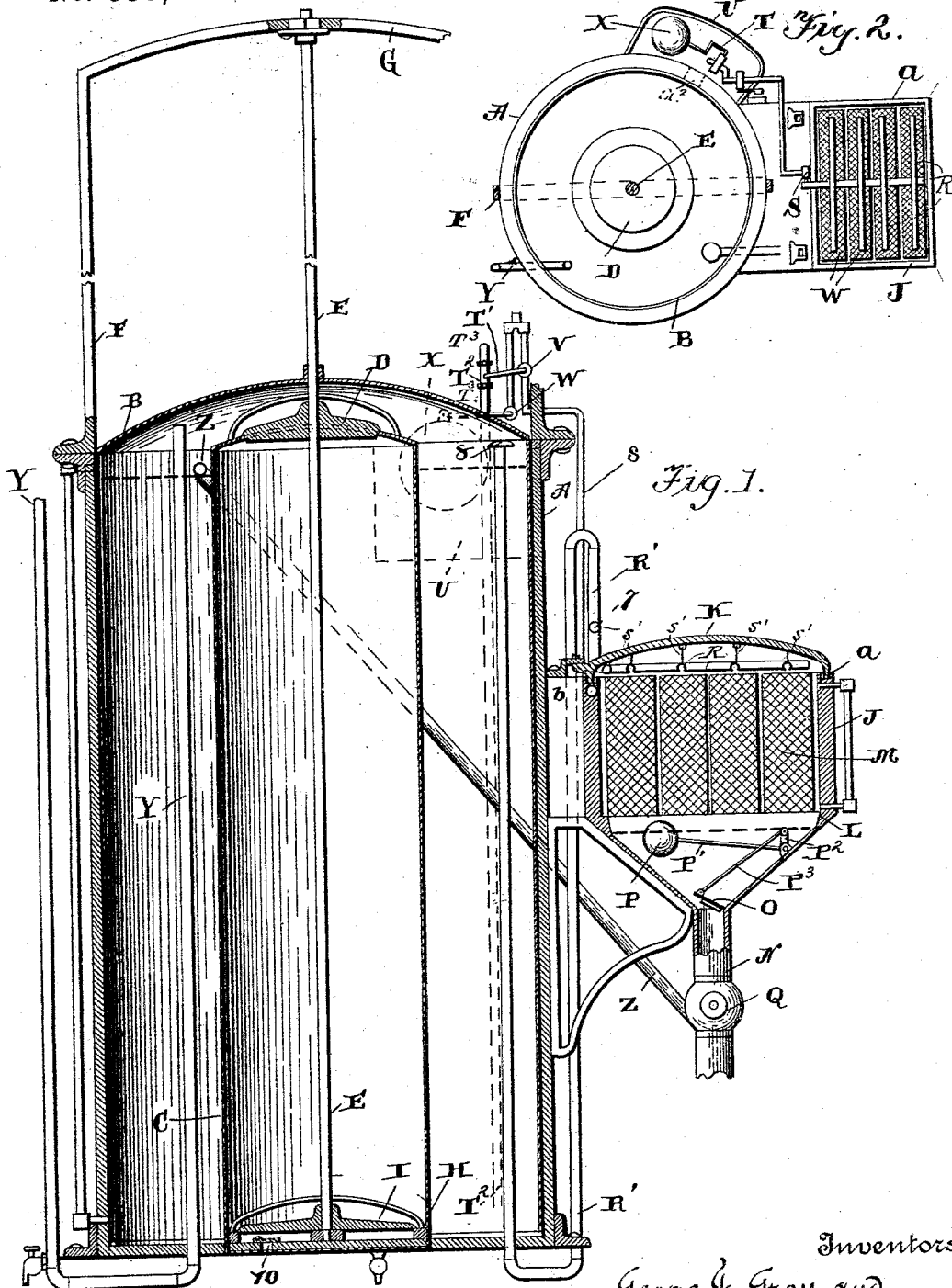


(No Model.)

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APPARATUS FOR MANUFACTURING ACETYLENE GAS.

No. 559,846.

Patented May 12, 1896.



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UNITED STATES PATENT OFFICE.

GEORGE J. GRAY AND WILLIAM F. HITCHCOCK, OF ROCHESTER, NEW YORK.

APPARATUS FOR MANUFACTURING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 559,846, dated May 12, 1896.

Application filed September 5, 1895. Serial No. 561,582. (No model.)

To all whom it may concern:

Be it known that we, GEORGE J. GRAY and WILLIAM F. HITCHCOCK, citizens of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Acetylene Gas; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to the manufacture of acetylene gas; and it has for its object to provide a machine which will automatically operate to effect a union of water and the carbide by letting in and shutting off the former and at the same time storing the gas produced. In the manufacture of acetylene it is important and almost necessary that the water and the carbide of potassium or calcium should be brought together automatically, and to effect this we have invented the apparatus hereinafter described.

In the drawings illustrating the invention, Figure 1 is a view of the machine complete, partly in elevation and partly in section. Fig. 2 is a plan or top view of the same.

Similar reference letters and figures in the drawings illustrate like parts in both of the views.

Referring to the drawings, A is a tank nearly filled with water.

B is a smaller tank or gas-holder, inverted and counterbalanced in the usual manner of gas-tanks, suitable to the requirements of pressure, &c. A water-space is to be provided between the said tank and holder to admit of a free movement of the latter within the former.

C is a third cylinder, provided with a valve D at its upper end, which is operated by the gas-pressure in the tank or holder B. Attached to the holder B at the center of its dome is a rod E, which is preferably double the length of said holder B, its upper end freely movable vertically in loop G of a yoke F, surmounting the tank A. The other end of said rod E has secured to it a plunger H, provided with a valve I, which latter works with the valve D previously mentioned. The

purpose of these two valves will be duly described hereinafter.

Upon the side of the tank A is a box J. This box is preferably rectangular in horizontal section and provided with a groove *a*, surrounding it at its top, to receive a top or cover K, having a corresponding flange *b*, water being provided in said groove, so that when the cover is in place an air-tight or gas-tight joint is formed. The box J has a bottom of pyramidal form, preferably, and on the inner surface of the said bottom portion at its intersection with the vertical portion of said tank is a shelf L. This shelf is intended for the support of one or a series of rectangular wire baskets M, intended to hold the carbide. At the lower extremity of the box J is a drain-pipe N with a hinged valve O. Pivoted to the conical portion of the box J is a float P with a long arm P' and a short arm P². The valve O and the short arm P² are connected with hinge-joints to an arm P³, and a cock Q is located in the drain-pipe beneath the said valve O.

Opening into the box J is a gas-pipe R'. The course of this pipe is upward from said box, then downward, and again upward, terminating with a check-valve S at a point in gas-holder B above the water-line. This pipe R' is provided with a cock 7 to shut off gas when the said box J is opened for any purpose.

R R, &c., are perforated water-pipes, corresponding in number with the baskets below them, hung upon a swing-joint S and also hung to cover K at S'. A pipe *s* extends from there upward and is provided with a cock V, operated by lever T' and rod T², the said rod T² being attached by and adjustably related to gas-holder B on the outside and adjustably related to lever T' by lugs T³. These lugs are adjustably fixed to rod T², so that they may be moved to any positions suitable to the required movement of the tank. Upon or in the tank A is a box U, connected directly under cocks V and W, the latter of which is operated by a float X, which moves with the rise or fall of the water of the tank to close or open a valve or cock W.

Y is a pipe, which is of U shape, extending upward with arms, one of which opens into the gas-holder to receive the supply of gas and

the other running to the place of destination of the gas. An overflow-pipe Z for the tank extends from the upper part of the holder B to the drain-pipe U, below the cock Q of the latter, whence overflow of water is discharged to a sewer or drain.

As before mentioned, gas is formed by the conjunction of water and the carbide of potassium or calcium, and the mechanism just described is applicable to the production of gas in the manner as follows: It is to be supposed that the tank A is precharged with water. So we first remove the cover K and carry with it the water-feed pipes R, they being swung to said cover and swivel-jointed to pipe S. The wire baskets M, &c., are now removed and filled with the carbide and replaced in box J, after which the cover K is closed again and hermetically sealed, the water of the groove *a* serving this purpose. To begin the operation, the cock V must be momentarily opened by hand to allow water to flow in through pipes S and R and spray or drop in upon the carbide contained in the baskets M M through perforations in pipes R R. When sufficient water has been admitted to form gas, a pressure is obtained sufficient to drive the gas through pipe R' and into the holder B. The gas now causes the holder to rise as the gas is generated. Check-valve 8 is at the upper extremity of pipe R'. If gas is being used, it will pass through pipe Y to the burners. After a given quantity of gas is formed the supply of water to the carbide is cut off, this being effected by the closing of cock V, this being done by contact of lugs T³ with lever T', said lugs being so located on rod T² as to allow of a certain rise of the gas-holder before the contact takes place by the rise of holder, said rod T² and holder B traveling inseparably together. When the supply of water ceases, the formation of gas will also cease, as a matter of course. If gas is being consumed, the holder will fall to a point regulated or limited by the lug on rod T², when formation of gas will again begin, water being again admitted to the carbide. A proper adjustment of the lugs upon the rod T² will insure an automatic generation and cessation of the gas formation after the operation has been begun. It is possible that more water may be admitted through pipe S than is required, and in such case the baskets M would be submerged and more gas would be formed than the holder would contain. This contingency is provided against in the float P. Should the water rise in the bottom of the box J to the level shown, (see Fig. 1,) the float will have risen with the water and opened valve O, thus allowing the surplus water to escape, but again closing the valve by gravity before all the water has escaped, thus continuing a perfect seal against the escape of gas. The formation of gas is continued until the carbide is exhausted, when it becomes necessary to renew the latter. In order that no gas contained in the

box at this juncture may be wasted, the cock Q must be closed, the cock V opened by hand, and the box J filled with water, thus driving all the gas into holder B. To guard against an excess of water in box J and the filling of pipe R, a water glass or indicator may be attached to the side of box J to exhibit the exact water-plane on the box at all times. All the gas being now stored, cock Q is opened and the whole box is thoroughly washed out. The cock V is now closed, the cover K raised, and the baskets taken out, refilled with carbide, and replaced. The operation as described may now be repeated. The check-valve 8 prevents the escape of gas from the holder B while the new carbide is being placed.

For ordinary commercial purposes acetylene is too rich for satisfactory consumption either in lighting or heating, requiring, therefore, an admixture of common air. To correct this defect, we place within or upon the tank A a chamber or cylinder C with certain appurtenances to be described. This cylinder is practically an air-pump, its piston being operated by the rise and fall of the gas-holder B, to which the rod of the said piston is attached. Within the cylinder C is a plunger II, a valve I, a piston-rod E, and a valve D. As the gas-holder B rises, carrying with it the piston-rod E and plunger II, the air received into the cylinder C and held by the valve I is carried up and discharged through valve D into the gas contained in holder B. The proportion of air delivered to the gas is determined by the diameter of cylinder C as compared to the diameter of the gas-holder B. In our drawings we have shown the opening 10 to receive air into the cylinder C, though we may as well have the piston-rod partly hollow and provided with an opening in its side through which air might be received to the cylinder below the piston. At opening 10 is shown a check-valve of simple form to prevent the escape of air as the plunger II descends.

Upon the side of the tank A is attached an auxiliary water-box U, which opens into said tank. This box when filled with water serves to keep a proper water-level in the tank A, and at the same time it serves to catch drippings from the valves V and W. Within the box U is a float X, provided with the usual lever-arms, which assist in operating cock V to keep up a proper supply of water to the tank, any excess being carried off by the overflow-pipe Z to the waste-pipe. Communication is had between tanks A and U through an opening in the tank A, as seen at *a*², coincident with the water-line.

The supply of water may be taken from any water-service through a pipe leading to the valve V, at which point the supply is controlled.

In order that the height of the water in the water-tank may be readily observed, we place

a tube of glass on the outside of said tank at some convenient line, through which the water-line may readily be seen.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a gasometer composed of a main water-tank, an inverted gas-tank, and an auxiliary water-tank arranged with an automatically-operating supply and discharge as described, of an air-cylinder operated as a pump simultaneously with the rise and fall of the gas-holder, as and for the purpose set forth.

2. The combination with the main water-tank, the auxiliary water-tank and the gas tank or holder, of cock W, lever-arm attached to said cock, and a float attached to said lever-arm, as and for the purpose set forth.

3. The combination with the main water-tank provided with extended yoke F having a loop G, the gas-holder and check-valve at 10, of the rod E connected to said gas-holder, the air-cylinder C, the plunger connected to said rod and the valves I and D, all arranged substantially as specified.

4. The box J provided with a surrounding groove at its top, a sealable cover, a funnel-

shaped bottom terminating with a discharge-pipe provided with a cock, a valve and a float mechanism to operate said valve, of the carbide-baskets located within said box, spraying-pipe R, pipe S and a valve T operated automatically from the movement of the gas-holder, as and for the purpose set forth.

5. The combination with the primary and secondary or auxiliary tank, connected by an opening, as described, the gas-holder and the generator, the pipe leading the gas from the generator to the holder, of the carbide-holder in separate apartments and discharge-pipe, as set forth.

6. The box J provided with a hinged top or cover to inclose tightly solid and fluid materials for the manufacture of gas, in combination with pipes R and S hinged together and the link S' uniting said pipes R, and the cover to said box, substantially as specified.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORGE J. GRAY.
WM. F. HITCHCOCK.

Witnesses:

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F. S. HUTCHINSON.