(No Model.) 3 Sheets—Sheet 1.

H. L. PYLE, L. LICHTENSTEIN & J. C. BRISON.

APPARATUS FOR GENERATING ACETYLENE GAS.

No. 590,592. Patented Sept. 28, 1897.

Fig. 1

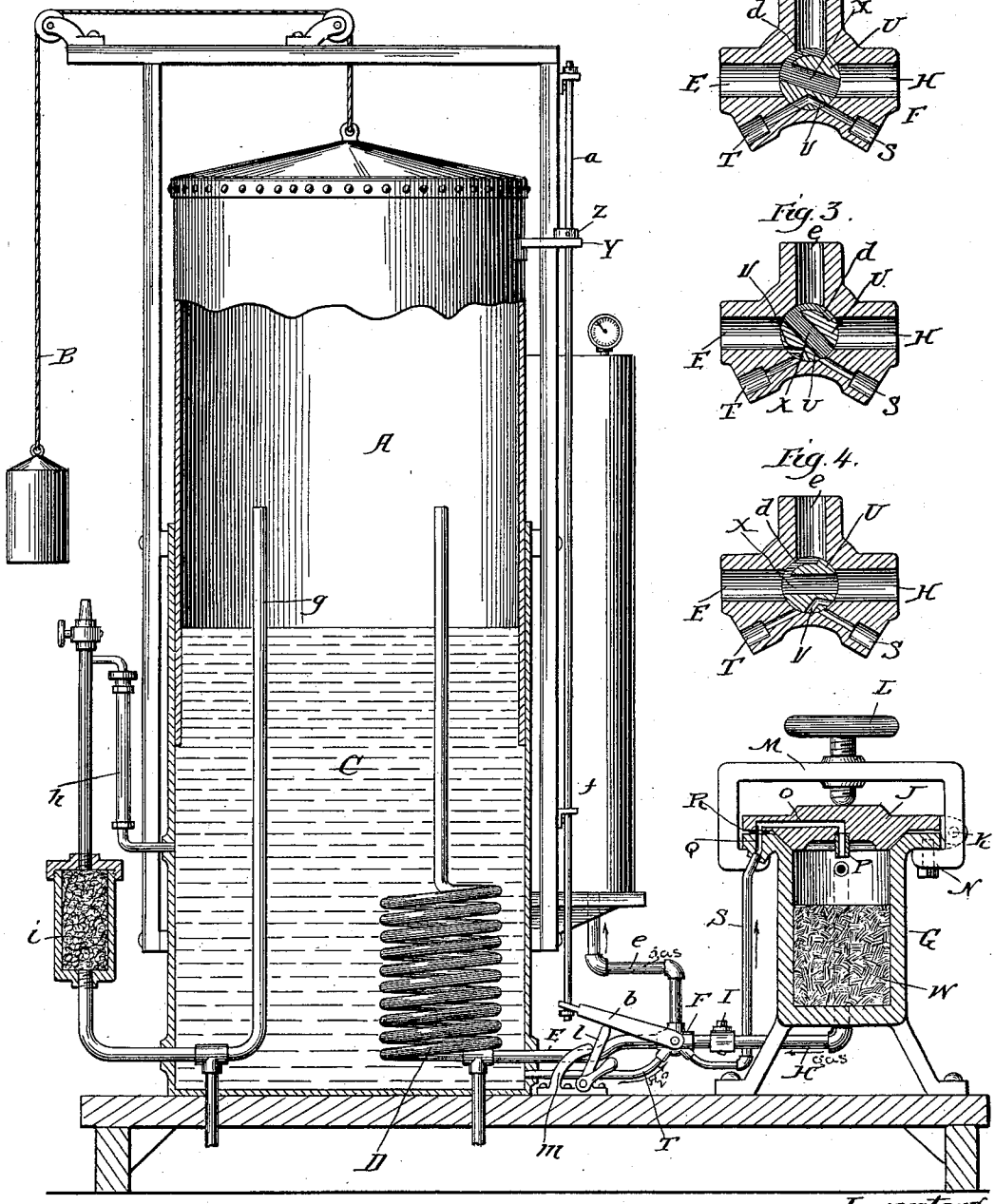


Fig. 2.

Fig. 3.

Fig. 4.

Witnesses:
H. B. Hallock.
J. J. Williamson

Inventors.
Howard L. Pyle.
Louis Lichtenstein
John C. Brison.
by Geo. H. Holgate
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

H. L. PYLE, L. LICHTENSTEIN & J. C. BRISON.

APPARATUS FOR GENERATING ACETYLENE GAS.

No. 590,592. Patented Sept. 28, 1897.

Fig. 6.

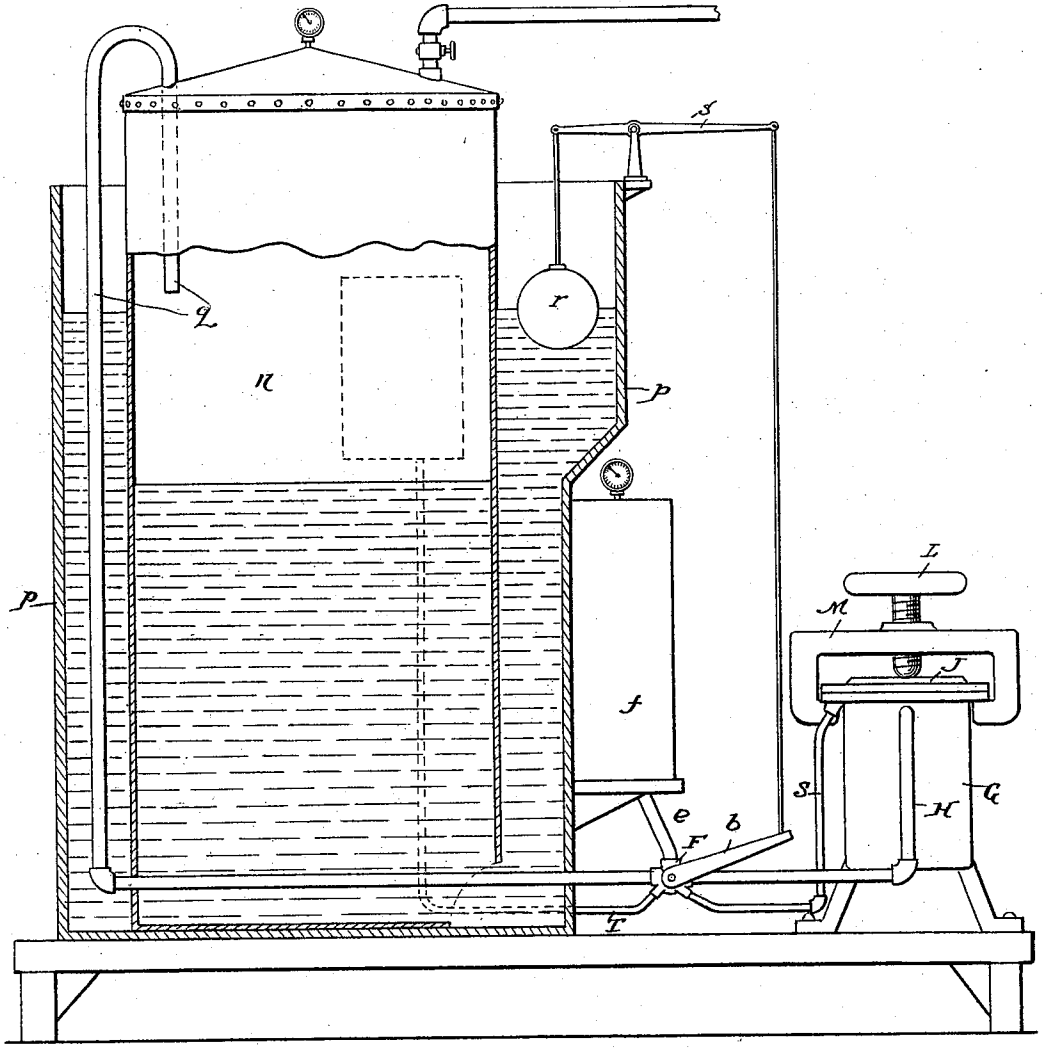
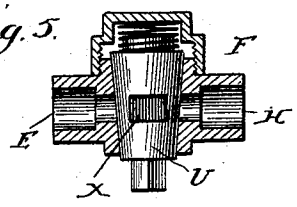


Fig. 5.



Witnesses:
H. B. Hallock.
J. J. Williamson

Inventors.
Howard L. Pyle.
Louis Lichtenstein.
John C. Brison.
By Geo. H. Hoegate
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

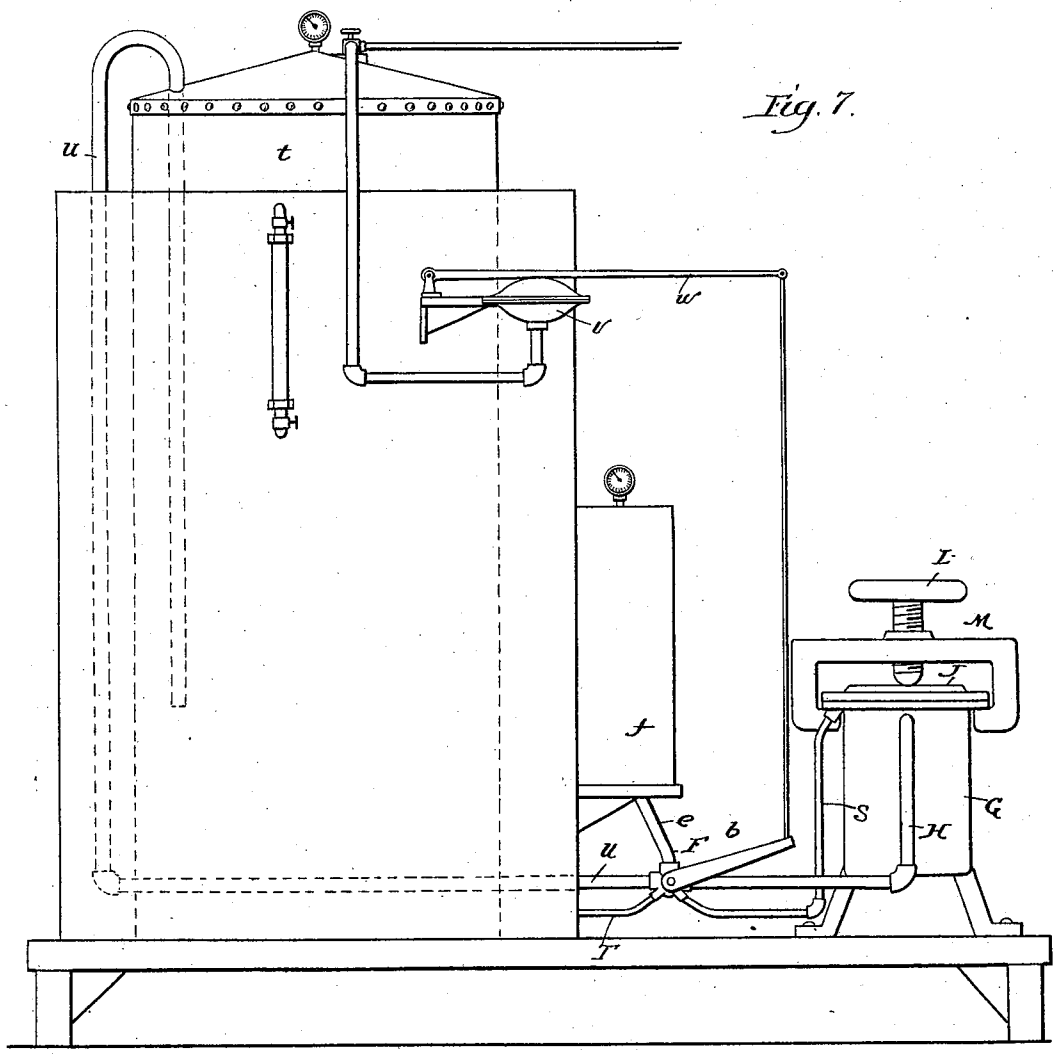
(No Model.) 3 Sheets—Sheet 3.

H. L. PYLE, L. LICHTENSTEIN & J. C. BRISON.

APPARATUS FOR GENERATING ACETYLENE GAS.

No. 590,592. Patented Sept. 28, 1897.

Fig. 7.



Witnesses:
H. B. Hallock.
S. Williamson

Inventors:
Howard L. Pyle.
Louis Lichtenstein
John C. Brison.
By Geo. H. Holgate
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HOWARD L. PYLE, LOUIS LICHTENSTEIN, AND JOHN C. BRISON, OF WILMINGTON, DELAWARE.

APPARATUS FOR GENERATING ACETYLENE GAS.

SPECIFICATION forming part of Letters Patent No. 590,592, dated September 28, 1897.

Application filed January 26, 1897. Serial No. 620,758. (No model.)

To all whom it may concern:

Be it known that we, HOWARD L. PYLE, LOUIS LICHTENSTEIN, and JOHN C. BRISON, citizens of the United States, residing at Wilmington, in the county of Newcastle and State of Delaware, have invented a certain new and useful Improvement in Apparatus for Generating Gas, of which the following is a full, clear, and exact specification.

Our invention relates to a new and useful improvement in apparatus for generating acetylene gas from carburet of calcium; and it consists of certain instrumentalities for automatically generating the gas, storing it in a gasometer, and providing for the holding of the excess of this gas formed by the residuary moisture held by the carbid after the induction of water has been cut off and for the giving up of said excess of gas to the gasometer when a portion of the gas contained within the latter has been used.

The object of this invention is to maintain at all times a reservoir of gas under a light pressure for the supplying of illuminating-burners and to automatically bring about the maintenance of gas within this reservoir so long as the charge of carbid retains vitality and then to permit the recharging of the carbid-chamber without interfering with the feeding of the gas from the reservoir to the burners.

With these ends in view the invention consists in the details of construction and combination of elements hereinafter described and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a section of a gasometer and generating apparatus, showing the valves and connections therebetween in elevation; Fig. 2, the three-function valve for controlling the operations of the apparatus, the ports therein being in active position; Fig. 3, a similar view showing the water-port closed and the excess-gas port in operative position; Fig. 4, a similar view, also showing the water-port closed, the port leading to the gasometer being opened, as well as the excess-port being in position to permit the outflow of gas from the excess-tank to the gasometer. Fig. 5 is a section taken in the reverse direction of the valve, showing the spring for holding the plug upon its seat; Fig. 6, a side elevation of a modified form of apparatus, and Fig. 7 a still further modification thereof.

In carrying out our invention as shown in Figs. 1 to 5, inclusive, we provide a gasometer A, the upper member of which is adapted to rise and fall in the well-known manner and may be partly balanced by a suitable weight and cord B, and this gasometer is also water-sealed, as indicated at C, and has arranged beneath the water a coil D, the end of which extends upward above the level of the water, while it is connected at its lower end through the pipe E with the three-function valve F, the construction of which will be hereinafter set forth.

A generating apparatus G is located adjacent to the gasometer, and a pipe H leads from the upper portion thereof to the valve F and has located therein a check-valve I, so arranged as to permit the outflow of gas from the generator, but prevent its retrograde movement. This generator has a suitable cover J, hinged at K, so as to be swung back when it is desired to gain access to the generator, and when the cover is in place that portion thereof which fits directly upon the chamfered edges of the generator is ground, as well as said chamfered portion, in order that a tight joint may be made between the two when sufficient pressure is brought to bear thereon, and this pressure is brought about by the hand-screw L, which is threaded through the yoke M, the latter having one end thereof swivelly secured to a flange of the generator, as indicated at N. By this arrangement the cover may be tightly secured upon the generator, and yet when access is desired thereto the hand-wheel may be backed off, the yoke swung sidewise, and the cover swung open, after the manner of a hinged door.

Formed within the cover is a waterway O,

having a suitable nozzle or outlet P leading from its inner end, while its outer end registers with the hole Q, formed in a boss and flange of the generator, and in order that this end of the waterway and the holes may be so united as to form a single passage-way a washer or packing R is placed between the cover and the flange made over the hole Q, so that when the cover is secured down this packing will prevent the escape of water sidewise, as will be readily understood.

A small pipe S leads from the hole Q to the valve F, and a similar pipe T leads from said valve to the water-compartment of the gasometer, from which it will be seen that when the plug U of the valve F is in such a position as to cause the water-port V thereof to register with the holes leading from the pipes S and T water will flow from the gasometer by reason of its head, as well as the pressure incident to the starting of the gas within said gasometer to the generator through the passage O, and be precipitated upon the carbid, which is indicated at W. This of course will generate gas from said water and carbid, as is well understood, and this gas will pass through the pipe H to the valve F and from thence through the port X and pipe E to the gasometer, and in its passage will traverse the coil D for the purpose of giving up the surplus heat therein. Gas thus admitted to the gasometer will cause the movable member thereof to rise, which member being provided with the bracket Y will carry said bracket into contact with the collar Z, secured upon the rod *a*, and lift said rod, thereby actuating the plug of the valve F through the medium of the lever *b*, to which the lower end of said rod is attached, and by a continued upward movement of the gasometer, and consequently the rod, the plug of the valve will be so turned as to carry the port V out of alinement with the holes leading from the pipes S and T, thereby shutting off the flow of water to the generator, as well as closing the port X against a further flow of gas from the generator to the gasometer and bringing the extension-port *d* into conjunction with the opening from the pipe H, after which the gas, which continues to form by the action of the residuary moisture within the carbid, will flow through this extension to the pipe *e* and from thence to the excess-tank *f*.

g represents the pipe for supplying the gas from the reservoir to the burners in any suitable locality, and *h* is a suitable water-column, and *i* a purifying-chamber for absorbing moisture from the gas, all of which may be of ordinary construction.

There are necessarily three prime positions of the valve F, the first of which is represented in Fig. 4 and corresponds to the lowest position or starting-point of the gasometer, and when the valve is in this position no action takes place in the apparatus, while the second position of this valve is indicated in Fig. 2 and is the position which admits water to the carbid-chamber and is the starting-point of the operations of the apparatus, the last position being that shown in Fig. 3, where water has been cut off from the carbid-chamber, and yet the excess of gas formed by the residuary moisture in the carbid is conveyed to the excess-tank.

In order to establish the second position of the valve and permit the same to thereafter automatically care for itself until the exhaustion of the carbid, a stop-lever *l* is so arranged that when it is desired to start the apparatus the lever *b* is elevated to the second position and this stop-lever is turned upward beneath the same, so as to support the lever *b* until the latter has been moved upward by the movements of the gasometer, after which the lever *l* will drop by gravity out of action, so that when the lever *b* is moved downward by the rod *a* it may pass to its first position. The desired action of the lever *l* is brought about by providing the stop M, against which it may be turned, so as to prevent it from passing its center of gravity, whereby it will be permitted to drop out of action when the weight of the lever *b* is removed therefrom.

From the foregoing description the operation of the several instrumentalities of the apparatus will be as follows:

The carbid is placed within the generating-chamber, the cap being securely fastened by the clamp, as shown. The lever B is then raised until the water-port in the valve F is brought into line with the water-pipes, when water will travel through said pipes to the carbid-chamber and there generate the gas, which latter, when it is liberated, will pass through the pipe H to the valve F, to the coil within the gasometer, where it is cooled, and thence to the space provided for it within the confines of the gasometer.

The three-function valve provides for the passage of the water when the port V in the plug rests with the holes leading from the pipes S and T. When the plug assumes the position shown in Fig. 3, the said port is out of line and consequently closed. When the position shown in Fig. 2 is reached, they are fully in line to their full cross-section and consequently wide open. In like relation the ports for the passage of the gas are maintained. The through-port X conducts the gas directly through the valve to the gasometer. When the gasometer reaches its predetermined height of travel, the position of the valve-plug is as indicated in Fig. 3 and the port is closed to the passage of gas direct. At this juncture the extension-port *d* is at the position shown in this figure and the gas liberated by reason of the remaining degree of humidity is transferred through this extension-port to the excess reservoir or tank *f*,

where it is stored so long as the position of the plug is as indicated in Fig. 3 or the gasometer is at the maximum of its travel upward. When the descent is begun, the port *d*, which is an extension of the port X, permits the extra charge of gas in the reservoir *f* to flow through the valve to the gasometer until an equilibrium between the pressures in said reservoir and gasometer is established. By this arrangement no excess of pressure can take place in the gasometer, and consequently the gas delivered therefrom to the illuminating-burners will be under a given pressure, while all excess of pressure will be stored within the reservoir *f*, and this reservoir may be provided with a suitable gage for determining the pressure therein.

The purifier *i* may be supplied with any suitable material for bringing about the desired result—as, for instance, charcoal, mineral wool, raw cotton, and asbestos—it only being necessary that some material for the absorption of moisture and other impurities shall intersect the gas in its passage to the burners.

In Fig. 6 we have shown a modification of the gasometer which consists of the tank *n*, surrounded by the usual water-tank *p*, the gas being introduced to the tank *n* through the pipe *q*, and when gas is thus introduced it will create a pressure upon the water contained within this last-named tank and tend to force the same out of said tank through a suitable opening provided at the bottom thereof, which will cause said water to rise within the water-tank, thus creating and maintaining the necessary pressure upon the gas. When the water rises in the outer tank by reason of the inflowing of the gas to the inner tank, the float *r* will be caused to rise, and this in turn by its connection to the lever *s* will operate the three-function valve, as before described. A gasometer thus constructed should be provided with a suitable gage for determining the pressure therein. In this construction it is preferable that a source of water-supply for feeding water to the generator be arranged outside of the gasometer, since the water therein rises and falls with the supply of gas fed thereto, thus varying the pressure of said water, and this is not desirable.

Still another modification of our improvement is shown in Fig. 7, and consists of an inner tank *t*, having a suitable water-jacket surrounding the same, and gas is admitted to this tank through the pipe *u* from the generator, and when thus admitted will act upon the diaphragm contained within the casing *v* and bring about the proper operations of the three-function valve through the lever *w*.

Having thus fully described this invention, what is claimed as new and useful is—

1. An apparatus for automatically producing acetylene gas, consisting of a generator, a three-function valve connected therewith by a gas-pipe and a water-pipe, a gasometer also connected with said valve for receiving the gas under pressure, and an excess-reservoir for receiving the gas generated after the gasometer is cut out, as specified.

2. In combination with a gasometer of the character described, a generator, a three-function valve, and an excess-reservoir, all arranged substantially as and for the purpose set forth.

3. The herein-described combination of a generator, a three-function valve connected therewith by a gas-pipe and a water-pipe, a mechanism depending upon the movements of the gasometer for controlling the valve, and an excess-reservoir, all arranged substantially as and for the purpose set forth.

4. In combination with a generator, gasometer and excess-reservoir, of a three-function valve depending upon the movements of the gasometer for its operation, and so arranged as to control the inflow of water to the generator, and the outflow of gas therefrom, substantially as and for the purpose set forth.

5. A three-function valve having a plug seated therein, in which a water-port, a gas-port, and an extension-port are formed, substantially as and for the purpose set forth.

6. In combination with a three-function valve, a generator to which said valve is connected by a gas-pipe and a water-pipe, said generator having a chamber therein, a cover for closing the same, means for holding said cover in place, and a passage-way through said cover for conveying the water to the chamber, substantially as and for the purpose set forth.

7. In combination, a generator, a three-function valve, an excess-chamber, and a gasometer, the latter being so constructed as to bring about the movements of the valve by the pressure of gas therein, as specified.

8. In combination with a three-function valve and the apparatus connected thereto, of a lever for operating said valve, and a drop-lever for determining the second position of said valve, substantially as shown and described.

9. In combination with a suitable gasometer and a storage-reservoir, a generator consisting of a receptacle G, a cover adapted to be secured thereto so that it may be readily removed therefrom, said cover having a water-way formed therein leading from the exterior to the interior of the tank, a water-pipe so connected with the reservoir as to register with said water-way when the cover is closed in place, and means for holding said cover, substantially as and for the purpose set forth.

10. In combination with a three-function valve, a generator consisting of a receptacle, a cover fitted thereto and adapted to be removed therefrom, said cover having a water-way formed therein, a pipe S leading from

one function of the valve to a boss having a hole therein which registers with the waterway in the cover, means for packing the joint between said hole and waterway, and a gas-pipe leading from the receptacle to the valve, said gas-pipe having a check-valve therein, substantially as and for the purpose set forth.

In testimony whereof we have hereunto affixed our signatures in the presence of two subscribing witnesses.

HOWARD L. PYLE.
LOUIS LICHTENSTEIN.
JOHN C. BRISON.

Witnesses:
J. JACKSON PEIRCE,
PHILIP REYBOLD.