No. 650,127. Patented May 22, 1900.

R. EXLEY.

APPARATUS FOR MANUFACTURING ACETYLENE GAS.

(Application filed Sept. 20, 1899.)

(No Model.)

FIG. 2.

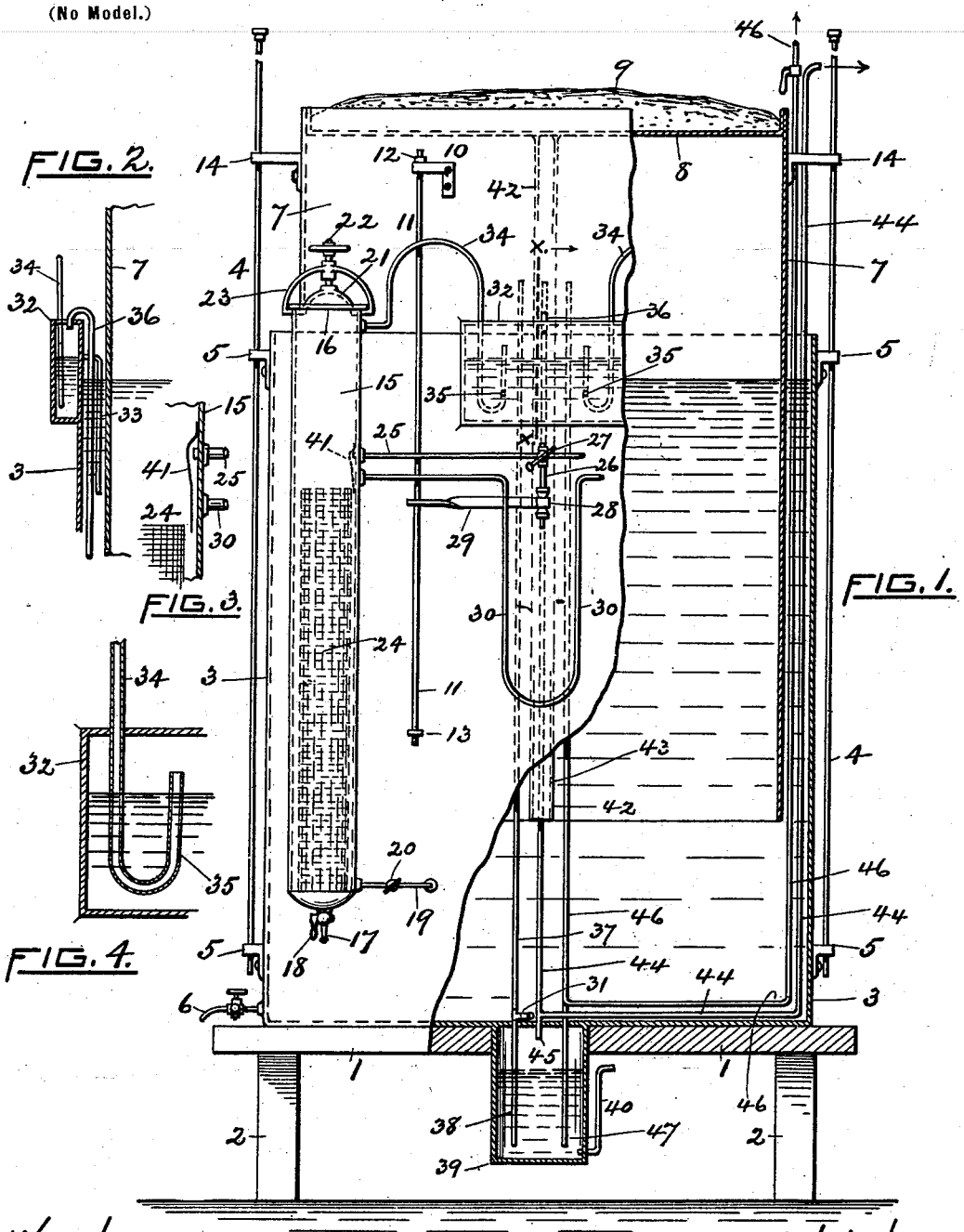

FIG. 4.

WITNESSES.

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APPARATUS FOR MANUFACTURING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 650,127, dated May 22, 1900.

Application filed September 20, 1899. Serial No. 731,041. (No model.)

To all whom it may concern:

Be it known that I, ROBERT EXLEY, a subject of the Queen of Great Britain, residing at Warwick, in the county of Kent and State of Rhode Island, have invented certain new and useful Improvements in Apparatus for the Manufacture of Acetylene Gas, of which the following is a specification, reference being had therein to the accompanying drawings.

Like numerals indicate like parts.

Figure 1 is a view, partly in front elevation and partly in central vertical section, of my improved apparatus for the manufacture of acetylene gas. Fig. 2 is a detail view of the gas-trap and tank. Fig. 3 is a detail view of that portion of the generator where the inlet water-pipes enter and shows the inner end of said pipes and of the hood extending over the same. Fig. 4 is an enlarged detail view in transverse vertical section of a portion of the gas-trap.

My invention is an apparatus for the manufacture of acetylene gas; and it consists of the novel construction and combinations of the several elements hereinafter particularly described, as set forth in the claims.

In the drawings, 1 is the platform or base, having the legs 2, on which it rests. The tank 3 is preferably cylindrical in form and has a closed bottom and an open top and is set securely on said platform. Guide-rods 4 extend upward on the outside of the tank 3 and parallel to the sides thereof, being supported by brackets 5, which are bolted to the tank, as shown. A faucet 6 extends from the bottom of the tank to enable the water to flow out when desired.

The gas-holder is shown at 7 and is made of a shape and size to enter in the tank 3, leaving, however, a space between it and the tank, as fully illustrated in Fig. 1. This gas-holder 7 has a closed top 8 and an open bottom, the latter being submerged in the water, as shown. The sides of the gas-holder 7 extend up above the closed top 8 and form a flange. Upon the top 8 and within this flange a weight 9, of cement, sand, or other suitable material, is placed. On the outside of the gas-holder 7 is a bracket 10, through the outer end of which passes a rod 11, having a nut 12 at its top above said bracket. The lower end of the rod 11 is screw-threaded to carry a nut 13 thereon. Brackets 14 extend from the gas-holder 7, having their outer ends slotted, and the bifurcated ends thus formed receive the rods 4, which pass loosely through them.

On the front of the tank 3 are two gas-generators 15, preferably cylindrical, one of which is shown in Fig. 1 on the left and the other of which (not shown) is to be understood as located correspondingly on the right side. Each generator 15 has a flanged edge 16 at the top and a closed end at the bottom, through the latter of which a tap 17 passes, provided with a stop-cock 18. A pipe 19, having a valve 20, passes from the generator 15 into the tank 3. The top of the generator 15 is covered by a cap 21, which is held forcibly and tightly in place by means of the screw 22. This screw passes through the bow or bridge-piece 23, whose ends bend inwardly and bear up against the flange 16 of the generator 15. A cage 24 of wire-gauze or perforated sheet-metal is contained within the generator 15, as shown.

A pipe 25 extends from one generator to the other and communicates therewith. It also communicates at its center with a water-supply pipe 26. At the union of the pipes 25 and 26 is a three-way valve 27, by means of which the water may be shut off entirely or may be directed into either one of the generators 15. The water-supply pipe 26 also has a valve 28, which is provided with a long handle or lever-arm 29, having its outer end bifurcated to allow the rod 11 to pass loosely through it. The generators 15 are also connected by the bent pipe 30, in which there is no valve.

A gas-trap is fixed upon the front side of the tank 3 near the top thereof. This gas-trap consists of a closed tank 32, secured to the outside of the tank 3 and filled with water up to the opening of the overflow-pipe 33. An opening in said tank, provided with a screw-cap, allows water to be poured therein. From the top of each generator 15 there extends a pipe 34 upwardly in the shape of an inverted U, leaving the generator about on a level with the top of the gas-trap tank 32, and its outer end is bent downward into a U shape, the bow 32 thereof passing nearly to the bottom of said tank 32. The open end of

the pipe 34 extends upward to a point above the level of the water in the tank 32, as seen in Figs. 1 and 4. A hole 35 is made in the pipe 34, as shown in said figures, above said water-level.

A pipe 36 passes through the top of the gas-trap tank 32, Fig. 2, and bends over and extends down inside the tank 3, in the space between said tank and the gas-holder 7 to the bottom of the tank, Fig. 1, where it connects with a T-pipe 31. One branch of the pipe 31 is connected with a pipe 37, which extends up centrally through the tank 3 into the gas-holder 7 to a height considerably above the level of the gas-trap 32 and is open at the top. The other branch of the pipe 31 is connected with a drip-pipe 38, which passes down into a closed drip-trap 39 almost to the bottom of the trap. The trap 39 is partially filled with water through an opening therein covered by a screw-cap. A waste-pipe 40 opens into the trap 39 near the bottom thereof and is bent upward to discharge from its outer end any water in said trap above the level of the outer end of said pipe.

On the inside of the generator 15 is a hood 41, extending downward over the inner ends of the pipes 25 and 30, Fig. 3, to a point below the top of the cage 24.

A tube 42 extends down from the center of the top of the gas-holder 7 the whole length of the gas-holder and its lower end is open. A hole 43 is made through the pipe 42 near the bottom. An escape-pipe 44, supported in any suitable manner on the bottom of the tank 3, extends up centrally inside the tube 42 to a height somewhat above the level of the gas-tank 32 and its upper end is open. The pipe 44 is bent to extend horizontally and radially along the bottom of the tank 3 inside it, as seen in Fig. 1, and again bent vertically to pass up through the tank in the space between the tank and gas-holder 7 to a height exceeding the height of the tank in its utmost vertical movement. This pipe 44 passes through the external walls of the building, wherein this gas apparatus is contained, and the open end of the pipe permits the discharge of the gas into the outer atmosphere. At the bend of the pipe 44 at the center of the bottom of the tank 3 it is provided with a short pipe 45, opening therein and having its lower end extending and opening into the drip-trip 39 at a point above the level of the water in said trap.

An outlet gas-pipe 46 is suitably supported on the bottom of the tank 3 and extends up through the tank 3 into the gas-holder 7. The pipe 46 is bent to pass from the bottom of the tank 3 up between said tank and gas-holder and out to connect with the gas-piping of the building which is to be illuminated. At the bend of the pipe 46, near the center of the tank-bottom, it is provided with a branch pipe 47, which extends down into the drip-tank 39 as far as the pipe 38, above described.

Having thus specified the several parts of the device, I will proceed to explain the operation. The tank 3 and traps 32 and 39 are filled with water to the height indicated by the water-lines in the several figures, and the gas-holder 7 is submerged in the tank 3 as far as it is adapted to descend. To enable such submergence, the stop-cock shown near the outer end of the service-pipe 46 is open, so that the natural air in the top of the gas-holder can escape to the external atmosphere as the gas-holder descends. When the gas-holder has been submerged to the desired distance, said stop-cock is closed again. The caps 21 of the generators 15 are then removed by operating the screws 22 and clamps 23, and the carbid of calcium from which the acetylene gas is to be made is placed in the wire cages 24. The caps 21 are then put on to cover the generators 15 and are clamped down tightly by means of the screws 22 and bows 23, as before. The water flows from the tank 3 through the water-pipe 26 (the valve 28 being then open) and by means of the valve 27 is directed into one of the generators 15 through the pipe 25, connected therewith. The water discharged by said pipe 25 into the generator first strikes against the inner surface of the hood 41, and its force is thus broken and the flow directed downward along the inside of the generator to the bottom thereof. The water should be allowed to flow into the generator until the water rises to the level of the pipe 30. When the water rises to the height of the pipe 30, it will flow through said pipe into the other of the generators 15, and by means of this intercommunicating pipe 30, which has no valves, the water in the two generators will be maintained at the same height in both, and at length the water in both generators will reach the same level as in the tank 3. The action of the water upon the carbid generates acetylene gas in the well-known manner, and said gas fills the upper portions of the generators 15. The gas passes from the top of each generator 15 out through the bent pipe 34, connected therewith. It will be seen that when this gas-machine is not in operation the water of the trap-tank 32, passing into the lower U-bend of the pipe 34 through the hole 35, fills the said pipe up to the water-level of the tank 32; but as soon as the gas forms in the generators 15 it has such pressure that it blows out the water from the pipe 34, and so the gas is discharged through said pipe 34, which is then dry, into the gas-trap 32 above the level of the water there. Thence the gas flows through the pipes 36, 31, and 37 into the gas-holder 7, causing the gas-holder to rise in the tank 3 until it has risen to the proper height. The weight 9 on the top of the gas-holder regulates the gas-pressure of the gas-holder 7. As the gas-holder 7 fills with gas it ascends, and its slotted brackets 14, sliding along the guide-rods 4, confine the upward travel of the gas-holder 7 to a true vertical direction. The upward movement of the gas-holder carrying

the bracket 10 and the rod 11 with it at length brings the nut 13 of the rod 11 up under the end of the handle 29 of the valve 28 and moves said handle up, thereby turning the valve 28 and shutting off the water in the water-supply pipe 26, so that no more water can flow into the generators 15 to act upon the carbid. As soon as the formation of the gas ceases in the generators or the gas therein has lost its pressure the water in the gas-trap 32, being no longer prevented, flows through the holes 35 into the pipes 34, filling the lower part of the U-bend and constituting a water seal to trap the gas. By turning the stop-cock in the service-pipe 46 to conduct the gas from the machine to the burners the gas flows down from the top of the gas-holder 7 through the pipe 46. The gas in passing from the generators 15 through the pipes 34 into the tank 32 is quite hot, but is cooled by passing from the tank 32 through the pipes 36, 31, and 37, because said pipes are submerged in the water of the tank 3. Some condensation therefore is caused in said pipes, and the water so formed passes down through the drip-pipe 38 into the tank 39, while the gas being lighter does not go down the pipe 38, but rises through the pipe 37 into the gas-holder 7. In like manner any condensation in the outlet-pipe 46 drips through the pipe 47 into the trap 39, but the overflow-pipe 40 of said trap disposes of all surplus water.

The purpose of the pipe 19 leading from the tank 3 into the bottom of the generator 15 is to flush the generator with water from said tank in order to wash out the residue after the operation of the machine. The valve 20 is turned to allow such flow, but is shut off at other times. The tap 17 enables the draining off of the contents of the generator 15 whenever the stop-cock of said tap is properly turned for that purpose.

By bending the pipe 30 centrally into the U shape shown the water in that portion of the pipe so bent constitutes a seal between the two generators.

The escape of any excess of gas takes place automatically whenever the conditions are improper. Near the lower end of the tube 42 is the hole or opening 43, which as soon as the gas-holder 7 has risen to such a height that its bottom is nearly up to the level of the water in the tank 3, being then above said water-level, allows the gas contained in the gas-holder 7 to escape into the tube 42, whence it flows into the blow-off pipe 44 and out into the external air. Any gas which may happen to be in the drip-trap 39 can pass up through the pipe 45 and so pass off through the pipe 44, and any clogging of the inlet-pipe 37 will simply divert the flow of gas down through the pipe 38 into the drip-tank 39, whence it can escape into the outer air through the pipes 45 44. When the excessive pressure of the gas has been reduced by the blow-off pipe 44, as described, the weight 9 upon the top of the gas-holder 7 will cause the bottom of the gas-holder to be submerged deeper in the water of the tank 3 until the hole 43 of the tube 42 is below the water-level again, whereupon the water seals the lower or open end of the tube 42, and no further escape of the gas through the pipe 44 is possible. This combination of the parts described constitutes a perfect safety device, and the amount of gas-pressure possible and allowable is determined by the weight of the sand or other material upon the top of the gas-holder 7.

By means of the faucet 6 the water can be drawn from the tank 3 when desired.

The characteristic feature of my invention is the discharge of the gas into the tank 32 through the U-shaped pipe 34, provided with the opening 35 therein. The water flowing through said opening fills so much of said pipe as is below the level of the water in said tank, thus forming an effective water seal, as already described; but the water so contained in the pipe 34 is blown out by the pressure of the gas formed in the generators 15 and discharged therefrom. When the water has been thus blown out of the pipe 34, said pipe is clear for the unobstructed passage of gas through it into the tank 32, whence the gas flows through the pipe 36 and is discharged into the gas-holder 7. In all other devices for the manufacture of acetylene gas, so far as I am aware, which have a supplemental tank between the gas-generator and gas-holder the pipe discharging gas from the generator terminates below the water-level in such intermediate tank. Therefore the gas which is discharged from said pipe bubbles up through the water into the upper portion of the intermediate tank and thence passes through another pipe into the gas-holder. It has been found by experience that this passage of the gas through the water in the form of bubbles results in a very considerable loss of the gas, from one-quarter to one-third thereof, and also impairs its quality. The opening 35 in the pipe 32, as described, provides a water seal in the pipe when gas is not flowing through it, but enables it to be a dry pipe when gas is passing through it.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a machine of the class described, the combination of a water-tank, a gas-holder, a gas-generator and means of generating gas therein, a supplemental water-tank and a pipe leading from said gas-generator to the last-mentioned tank, bent to form a trap below the level of the water in said supplemental tank, and having its outer end open and above said water-level, said pipe being provided with an aperture below said water-level, as and for the purpose specified.

2. In a machine of the class described, the combination of a water-tank, a gas-holder, a gas-generator and means for generating gas therein, a closed supplemental water-tank, a pipe leading from the gas-generator to the last-mentioned tank, bent to form a trap be-

low the level of the water in said supplemental tank, and having its outer end open and above said water-level, said pipe being provided with an aperture below said water-level, and a pipe from the upper part of said tank above said water-level leading to the gas-holder, substantially as described.

3. In a machine of the class described, the combination of a tank of water, a gas-holder having a closed top and an open bottom and submerged in said water-tank so as to be buoyant therein, a gas-generator and means of generating gas therein, a closed supplemental tank of water, a pipe leading from the gas-generator to the last-mentioned tank, bent to form a trap below the level of the water in said supplemental tank, and having its outer end open and above said water-level, said pipe being provided with an aperture below said water-level, and a pipe from the upper part of said tank above said water-level leading to the gas-holder, substantially as shown.

4. In a machine of the class described, the combination of two vessels adapted to contain gas, one of which vessels is partially filled with water, and a pipe connecting said vessels, bent to form a trap beneath the level of said water and there perforated and having its outer end open and above said water-level, substantially as set forth.

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

ROBERT EXLEY.

Witnesses:
WARREN R. PERCE,
HOWARD A. LAMPREY.