

No. 708,956.

Patented Sept. 9, 1902.

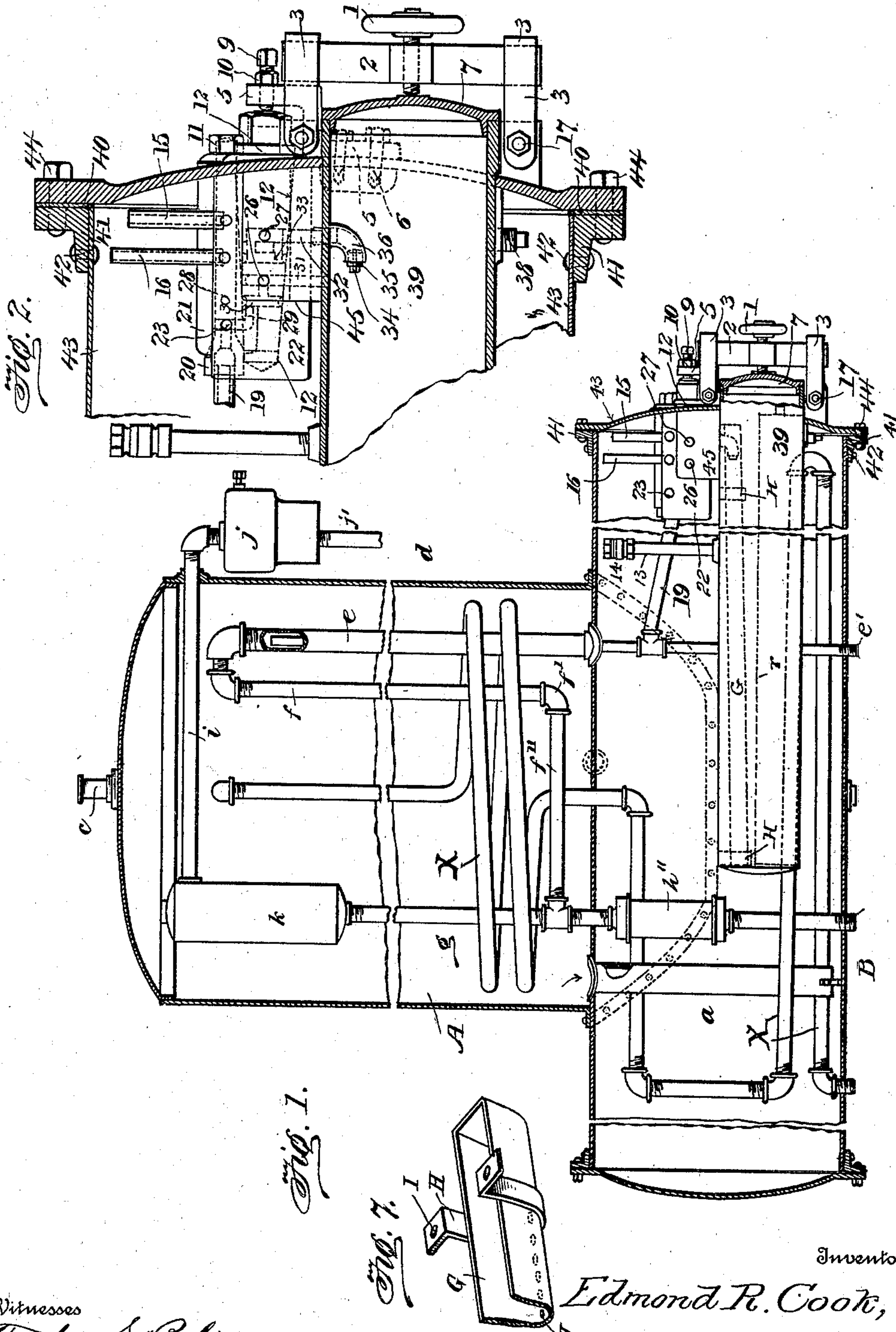
E. R. COOK.

APPARATUS FOR GENERATING ACETYLENE GAS.

(Application filed Apr. 27, 1901. Renewed Aug. 16, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
Fenton S. Belt,  
C. H. Fowler

Inventor  
Edmond R. Cook,  
By  
J. Walter Fowler  
his Attorney

No. 708,956.

Patented Sept. 9, 1902.

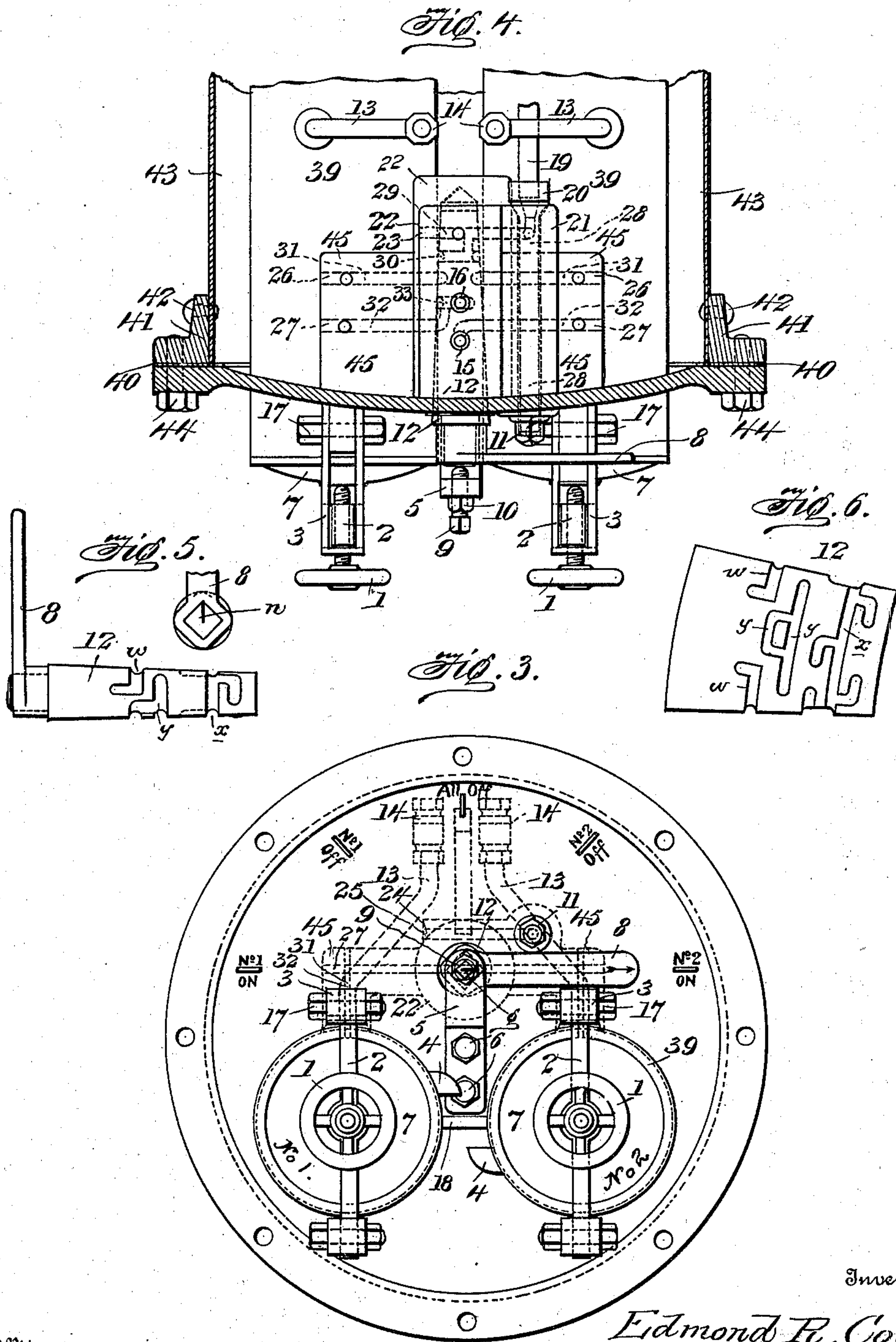
E. R. COOK.

APPARATUS FOR GENERATING ACETYLENE GAS.

(Application filed Apr. 27, 1901. Renewed Aug. 16, 1902.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses  
*Samuel S. Bell*  
*C. H. Fowler*

Inventor  
*Edmond R. Cook*  
By *J. D. Walter Fowler*  
Attorney



# UNITED STATES PATENT OFFICE.

EDMOND R. COOK, OF SACRAMENTO, CALIFORNIA, ASSIGNOR OF ONE-HALF  
TO GEORGE F. HEUSNER, OF PORTLAND, OREGON.

## APPARATUS FOR GENERATING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 708,956, dated September 9, 1902.

Application filed April 27, 1901. Renewed August 16, 1902. Serial No. 119,968. (No model.)

*To all whom it may concern:*

Be it known that I, EDMOND R. COOK, a citizen of the United States, residing at Sacramento, in the county of Sacramento and State of California, have invented new and useful Improvements in Apparatus for Generating Gas, of which the following is a specification.

My invention relates to certain new and useful improvements in apparatus for generating acetylene gas; and it consists of the parts and the constructions and combinations of parts, which I will hereinafter describe and claim.

The present invention is an improvement upon my former patent, No. 670,196, dated March 19, 1901, the improvements including a cast-iron generator-head and a plurality of carbid cylinders or vessels cast on this same head, a seven (7) way valve with water and gas passages and the connections thereof, a certain arrangement of steam heating-coil, and a rearrangement and reconstruction of the important parts.

One of the essential objects of my invention is to provide means for overcoming the tendency of apparatus of this character freezing in extreme cold weather, which object I attain by locating the valves and pipe connections (which in my former patented construction were located outside of the generating-chamber) within the generator, and instead of employing, say, three pipes and a three-way valve for conducting water to the carbid-trays I now use two vertical pipes through which and a seven-way valve and passages I conduct the water to the carbid, this valve being the only valve to operate, essentially, the whole apparatus.

In the accompanying drawings, in which similar letters of reference indicate like parts throughout the several figures, Figure 1 is a longitudinal sectional view of the apparatus, showing clearly the heating-coil arranged therein. Fig. 2 is an enlarged sectional view of one end portion of the generating-chamber. Fig. 3 is an end view of Fig. 2. Fig. 4 is a plan view of Fig. 2, the generating-chamber and its head being in section. Fig. 5 is a detached view of the seven-way valve. Fig. 6 is a plan showing the valve-face with its ports

and passages. Fig. 7 is a detached view of one of the spray-troughs and its hanger.

This apparatus is especially designed for the production of acetylene gas and its storage under a constant pressure, whereby the supply to the burners is effected whenever the cocks are opened under such conditions that the burners will be kept clear and prevented from clogging. It is particularly intended for use on locomotives for headlight purposes.

The apparatus, as in the former patent, consists of two chambers A and B, one superposed above the other. For ordinary uses these chambers may be formed in a single vertically-disposed cylinder of sufficient length; but I have here shown the apparatus as comprising a vertical chamber A and a horizontal chamber B, the two being connected together and having a pipe *a* extending from the bottom of the chamber A to near the bottom of the generator B, so that water being placed in the upper tank will pass through the pipe *a* into the lower part of the generator, producing an upward pressure on any gas or like medium contained in the generator, which pressure will depend on the height of the water in the tank A. The head of the chamber A is closed except for the opening *c*, having a pipe through which the tank is ordinarily filled with water.

*d* is a smaller opening to connect with an injector (not shown) by which the engineer or operator can let in water in case at any time more is desired.

Within the tank A is a vertical tube *e*, extending to near the top of the tank, closed at the upper end and having its lower end in open communication with the generator. Into this tube the gas from the generator passes under whatever pressure may be produced by the height of the column of water, as previously stated.

From the upper end of the tubular chamber *e* a pipe *f* extends, passing down to an elbow *f'*, from which a pipe *f''* leads to a vertical pipe *g*, which extends upwardly and connects with a purifying-chamber *k*, the object of which is to arrest any moisture which has reached this point and condense it and



any deleterious substances which may be carried by the gas and which would ordinarily clog the burners.

From the upper part of the purifier *h* a tube *i* extends and connects with a regulator, as shown at *j*. From this regulator the gas is delivered to the pipe *j'* to pass to the burners. A regulator or some means of insuring a steady light is essential. While the action of the water in the chamber insures a certain constant pressure on the gas and would be a sufficient regulator in case the machine was at rest, when it comes to use on locomotives or where the jar and wash of the water are continuous and violent it is necessary to have means for relieving the otherwise serious fluctuations in the head of gas.

It will be understood from the arrangement of the tubular chamber *e*, closed at the top, that no gas enters the chamber A outside of this tube and the connected pipe and related parts, the chamber A serving simply as a receiver for the water when the latter is forced out of the generator-chamber through the pipe *a* by pressure of gas in said chamber and allowing the water to again return into the generator-chamber when the amount of gas therein has been sufficiently reduced. This generator-chamber has fixed in it the horizontal chambers 39, which are here shown as cylindrical and having heads or caps on their outer ends, with suitable means for forming tight joints. The carbid-cylinders 39 are both cast on or secured to the same generator-head, and each cylinder has a cover 7, against the central portion of which operates the point or end of a hand-screw 1 for tightly holding the cover in place. This screw operates through the center of a clamp-bar 2, the ends of which enter the loops 3, bolted to lugs on the generator-head by means of the bolts 17, the edges of the said covers 7 being provided with lugs 4, Fig. 3, which, in conjunction with a fulcrum or brace 18 on the head of the generator and extending between the two carbid-chambers, serves as a means for loosening the covers of the cylinders when the removal of said covers is desired. Bolted to the head of the generator by means of tap-bolts 6 is a bracket 5, which holds in place the seven-way valve, hereinafter described, said valve having its stem connected with a lever-handle 8. Tension-screws 9 are threaded in an arm of the bracket 5, and their inner ends bear upon the outer end of the turning plug or valve 12, as indicated in Figs. 2 and 3, lock-nuts 10 being employed to lock the screws after they have been adjusted. The generator-head is also cast or provided with a casting 22, which serves as a housing and valve-casing for the seven-way valve, and the generator-head is also formed with a lug 45, in which is made suitable gas-inlet ports 26 and water-inlet ports 24, 25, and 27 and gas-outlet ports 23 and 31 and water-outlet ports 32, the latter connecting with elbows 36 within the carbid-chambers and provided

with reducing-nozzles 35, having plugs 34 with holes for the discharge of water.

The seven-way valve 12 is in the form of a long tapering plug. It is provided with annular grooves, arranged as shown in Figs. 5 and 6, having lateral branches. The grooves *w* and *y* in these figures are water-ports and the grooves *x* are the gas-ports, the former adapted to communicate with the water-ports 27 and the latter with the gas-ports 26 in the lug 45, and the operation of which valve and its ports I will hereinafter indicate. The annular passage 30, Fig. 2, in the turning plug or valve 12 is a gas-passage and connects with a branch or passage 29, and another of the annular grooves or passages connects with the gas outlet-port 31, as shown in Fig. 2. These ports or passages and the water-inlet ports 32 33 control the flow of gas and the admission of water, and all of said ports are controlled by the movement of the single valve shown and described.

Fitted to the lug or casting 22 are the vertical pipes 15 and 16, one being shorter than the other and both serving to conduct water to the water-passages in the valve or plug, whereby upon the proper manipulation of said valve the water is delivered to the reducing-nozzles and discharged upon the carbid in the carbid-chambers. Rising from the carbid-chambers are also the pipes 13, provided with safety or check valves at 14. A long bolt 28 passes through the lug or casting 22, and its outer end receives a cap-nut 11. The inner end of this bolt is formed with an enlarged head 20, provided with a countersink, a lug 21 being cast on the generator-head for the purpose of receiving the countersink-head bolt. Connecting with the countersink in the bolt 28 is the gas-conducting pipe 19, said countersink being itself a passage which communicates with the gas-outlet passage 29 in the valve or plug 12. The carbid-cylinders receive the carbid-trays *r*, which are introduced whenever the generator-heads and their attached carbid-cylinders are removed and the trays again replaced after charging. Above the carbid-trays are the spray-troughs *G*, having perforations *J* in the bottom, and these troughs are slightly inclined, so that the ends at the rear of the chambers are a little lower than the front ends. These spray-troughs are held up near the top of the carbid-cylinders by lugs or loops *H* and screws or bolts at *I* in such manner that the troughs may be removed at any time—say for the purpose of cleaning—without disturbing or loosening the loops which support them. Both ends of the trays will be supported by loops, as just described.

It will thus be seen that water delivered to the troughs will flow to the rear or inner end and will percolate through the foraminations and be distributed with considerable evenness from one end to the other of the carbid-trays. As seen in Fig. 2, the generator-head



43 is bolted to the casing by tap-bolts 44, a packing or gasket being interposed between the head and casing to make a tight joint and the casing being reinforced at this end to receive the bolts by means of a flange 41, riveted to the casing.

The diagrammatic figure shows the outside surface of the turning plug or valve and the position of the water and gas ports, and the outer end of this plug or valve has a mark or notch *n* as a means of indicating which way the lever should be turned or pointed with relation to certain designating marks or characters on the generator-head, as shown in Fig. 3.

As before described, the ports *w* and *y* in the valve are water-passages, and the ports *x* are passages for gas, and two pipes 15 and 16, one shorter than the other, connect with the said water-passages. Now when the arrow on the lever-handle is pointing at "All off" the passages, both water and gas, are closed, and the flow of water and gas is shut off. When the lever is moved into a second position—namely, with the arrow pointing to "No. 1 on"—the valve is turned and opens the ports for the water-inlet from the short pipe 15 to the carbid-chamber No. 1 and the water ports or passages from the longer or higher pipe 16 to carbid-chamber No. 2. At the same time there is opened the outlet gas port or passage from carbid-holder No. 1 into the gas-conducting pipe 19, and there has also been opened the gas-outlet port from carbid-holder No. 2 into gas-conducting pipe 19. When the lever is moved into a third position—namely, with the arrow pointing at "No. 1 off"—the following result is effected, to wit: The gas-port leading from the carbid-holder No. 1 is closed, also the water-passage leading to said holder No. 1, and the valve has been turned so that its water and gas ports are in open communication with carbid-holder No. 2.

In another movement of the lever—namely, with the arrow pointing at "No. 2 on"—the port for water-inlet from the short pipe 15 to carbid-holder No. 2 is opened, likewise the port for water-inlet from the longer pipe 16 to carbid-holder No. 1 is opened, also the gas-outlet port from carbid-holder No. 1 to gas-conducting pipe 19 and gas-outlet port from carbid-holder No. 2 into said gas-conducting pipe 19. In other or fifth position of the lever, as when the arrow is pointing at "No. 2 off," the gas-port leading from carbid-holder No. 2 is closed, also the water-port leading to said holder, which leaves the water and gas ports open to the other carbid-holder No. 1. Thus the object of the seven ways of the valve may be stated generally to be: one to conduct gas from carbid-holder No. 1, two to conduct gas from carbid-holder No. 2, three to conduct water to carbid-holder No. 1, four to conduct water to carbid-holder No. 2, five to connect short water-pipe 15 with one carbid-holder only, six to connect the longer water-pipe 16 with the other carbid-holder only,

and seven to conduct gas from both carbid-holders to the conducting-pipe 19. The automatic switching from one carbid-holder to the other is brought about by the change of travel of the water by the same rising to the higher level—namely, to overflow-pipe 16—when the carbid holder or chamber becomes exhausted. This the present apparatus does without any manipulation of the valve. In other words, the carbid in both holders or generators will be consumed alternately without any change of position of the seven-way valve. The changing or moving of the valve or its handle is necessary only for the convenience of the operator when recharging or as an indicator to make manifest to the operator which chamber water is first feeding into.

To operate this apparatus with this improved seven-way valve and head is substantially the same as in my prior invention, except there is one valve only to handle in shutting off all gas and all water or to shut off gas and water from whichever carbid-cylinder may be required and leave the other one turned on. By having the arrow on the valve-lever handle pointed "No. 2 on," Fig. 3, the carbid holder or generator No. 2 will commence to make gas first when gas is required to be made by the withdrawal of gas from the apparatus by the burners or otherwise and will continue so to do from time to time until this No. 2 carbid holder or generator has been exhausted, as the position of the valve by having lever-handle 8 pointed at "No. 2 on" connects the shorter pipe 15 with carbid-chamber No. 2, through which the water has been flowing to No. 2 chamber, until all the carbid therein becomes exhausted. The water will then rise in chamber B, Fig. 1, until it will pass down through the higher pipe 16 and through the water-passages in the seven-way valve and into carbid-holder No. 1 and continue to make gas from this chamber until it becomes exhausted.

It will be readily seen that when placing the lever-handle of the seven-way valve so that the arrow points at "No. 2 on" the valve will be in such a position as to allow the shorter upright water-pipe 15 to be connected direct to carbid chamber or generator No. 2 only and the longer upright pipe 16 will be connected to the carbid chamber or generator No. 1 only, and naturally the water will commence to flow down the shortest pipe first and go to whichever carbid-holder the lever-handle 8 is pointed at. Now by changing the valve-lever handle 8 so as to have the arrow thereon point at carbid holder or generator No. 1 the position of the ports in the valve will change so as to connect the short upright pipe 15 with carbid-chamber No. 1 only and the longer water-pipe 16 with carbid-chamber No. 2 only. By reversing the position of the lever-handle No. 8 it reverses the travel of the water that



passes down these water-pipes 15 and 16. When it becomes necessary to refill the carbid-holder toward which the lever-handle 8 is pointed—say if it points at “No. 2 on,” or vice versa—all that is necessary is to raise the lever-handle until it points at “No. 2 off,” Fig. 3, and in so doing the inflow of gas and water is shut off from the carbid-chamber No. 2; but it does not in that position affect the operation of the other carbid-holder No. 1 in any particular, and in this position the hand-screw 1 can be loosened and the clamp-bar 2 removed, and then the cover 7 may be removed by taking the end of clamp-bar 2 and putting it between the lug 4 on cover and the brace 18 and pry down, which will cause the cover to loosen very readily in case same should be stuck to gasket, and after refilling and restoring the carbid-chamber and replacing the cover 7 and clamp-bar 2 the hand-screw 1 is tightened and the lever-handle 8 may be moved so that the arrow will point to the carbid-chamber opposite to the one that has been filled, whereby the apparatus will continue to make gas from the same generating-chamber that has been partly exhausted. At all times when the lever-handle 8 is pointed at “No. 1 on” or at “No. 2 on” the ports in the seven-way valve are in such a position as to allow the gas to pass freely out of either or both carbid-chambers up through seven-way valve, then through and out of gas-pipe 19, Fig. 2. When the lever-handle is pointed at “No. 1 off,” the gas will then pass through the seven-way valve from carbid-chamber No. 2 only, and when pointed at “No. 2 off” it will pass from carbid-chamber No. 1 only, and by changing the lever-handle so that the arrow will point straight up and at mark “All off” all gas and all water will be cut off and prevented from passing through the valve from either cylinder. In case the carbid should be damp in one or both of these carbid-chambers and be throwing off gas this gas would then pass up and out through pipe 13 and the safety-valves 14 and into the chamber B, and in so doing would prevent any excess of pressure in the chamber. The gas-conducting pipe is connected to the openings from the seven-way valve gas-outlets by being screwed into the head of the long brass bolt 20, that has a countersunk head and passes through lug 21 and generator-head and is held in position by a cap-nut 11 on outer surface, as shown. To receive any moisture from the gas before it is delivered into the chamber *e*, I provide a pipe *e'*, substantially as in my former patent, and the pipe *g*, which leads to the purifying-chamber, also connects with a chamber *h''*, which is useful for drawing off collected moisture. It will also be understood that the water-spray troughs, carbid-trays, and all parts connected therewith are freely removable for cleaning or for other purposes and that the recharging of the trays may be accomplished while the apparatus is in operation without

affecting the steadiness of the lights—an important feature where the apparatus is designed primarily for use on locomotives for headlight purposes. Also the location of the essential parts wholly within the generator and the employment of the steam heating-coil X, which passes back and forth substantially throughout the vertical and horizontal portions of the apparatus, overcomes all tendency of the parts freezing in extreme cold weather.

In Fig. 2 the plug 38 is one used for stopping the hole that the drill passed through when drilling the hole for the attachment of the elbow 36.

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

1. In a gas-machine, the combination of a generator-chamber, a removable head for said chamber and a plurality of carbid-cylinders formed rigid with said head, a single valve interposed between the two cylinders, and provided with gas and water passages, gas and water passages connecting the passages of the valve with said chambers, and means whereby the valve may be turned to open communication with one chamber and shut off communication with the other chamber.

2. In a gas-machine, the combination of a generator-chamber, a removable head therefor, a plurality of carbid-cylinders cast with said head, a turning plug axially mounted between said cylinders and provided with independent gas and water inlet and outlet ports or passages, gas and water inlet and water inlet and outlet passages leading from the plug to each cylinder, and means whereby the plug may be turned to open communication with one carbid-chamber and shut off communication with the other chamber.

3. In a gas-machine, the combination of a generator, a removable head therefor; a casting or lug rigid with said head and projecting into the generator-chamber; carbid-cylinders rigid with said head, one on each side of the vertical plane of said casting or lug; gas and water inlet and outlet passages formed in said lug and leading to each cylinder; a turning plug or valve mounted in said casting or lug, and circumferentially grooved to form passages or ports to connect with the said gas and water inlet and outlet passages in the lug or casting; and means whereby the plug may be turned to connect its passages with the corresponding passages leading to either cylinder, and simultaneously shut off the passages leading to the other cylinder.

4. In a gas-machine, the combination of a generator having a removable head, said head formed with a plurality of carbid-cylinders and an inwardly-projecting portion provided with oppositely-leading gas and water inlet and gas-outlet passages, one set of gas and water passages leading to each cylinder; and a single controlling-valve having gas and water ports or passages adapted to connect with the passages leading to one cylinder and



simultaneously shut off communication with the passages leading to the other cylinder.

5. In a gas-machine, the combination of a generator; two carbid-cylinders contained in the same generator-chamber, and gas and water inlet and outlet passages formed in an inward extension of the head of the generator; and a longitudinally-extending turning plug or valve mounted in said extension and provided with ports or passages adapted to register with the inlet and outlet passages of each cylinder whereby a single valve controls the operation of each cylinder and one cylinder may be cut out without disturbing the operation of the other cylinder.

6. In a gas-machine, the combination of a generator; a plurality of carbid-cylinders contained in the same generating-chamber, the head of said chamber having an inward extension formed with gas and water inlet passages and gas-outlet passages, and one set of said passages communicating with each carbid-cylinder; and a longitudinally-extending turning plug or valve mounted in said extension between the cylinders and having peripheral ports or passages adapted to register with corresponding passages to and from each cylinder whereby the plug may admit water to, and exhaust gas from, one cylinder and then be turned to cut off this cylinder and establish communication with the other cylinder without interrupting the continuous operation of the machine.

7. In a gas-machine, the combination of a generator having a removable head said head provided with an inwardly-extending lug or casting with gas and water inlet and outlet passages formed therein; a plurality of carbid-cylinders in the single generator-chamber; a turning plug mounted in the lug or casting between two carbid-cylinders, and having peripheral ports or passages to connect with the water and gas passages to each cylinder; and a plurality of vertical tubes of unequal height whereby water may enter the shorter tube and be directed to one of said cylinders, and said plug may be turned into another position to establish connection with the longer tube and thus admit water to the other cylinder, and cut out the first-named cylinder.

8. In a gas-machine, the combination of a generator and a plurality of carbid-cylinders therein; a removable head for the generator, said head having an integral inwardly-projecting portion formed with water and gas inlet and outlet passages; an inwardly-extending turning plug mounted in the head; and having gas and water ports; a longitudinal bolt having a countersunk head or passage and a gas-pipe connecting therewith; water-inlet pipes of unequal height; and means whereby the plug may be turned to establish communication with one carbid-cylinder and cut out another cylinder.

9. In a gas-machine, the combination of a generator and a removable head therefor; two carbid-cylinders within the same generator-chamber; a turning plug and water and gas passages therein and in the head and adapted to register to establish communication with one cylinder and cut out the other; a bracket secured on the outside of the head, and a screw mounted in said bracket and adapted to bear against the outer end of the plug substantially as and for the purpose described.

10. In a gas-machine, the combination of a generator; a removable head therefor, provided with a brace or bar; a carbid-cylinder; and a cover therefor having a projecting lug said brace-bar serving as a fulcrum for a tool adapted to engage said lug and loosen said closure.

11. In a gas-machine, the combination of a generator; a plurality of carbid-cylinders therein; a lug extending inwardly from the head of the generator and provided with water and gas passages for each cylinder; a seven-way valve in said passages between adjacent cylinders and controlling the passages to and from each, whereby the valve may be adjusted to establish communication with one cylinder and cut out the other cylinder, or cut out both cylinders; and a gas-pipe communicating with the gas-outlet passage of the valve.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

EDMOND R. COOK.

Witnesses:

W. B. JEROME,  
J. H. VINCENT.