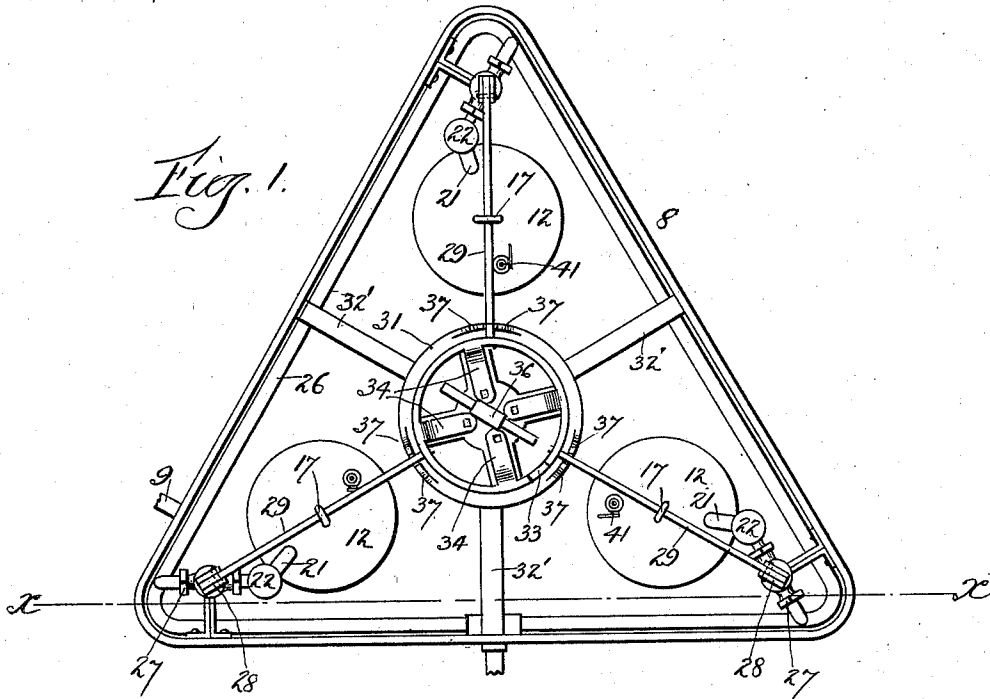
(No Model.)

2 Sheets—Sheet 1.

C. MATTHEWS, Jr.
ACETYLENE GAS GENERATOR.

No. 586,194.

Patented July 13, 1897.



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UNITED STATES PATENT OFFICE.

CHARLES MATTHEWS, JR., OF CHICAGO, ILLINOIS.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 586,194, dated July 13, 1897.

Application filed March 29, 1897. Serial No. 629,835. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MATTHEWS, Jr., a citizen of the United States, residing at 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, reference being had to the accompanying drawings.

10 This invention relates to improvements in gas-generators wherein gas is produced by the action of a liquid upon a solid, and is designed particularly for the production of acetylene gas from calcium carbid by the application of water thereto.

15 The leading objects of my invention are to provide, in combination with a common source of liquid-supply, a number of gas-generating tanks, in each of which is contained a supply of the solid from which, by the application thereto of the liquid, gas will be produced, such tanks being so constructed and arranged that the supply of solid matter in the several tanks will be successively and automatically brought into use; to provide means for locking said tanks in position; to provide means for permitting the withdrawal of one tank for cleaning and replenishing with fresh material without removing the remaining tanks or interrupting the flow of gas to the point of discharge or consumption; to provide for the automatic cutting off of communication between the tank being removed and the pipe through which gas is discharged to the gasometer, and to improve generally the construction and operation of gas-generators of the type specified. I accomplish these various objects by the means shown in the accompanying drawings and hereinafter fully described.

Those things which I regard as new will be set forth in the claims.

Referring to the drawings, Figure 1 is a top or plan view. Fig. 2 is a vertical section at line xx of Fig. 1. Fig. 3 is an enlarged sectional view of one of the gas-generating tanks in which the calcium carbid is held and the inverted vessel that surrounds the upper portion thereof. Fig. 4 is a cross-section at line yy of Fig. 3. Fig. 5 is a detail of the upper portion of the inverted vessel shown in Fig. 3, the same being a section taken on a

plane at right angles to that of the section of Fig. 3. Fig. 6 is a detail, being a perspective view of the upper end of one of the gas-generating tanks. Fig. 7 is a detail of the means employed for securing the attachment of the levers or arms to which the gas-generating tanks are suspended.

In the drawings, 8 indicates a liquid-chamber, which may be of any suitable size and shape. As shown, it is triangular in shape, as such shape well adapts it to receive and hold the three gas-generating tanks that are shown as being employed. At a proper point it is provided, as shown, with an overflow-opening 9.

10 indicates the gas-generating tanks referred to, each being made of iron or other suitable material, and, as shown, they are held suspended within the chamber 8 at varying heights. Each tank 10 is provided about one third of its length from the top with a series of holes 11, through which water from the chamber 8 is admitted onto the calcium carbid that is placed within such tanks.

12 indicates a vessel, closed at one end and open at the other end, that is inverted and placed over the upper end of each tank 10, such vessel-extending down sufficiently far to surround the tank 10 for quite a distance below the water-openings 11, as clearly shown in Figs. 2 and 3. Each vessel 12 is removably attached to its tank 10 by means of lateral inwardly-extending lugs 13, at the upper edge of the tank 10, that are adapted to project through suitable openings 14, formed in a plug or head 15, attached to the vessel 12 and fitting down within the open upper end of the tank 10, so that after the lugs 13 have been passed through such openings a slight turn given to the tank secures it on such plug or head 15, as will be understood by reference to Figs. 4, 5, and 6. This head or plug 15 is secured to a bolt 16, which passes up through such plug or head and through the end of the vessel 12, terminating in a hook 17, as shown. On the end of the vessel 12, around the opening through which passes the bolt 16, is formed a hub 18, upon which is formed a stop 19, which is brought into use whenever it is attempted to improperly remove a tank, as hereinafter explained.

20 indicates a short pipe passing through

the plug or head 15 and the end of the vessel 12, onto which is screw-threaded another short section of pipe 21, that by means of a suitable connection 22 affords communication with a vertical tube 23, lying alongside of the vessel 12, to which vessel it is secured by a suitable strap 24 or in any other secure manner, the lower end of said tube being open.

25 indicates a pipe, the greater portion of its length being within the tube 23 and having its upper end open and above the line of the overflow-opening 9, as shown in Fig. 2. At its lower portion each pipe 25 is bent and suitably connected to a pipe 26, which connects with a gasometer of any approved construction, (not shown,) so that the gasometer may be supplied with the gas that is generated in the different tanks 10 and be there held until required for use. Each pipe 25 is provided at the point indicated by 27 with a suitable valve, upon the turning of which communication with the pipe 26, that leads to the gasometer, can be established or cut off, it being understood that such communication is had at all times, except when one of the tanks is removed, and that the removal of one tank does not disturb such communication between the pipes 25 of the remaining tanks and the said pipe that leads to the gasometer.

28 indicates a vertical rod connected to and adapted to operate one of the said valves 27, such rod rising, as shown, slightly above the upper edge of the vessel 8.

29 indicates arms or levers, one for each gas-generating tank 10, each of such arms or levers being pivoted at its outer end to one of the vertical valve-rods 28, and each adapted to support one of the gas-generating tanks 10 and its inclosing vessel 12, with attached tube 23, such support being by means of the hook 17 engaging the arm or lever.

30 indicates a post rigidly secured to the floor of the chamber 8 in the construction shown, and supporting at its upper end, a little above the water-line, a plate 31, which may be braced, as shown, by braces 32', secured to it and to the sides of the chamber. Resting upon this plate 31 is a head 32, which, as shown, is composed of two parts so formed as to leave between them an approximately spiral-shaped slot 33, in which are placed the inner ends of the several arms or levers 29, on which are supported the gas-generating tanks 10 and their inverted vessels 12, and by reason of the slot being of the shape shown and specified it will be seen that the inner ends of said arms or levers are at different heights, thus of course causing the several tanks 10 to be supported within the chamber 8 at correspondingly-different heights with relation to each other. The two parts of the head are held together by suitable braces 34, each curved inwardly sufficiently so as not to interfere with the movement of the arms or levers 29, projecting into and moving in the

slot 33. This divided head is prevented from moving laterally on the plate 31 by reason of a circular ring or collar 35, projecting from its under face into a correspondingly-shaped socket in the face of the plate 31. (See Fig. 7.)

36 indicates a handle centrally secured to and projecting above the divided head 32, by the use of which the said head may be rotated.

37 indicates a pair of vertical guides formed with or secured to the plate 31 and set a short distance from the side of the divided head 32, a pair of such vertical guides being provided for each arm or lever 29; but for clearness in the illustration of other parts one pair of such guides is omitted from Fig. 7, and in Fig. 2 one pair is shown broken off.

38 indicates a latch pivoted to the divided head 32, near the upper portion of the slot 33, and adapted to be thrown across such slot, as indicated in dotted lines in Fig. 7, in which position it serves to prevent the ends of the arms or levers, which are placed in the open upper end of the slot, from being forced through the slot in the wrong direction. This latch, when in the position shown in full lines in said Fig. 7, bridges that portion of the slot where it crosses upon itself, and so permits the ends of the said levers 29 to pass out of the slot and upon the top of the divided head when said head is rotated. If such latch were not provided, the ends of the several levers 29 would, as the head was rotated, drop back into that portion of the slot that the latch bridges, and so be unable to be brought to the top of the head at all by the mere rotation of such head. When the latch is thrown across the slot, it rests, as shown, against a pin 39.

40 indicates a pipe projecting down through the end of the inverted vessel 12 and the head or plug 15 to a point below the water-openings 11 in the tank 10, and at its upper end is provided with a cock 41. This pipe and cock are provided in connection with each tank and are for the purpose of enabling the user of the machine to test the tanks at any time to see whether gas is still being produced therein or not.

The operation of the machine is as follows: The several tanks 10, before being placed in the chamber 8, are each provided with the required amount of calcium carbide, after which the inverted vessels 12 are placed on and secured to the tanks in the manner described. The tanks with their respective inverted vessels are then placed in the chamber 8, the tube 23, attached to each vessel 12, fitting over the gas-pipe 25, as shown. The arms or levers, which have been swung to one side to permit the tanks 10 to be placed in the chamber, are then turned so as to be over their respective tanks 10, each arm or lever resting at its inner end on the upper face of the divided head 32. By means of the handle 36 the said head 32 is then turned so as to permit one of the arms or levers to enter the slot 33, said arm or lever passing down the slot a

short distance until it has been stopped by the latch 38 thrown across the slot, as in Fig. 7. As heretofore stated, the slot at the point where the latch is placed crosses itself, and by reason of this the end of the arm or lever drops into the downward portion of the slot that is left unguarded by the latch, so that when the head is reversely rotated the inner end of the arm or lever is gradually depressed as it follows downward in the slot, it being prevented from lateral movement, as stated, by its pair of vertical guides 37, into which it settles shortly after it enters the slot. The remaining arms or levers are successively entered in the slot in a similar manner, with the result that the inner end of the first lever entered will be at the lowermost portion of the slot, the second one slightly higher in the slot, and the third one slightly higher than the second, owing to the shape of the slot. After the levers are thus secured in the slot the tanks are to be raised by hand sufficiently to enable them to be hung by their hooks 17 to their respective arms or levers, the said tanks being of course suspended one slightly higher than the other.

Water being placed in the chamber 8 will when it has reached the openings 11 in the lowest tank flow into such tank and, coming in contact with the calcium carbide, will at once generate gas, which escapes by way of the pipes 20 and 21 to the tube 23, which tube, being partially filled with water, effectually seals it, so that the gas is forced to pass through the pipe 25 to the pipe 26, from which it is conducted to a suitable gasometer. The presence of the gas in this lowest tank will also act upon the water between it and its surrounding vessel 12 and prevent the further entrance of water. When the volume of gas thus generated is diminished by being drawn off from the gasometer for use, the diminution of pressure will permit more water to enter at the openings 11, more gas being thus formed. This admission of water from time to time for the making of gas as it is needed will continue so long as the calcium carbide remains, and after the carbide has become exhausted the water between the said lowest tank and its surrounding vessel 12 will enter freely through the openings 11. As this takes place the water between the second highest tank and its surrounding vessel 12 will rise until it enters at the openings 11 of said second tank, the results of which will be the same as that described for the lowest tank. As the several tanks communicate with each other and with the gasometer through the pipe 26 it is evident that the gas-pressure is equal throughout, so that it is evident that the water can never rise sufficiently to enter any tank when the pressure in the lower tank is sufficient to keep it out of such lower tank, and for this reason the carbide in a higher tank remains unused until that in the lower tank or tanks is exhausted.

When it is desired to ascertain whether any

tank is still producing gas or not, the cock 41 is turned. If no gas escapes, it is evidence that the carbide in that tank is exhausted, and to remove the same for cleaning and refilling it is raised sufficiently to permit its hook being removed from its arm or lever 29 and is then allowed to settle back in the chamber, as it cannot be removed until the arm or lever is turned to one side. To release such arm or lever from its engagement with the divided head 32, such head is turned by means of the handle 36 in the proper direction to cause said arm or lever to move upward in the slot 33, so that when clear of the slot it will rest upon the upper surface of such head, the arm or lever pushing back the latch 38 as it comes in contact with it from the position shown in dotted lines in Fig. 7 to that shown in full lines for the purpose stated hereinbefore when describing said latch. The lever having been raised to the top of the divided head is then to be swung around to one side to permit the tank 10 to be withdrawn, and as it is being so swung around it will turn the rod 28, to which it is pivoted, and through such rod turn the valve 27, thus shutting off communication at that point with the pipe 26. The arm or lever being out of the way the tank can be lifted out, cleaned, refilled, and replaced in the manner already described, the valve 27 that has been closed being again opened as the arm or lever 29 is replaced in position. The turning of the divided head for the purpose of releasing the arm or lever to which the exhausted tank was attached also causes the ends of the other arms or levers to be moved down in the slot 33, so that what was the second lowest tank would be depressed in the chamber and occupy the position of the exhausted or lowest one, so that when the cleaned and refilled tank was secured in place it would occupy the highest position, and accordingly not be again put in service for the generation of gas until the preceding ones had been used.

As stated, the hook 17 of a tank 10 must be detached before the divided head is turned to raise the supporting arm or lever 29 of such tank, and this is because of the fact that if it were attempted to release the hook after the arm or lever had been so raised the inclination would be such that the stop 19, which is immediately under the arm or lever, would come in contact with such arm or lever before the hook could be entirely disengaged. This provision is made for the purpose of preventing the easy removal of a tank that may be left on its lever after the head has been turned to bring such lever to rest on the upper surface of the head. Such position of a lever with a tank suspended to it will happen at times when a tank has become useless by reason of the exhaustion of the carbide, and the user turns the head to bring the next tank to the lowermost position, but does not care to at that time remove, clean, and refill the first-mentioned tank. In such case, by

reason of the stop on the top of the tank, the tank cannot be removed without reinstating the end of the lever down into the slot, which fact will prevent removal by persons not familiar with the machine.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquid to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head engaging said arms or levers, and means for conveying away the gas generated in the tanks, substantially as specified.

2. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquid to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head provided with means for locking said arms or levers to lie in different planes, and means for conveying away the gas generated in the tanks, substantially as specified.

3. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquid to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head provided with an inclined slot adapted to receive and hold one end of each of said arms or levers, and means for conveying away the gas generated in the tanks, substantially as specified.

4. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquids to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head provided with an inclined slot adapted to receive and hold one end of each of said arms or levers, devices for holding said arms or levers against lateral movement while in the slot, and means for conveying away the gas generated in the tanks, substantially as specified.

5. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the reception of the solid material, means for supplying liquid to said tanks successively, devices for holding said tanks at different heights, pipes connecting the several tanks so that an equal pressure is maintained in all, and means for conveying away the gas generated in the tanks, substantially as specified.

6. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the reception of the

solid material, means for supplying liquid to said tanks successively, devices for holding said tanks at different heights, pipes connecting the several tanks so that an equal pressure is maintained in all, means for shutting off communication with one tank before it can be removed without disturbing the communication with the remaining tank or tanks, and means for conveying away the gas generated in the tanks, substantially as specified.

7. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a liquid-containing chamber, a series of tanks for the solid material arranged at different heights within said chamber and each provided with openings for the admission of water from the chamber, arms or levers to which said tanks are suspended, a rotatable head engaging said arms or levers, and means for conveying away the gas generated in the tanks, substantially as specified.

8. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a liquid-containing chamber, a series of tanks for the solid material arranged at different heights within said chamber and each provided with openings for the admission of water from the chamber, a pipe within the chamber with which each tank communicates, which pipe is adapted to conduct away the gas generated in the several tanks successively, and means for cutting off communication between such pipe and a tank when the tank is removed without disturbing the communication between the remaining tank or tanks and said pipe, substantially as specified.

9. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material, means for supplying water to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head provided with an inclined slot into which the inner ends of said arms or levers project, a pivoted latch adapted to be thrown across said slot and also adapted to be turned to bridge a portion of such slot, and means for conveying away the gas generated in the said tanks, substantially as and for the purpose specified.

10. In an apparatus for forming gas by the union of a solid and a liquid, a liquid-containing chamber, in combination with a series of tanks for the solid material arranged at different heights within the chamber and each provided with openings for the admission of water from the chamber, an inverted vessel placed over each tank and removably connected with it, a tube connected with each inverted vessel and communicating with the interior of one of said tanks, a pipe rising within said tube and attached to a pipe for conveying away the gas, a lever or arm to which the tank is suspended, and a rod secured at its upper end to said lever and to a valve at its lower end, whereby upon the turning of said lever or arm said valve is turned and communication between the tank and the pipe

for conveying away the gas is cut off, substantially as and for the purpose specified.

11. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquid to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head engaging said arms or levers, a device for preventing disengagement of the tanks from the levers when the levers are raised to rest on the upper surface of said head, and means for conveying away the gas generated in the said tanks, substantially as and for the purpose specified.

12. In an apparatus for forming gas by the union of a solid and a liquid, the combination of a series of tanks for the solid material arranged at different heights with relation to each other, means for supplying liquid to said tanks successively, arms or levers to which said tanks are suspended, a rotatable head engaging said arms or levers, stops arranged above the tanks and adapted to strike the supporting arms or levers when said arms or levers are raised at their inner ends to the upper surface of said head and thereby pre-

vent the disengagement of the tanks from the said arms or levers, and means for conveying away the gas generated in the said tanks, substantially as and for the purpose specified.

13. In an apparatus for forming gas by the union of a solid and a liquid, a liquid-containing chamber, in combination with a series of tanks therein adapted to receive the solid material, a plate supported in the upper part of said chamber, a rotatable head located on said plate, fixed guides on said plate at the side of said rotatable head, tanks within the chamber adapted to receive the solid material and provided with openings in their sides for the admission of liquid from the chamber, pivoted arms or levers secured at their inner ends to said rotatable head and resting between the said guides and adapted to sustain said tanks at different heights within the chamber, and means for conveying away the gas generated in said tanks, substantially as specified.

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