No. 702,604. Patented June 17, 1902.

D. H. TREICHLER.

ACETYLENE GAS GENERATOR.

(Application filed July 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

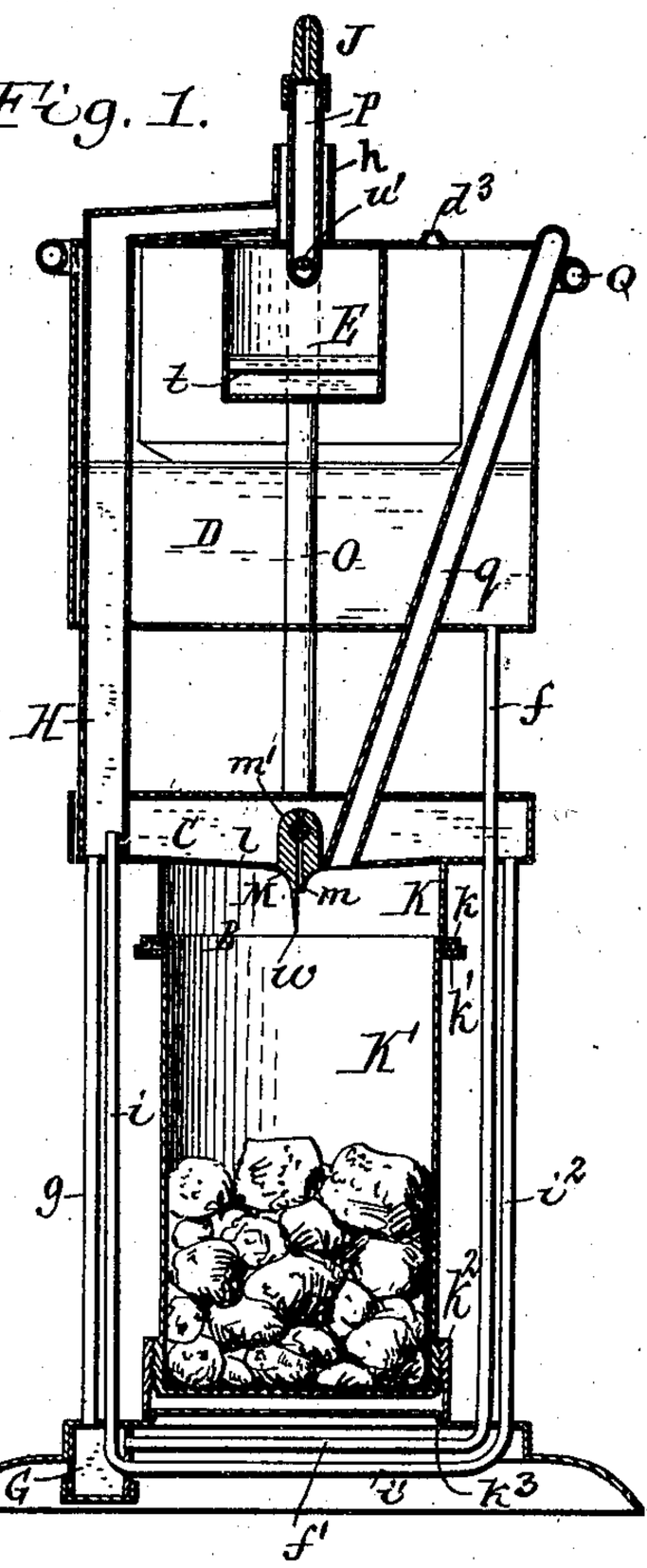


Fig. 2.

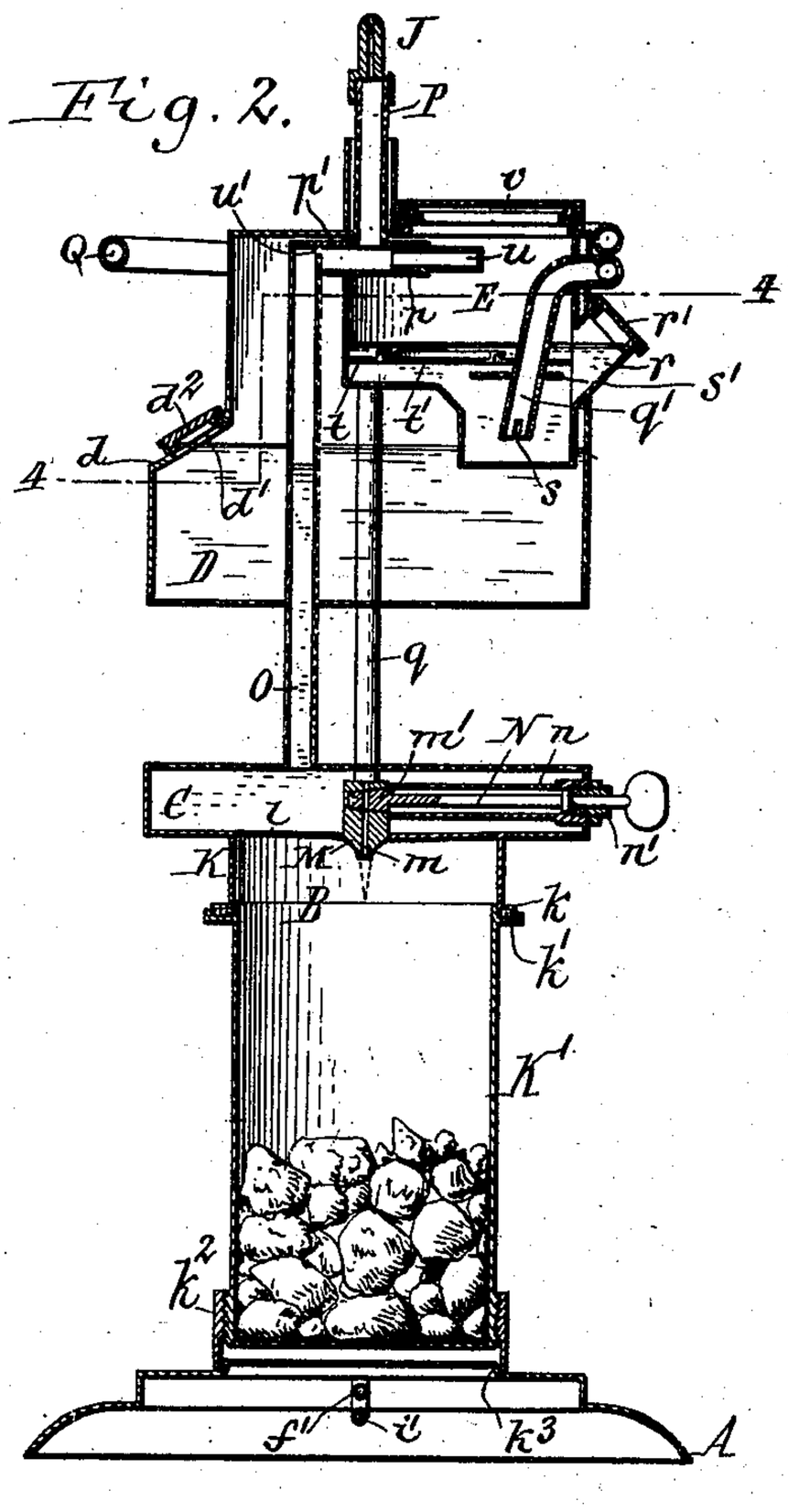


Fig. 3.

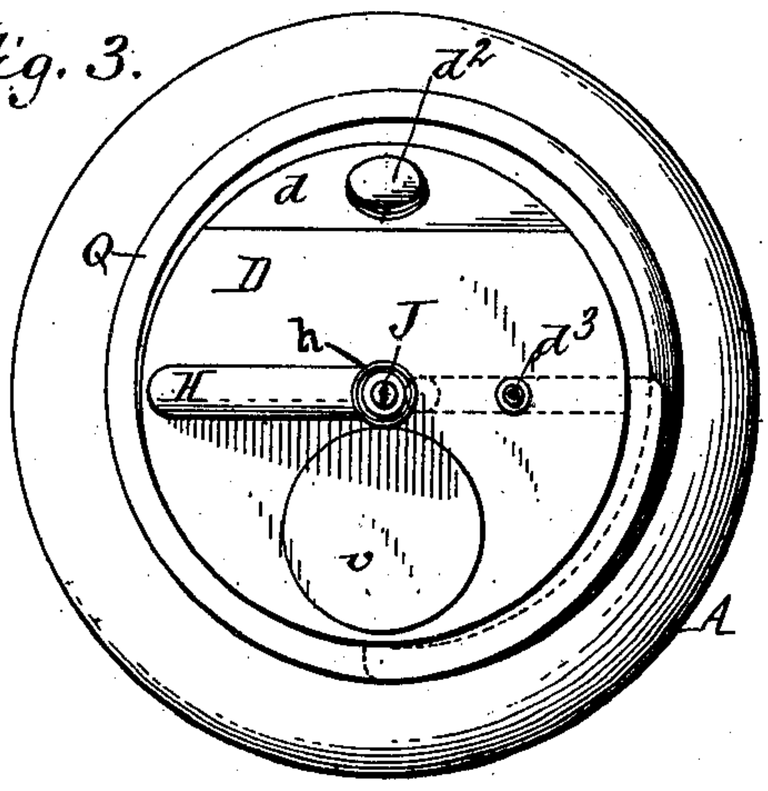
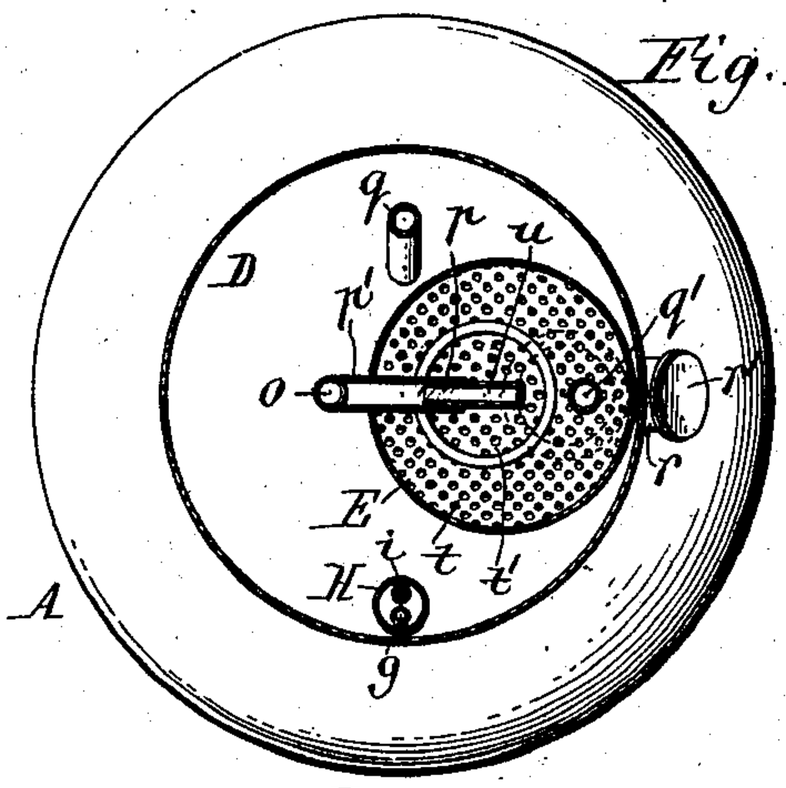


Fig. 4.



Witnesses:
Louis A. Grate.
Emma M. Graham.

Daniel H. Treichler Inventor
By Geyer & Popp.
Attorneys

No. 702,604. Patented June 17, 1902.

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ACETYLENE GAS GENERATOR.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

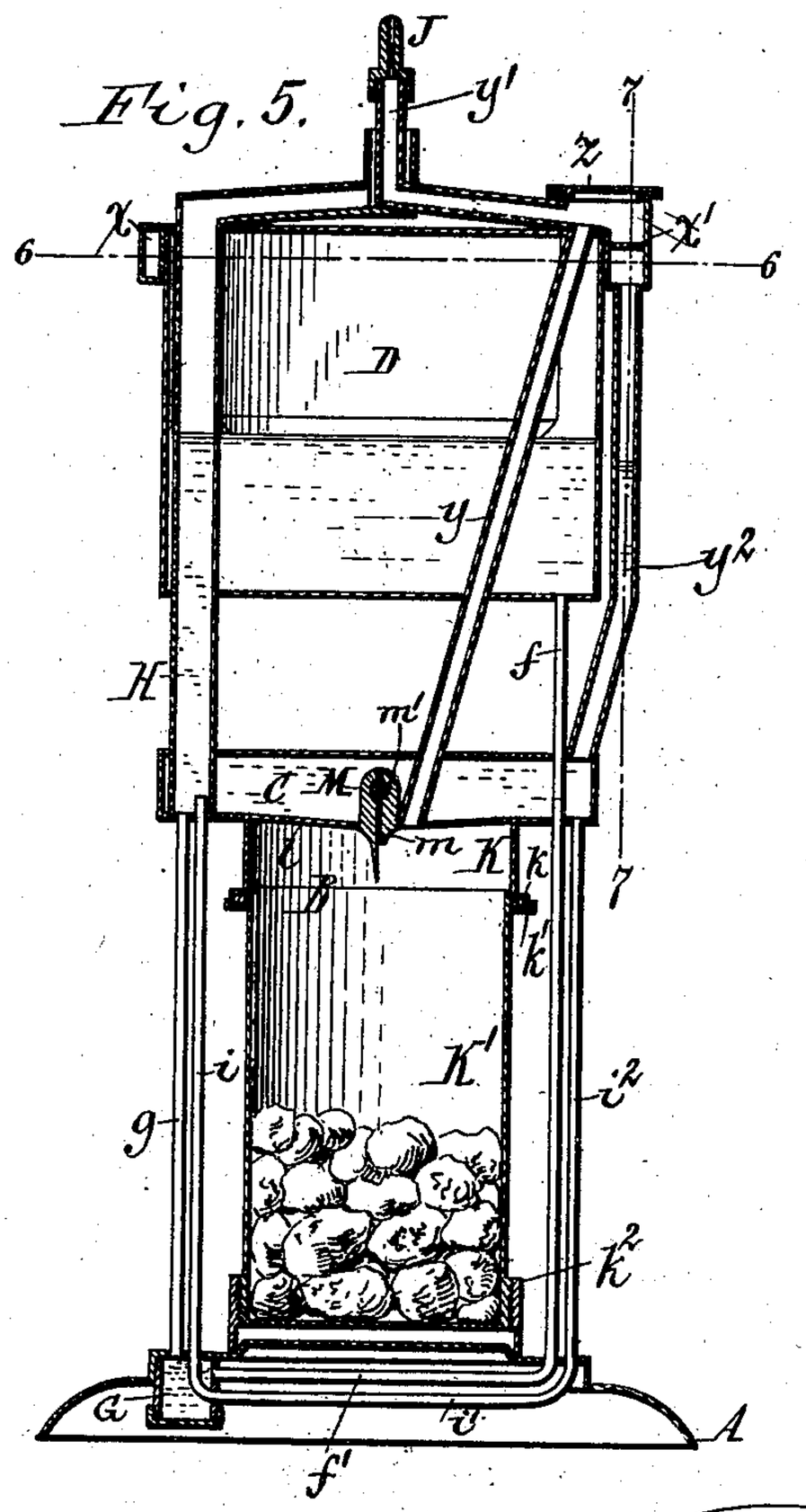


Fig. 7.

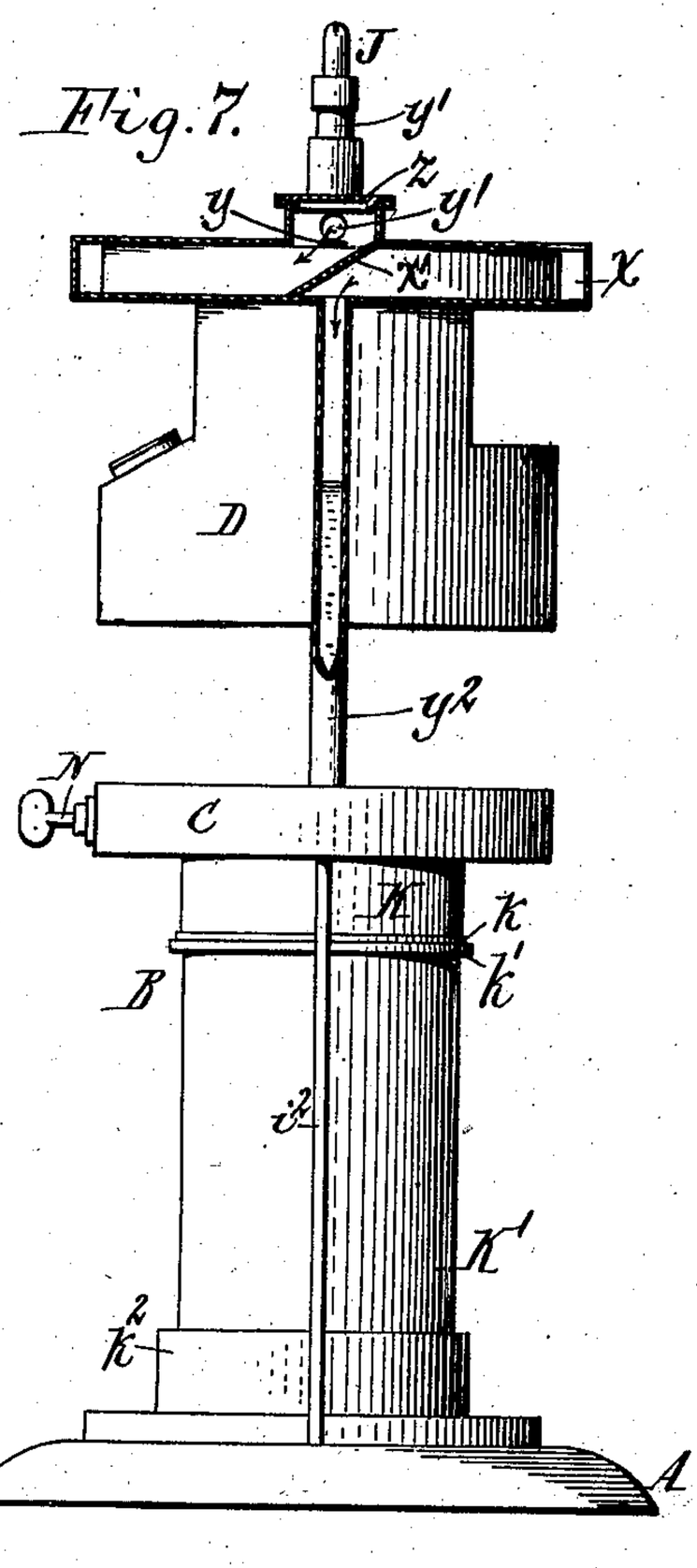
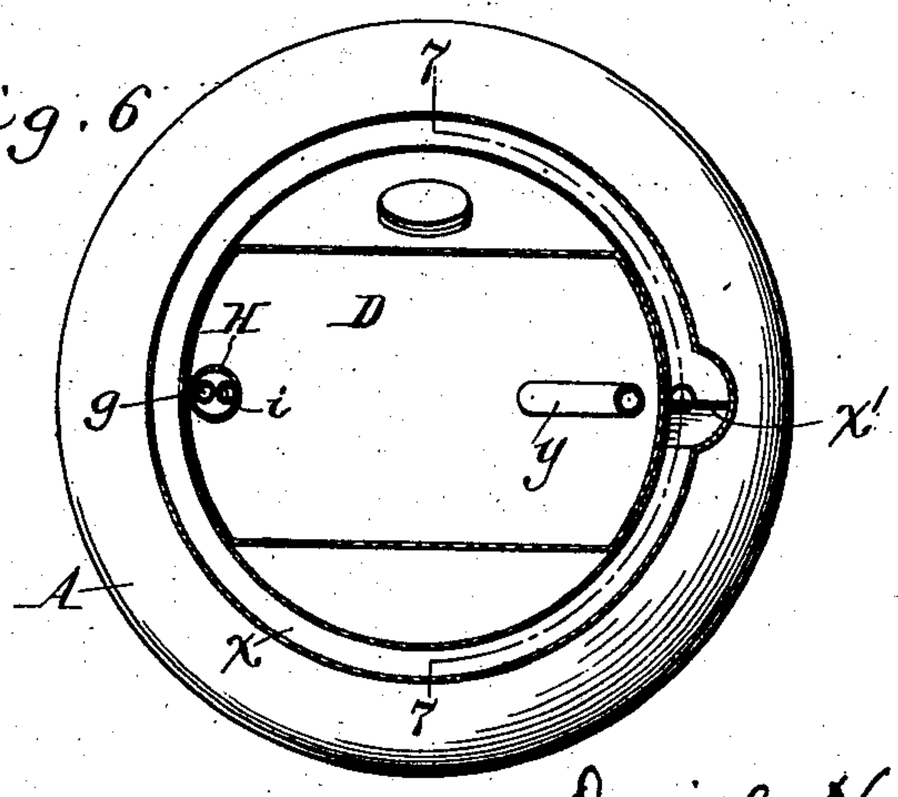


Fig. 6.



Witnesses:
Louis A. Gratz
Emma M. Graham.

Daniel H. Treichler
Inventor
By Geyer & Popp
Attorneys.

UNITED STATES PATENT OFFICE.

DANIEL H. TREICHLER, OF NIAGARA FALLS, NEW YORK.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 702,604, dated June 17, 1902.

Application filed July 5, 1901. Serial No. 67,072. (No model.)

To all whom it may concern:

Be it known that I, DANIEL H. TREICHLER, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented a new and useful Improvement in Acetylene-Generators, of which the following is a specification.

This invention relates to that type of acetylene-generators in which the water is dripped upon the carbid and which is more especially desirable for lamps, although the construction is also adapted for generators of larger capacity. A generator of this character is shown in my pending application for patent, Serial No. 23,645, filed July 14, 1900, and allowed January 22, 1901.

One of the objects of my invention is to so construct the generator that liability of clogging the passages is reduced to a minimum and that all passages which are liable to become clogged are easily accessible for cleaning.

Another object of my invention is to so construct the carbid or generating chamber that the same can be detached from the other parts of the generator and replaced without necessitating lifting of the entire generator.

Another object of my invention is to improve the means whereby the water is prevented from reaching the generating-chamber in the event of upsetting the generator, thereby avoiding dangerous generation of gas.

My invention has the further object to improve the apparatus in various details.

In the accompanying drawings, consisting of two sheets, Figure 1 is a vertical section of my improved generator, taken through the gas-delivery and vent pipes. Fig. 2 is a similar section at right angles to Fig. 1 and taken through the stand-pipe. Fig. 3 is a top plan view of the generator, the position of this figure corresponding to Fig. 1. Fig. 4 is a horizontal section in line 4 4, Fig. 2. Fig. 5 is a vertical section showing a modification of the means whereby the water is prevented from reaching the generating-chamber. Fig. 6 is a horizontal section of the same in line 6 6, Fig. 5. Fig. 7 is a side elevation of the same, partly in section, the section being taken in lines 7 7, Figs. 5 and 6.

Like letters of reference refer to like parts in the several figures.

A represents the base of the generator; B, the carbid or generating chamber, arranged above the base; C, the expansion or equalizing chamber, arranged above the generating-chamber; D, the water chamber or tank, arranged above the equalizing-chamber, and E the purifying-chamber, arranged in the upper part of the water-tank and on one side thereof.

The side of the water-tank opposite to that on which the purifying-chamber is arranged is indented, which indentation extends from the top of the water-chamber downwardly to about the middle thereof and forms an outwardly inclined or sloping shelf *d* at the junction of the upper contracted and the lower wide part of the water-tank.

d' represents a filling opening or nipple, which is arranged in the inclined shelf *d* and which is normally closed by a screw-cap d^2. This filling-opening is arranged at the intended water-level of the tank, so that the same cannot be filled above the filling-opening, thereby insuring a free space in the upper part of the tank, which permits the water to rise and fall therein as the generation of gas varies. By forming the filling-opening of the tank in the inclined shelf *d* the tank can be filled with water up to the filling-opening without producing bubbles at the same, because the air is free to escape on the elevated inner side of the filling-opening as the water reaches the same. When filling the water-tank of a generator through a filling-opening which is horizontal, the air does not escape freely and bubbles are produced at the filling-opening, which are liable to deceive the attendant and make it appear that the tank is filled to the proper level when such is not the case. The atmosphere is permitted to pass into and out of the top of the tank as the water therein rises and falls by means of an opening d^3, formed in the top of the tank. The water passes from the water-tank downwardly through a vertical pipe *f*, extending from the tank to the base on one side of the equalizing and generating chambers, thence through a horizontal pipe *f'*, extending from the lower end of the vertical

pipe *f* underneath the base and into a sediment-chamber G on the opposite side of the base, thence upwardly through a vertical pipe *g*, arranged on the opposite side of the carbid and equalizing chambers, into the lower end of a safety vent-pipe H, thence downwardly through a vertical pipe *i* on the same side as the pipe *g*, thence horizontally through a pipe *i'* underneath the base, and thence upwardly through a pipe i^2 on the same side as the pipe *f* to the equalizing-chamber. The pipes *f g* i i^2, in addition to serving as water-conduits from the tank to the equalizing-chamber, also serve to support the upper parts of the generator upon the base independent of the generating-chamber, and they also form part of a double water seal between the water-tank and the equalizing-chamber. The vent-pipe H extends from the junction between the upper ends of the pipes *g i* upwardly through the equalizing-chamber and tank and thence inwardly to a sleeve *h*, surrounding the burner J and forming the terminus of the pipe H, so that any gases which escape from the vent-pipe are conducted to the burner and consumed.

The generating-chamber consists of a fixed section or collar K, which is secured to the under side of the equalizing-chamber, and a lower removable section or cup K', which is arranged between the fixed section and the base. The cup in the normal position of the parts fits into the collar, and a gas-tight joint is formed between these parts by means of a packing interposed between opposing flanges *k k'* on the opposing ends of the collar and cup, as shown in Figs. 1 and 2. The carbid-cup is held firmly against the collar by means of a clamping-ring k^2, resting on the base and having a screw connection with the lower end of the carbid-cup. The distance between the top of the base and the lower edge of the collar K is slightly greater than the height of the carbid cup or receptacle K', so as to permit this cup to be moved laterally for attaching the same to or removing the same from the generator, thereby avoiding lifting the whole generator for emptying and replenishing the generating-chamber, as would be the case if the generating-chamber were removable from the under side of the base. When it is desired to remove the cup from the generator, the clamping-ring is turned in the proper direction for lowering the cup until the upper end of the cup clears the collar K. The cup can now be removed laterally, and after the ashes have been emptied therefrom and the same has been refilled with a fresh charge of carbid the cup, with the clamping-collar still in a raised position thereon, is placed between the base and collar. Upon now turning the clamping-collar in the opposite direction the cup will be raised and its upper end will be coupled with the collar. In order to facilitate centering of the cup with reference to the collar, the base is provided with a raised central portion, forming an annular shoulder k^3, which fits the inner side of the clamping-collar. By arranging the clamping means at the lower end of the generating-chamber the screw-threads of the clamping means are not liable to be corroded by the action of the gas, as would be the case if the clamping means were arranged near the joint between the upper and lower sections of the generating-chamber. The bottom of the equalizing-chamber and the top of the generating-chamber are formed by a single partition *l*, which separates these chambers.

The valve which controls the supply of water to the carbid is arranged centrally in the partition *l* and consists of a case M, having a vertical passage *m*, which opens at its upper end into the equalizing-chamber and at its lower end into the generator-chamber, and a rotary plug *m'*, having a passage which can be moved into and out of register with the passage in the case. This plug is secured to the inner end of a stem N, which is arranged in a sleeve *n*, connecting the valve-case with the side of the equalizing-chamber. The valve-plug is preferably of conical form and is held tightly against its seat on the case by a gland *n'*, which screws into the outer end of the sleeve and bears against a shoulder on the valve-stem. Upon opening the valve the water passes through the same from the equalizing-chamber and drips on the carbid in the generating-chamber.

O represents a stand-pipe which extends upwardly from the top of the equalizing-chamber through the water-tank and in which the water rises from the equalizing-chamber.

P represents the burner-pipe which carries the burner at its upper end. The lower end of the burner-pipe extends through the top of the purifying-chamber and is provided with a horizontal T, one branch *p* of which opens into the purifying-chamber and the other branch *p'* of which connects with the upper end of the stand-pipe.

The gas is conducted from the generating-chamber into the purifying-chamber by a gas-delivery conduit consisting of an upright inlet-pipe *q*, which extends upwardly from the top of the generating-chamber, a trap-coil Q inclosing the upper part of the water-tank and having its elevated inlet end connected with the upper end of the inlet-pipe *q* and an outlet-pipe *q'* extending from the depressed outlet end of the coil Q downwardly into the lower portion of the purifying-chamber. As the gas issues from the lower end of the outlet-pipe *q'* of the gas-delivery conduit it passes upwardly through the cooling and purifying liquid in the lower part of the purifying-chamber into the gas-space in the upper part of the purifying-chamber. The cooling and purifying liquid is introduced into and removed from the purifying-chamber by a filling opening or nipple *r*, which is arranged at the intended liquid-level of the purifying-chamber and is normally closed by a cap *r'*. The diameter of the coil Q is such that when

the lamp is upset the liquid from the purifying-chamber entering the outlet end of the gas-delivery conduit will be unable to pass over that part of the coil which for the time is elevated, thereby preventing the liquid from entering the generating-chamber through the gas-delivery conduit and avoiding dangerous generation of gas. In order to effectually prevent any liquid passing from the outlet end of the gas-conduit over the elevated part of the coil to the inlet end thereof when the generator is upset, the coil should make at least one complete turn, the coil shown in the drawings having one turn and a quarter. The coil slopes from its inlet toward its outlet end, which causes the water entering the coil upon upsetting the generator to drain back into the purifying-chamber upon righting the generator. By providing free spaces in the purifying and water chambers above the liquid-levels in the same these spaces will accommodate a considerable amount of the liquids in the respective chambers when the generator is tipped to one side or upset, thereby reducing the amount of liquid which is liable to enter the passages leading to the generating-chamber.

The lower end of the outlet-pipe of the gas-delivery conduit is provided with a plurality of vertical slits *s*, which cause the gas to issue therefrom in numerous small bubbles instead of large bubbles, as would be the case when the pipe terminates in a plain unbroken end. As the bubbles rise in the liquid of the purifying-chamber they strike a horizontal deflecting plate or disk *s'*, which is secured to the outlet-pipe *q'* above its slitted portion and whereby the bubbles are spread out over a larger area. After passing the deflected plate and before reaching the surface of the liquid in the purifying-chamber the bubbles are still further broken up by a horizontal screen, thereby mingling the gas thoroughly with the purifying and cooling liquid and removing the dirt and moisture from the gas. This screen consists of a fixed section *t*, which is secured to the outlet end of the gas-conduit and to the wall of the purifying-chamber, and a removable section *t'*, which fits into a large opening in the fixed section. The fixed screen-section assists in holding the gas-conduit in place, while the removable section affords access to the lower part of the purifying-chamber for cleaning the same. By thus breaking the gas up minutely as it passes from the outlet of the gas-conduit to the burner any sudden variation in the gas-pressure is prevented and a steady and uniform flame is produced at the burner. The purified gas passes from the upper part of the purifying-chamber into the burner-pipe to the burner and also into the upper end of the stand-pipe and presses downwardly upon the column of water in the same. At the same time that the gas is pressing downwardly on the column of water in the stand-pipe the gas in the generating-chamber is pressing upwardly against the column of water in the passage of the supply-valve. Inasmuch as the gas from the generating-chamber has to pass through the liquid in the purifying-chamber before reaching the upper end of the column of water in the stand-pipe this purifying liquid serves as a water-column which reduces the pressure of the gas against the upper end of the stand-pipe column below that against the lower end of the valve water-column. When the gas-pressure rises above the normal, the preponderating pressure against the lower end of the valve water-column causes this column to be suspended at its lower end or held back, so that no more water passes from the equalizing-chamber through said valve into the generating-chamber, thereby arresting the generation of gas. When the gas-pressure drops below normal, the water is again permitted to escape from the equalizing-chamber into the generating-chamber and the generation of gas is resumed. If an abnormal gas-pressure takes place, the water, in addition to being held back in the valve, is also pressed downwardly in the water-column and into the equalizing-chamber. The latter being of large area and comparatively shallow will store a considerable amount of gas without materially varying the height of the water-level, thereby insuring a uniform gas-pressure at the burner. If an excessive generation of gas takes place, the water will be pressed by the gas from the equalizing-chamber backwardly through the pipes i^2 i' i g, sediment-chamber G, and pipes f' f into the water-tank, the gas passing from the upper end of pipe *i* through the vent-pipe H to the burner. When the water in the equalizing-chamber is pressed below the inlet of the valve, the flow of water is positively cut off from the generating-chamber. The height of the water column in the purifying-chamber is preferably equal to the distance from the lower end of the valve water column to the lower end of the stand-pipe water column. In order to obtain the required depth of water in the purifying-chamber and also provide the necessary space in the same for accommodating the liquid in case the generator is upset without utilizing an undue amount of liquid in the chamber, the lower end thereof is contracted, while the upper end is made comparatively wide, as shown in Fig. 2.

The gas-inlet branch *p* of the burner-pipe is provided with a perforated nipple *u*, which is removably attached to said branch. This nipple permits the gas to pass freely to the burner and stand-pipes, but retards the passage of water from the purifying-chamber into the burner and stand-pipes when the generator is upset or shaken. The liquid from the purifying-chamber is further prevented from passing into the stand-pipe by connecting the latter with the upper part of the T branch *p* by a small opening *u'*, thereby reducing the liability of getting any of the impurities from the purifying-chamber into the stand-pipe, which (the impurities) might be

conducted to the valve and clog the same. Any liquid which enters the branches of the burner-pipe when the generator is upset is again drained back into the purifying-chamber through the openings in the lower part of the nipple, leaving the openings in the upper part thereof free for the escape of the gas. The liability of water entering the burner and stand-pipes is still further reduced by extending the nipple of the branch pipe *p* to the center of the purifying-chamber, in which position the nipple would most likely be above the liquid-level upon tipping the generator in any direction.

The top of the purifying-chamber is provided with an opening through which access may be had to the interior of the purifying-chamber for cleaning the parts therein, said opening being normally closed by a cover *v*.

In order to prevent any impurities which may be carried into the stand-pipe from being deposited on the valve and clogging the same, the stand-pipe is arranged out of line with the valve. Inasmuch as the valve is wholly disconnected from the stand-pipe and its inlet opens into the equalizing-chamber, the construction is simplified and the valve can be readily cleaned.

When the generator is first started, the water in the equalizing-chamber causes water of condensation to gather on the under side of the partition *l*. This condensation in the absence of any provision to overcome it would hang in large drops and be precipitated indiscriminately onto the carbid by the least jolt, perhaps at the most inopportune moment, as when the gas-pressure has already been excessive. The same effect is also liable to be produced by the water of condensation which gathers in the inlet-pipe of the gas-delivery conduit and which is liable to drop from the lower end of this conduit upon the carbid at a point remote from the place where the regular water-supply drops. Owing to the comparatively small capacity of this type of generators for storing gas, a few drops of water delivered upon the carbid in excess of the general flow will make a considerable variation in pressure, which is objectionable. It is therefore desirable to cause the water of condensation on the under side of the partition *l* and in the inlet end *q* of the gas-conduit to be conducted to the same point where the regular water-supply takes place. This is effected by sloping the partition *l* toward the drip-point *w* at the outlet of the valve and inclining or arranging the lower end *q* of the gas-conduit adjacent to said drip-point, as shown in Fig. 1. By this means any water of condensation on the partition or in the lower end of the gas-conduit will be immediately conducted to the drip-point, from which it will drop upon the moist ashes leading down to the fresh or unconsumed carbid. The water of condensation when delivered at this place will have immediate effect without heating unduly, and the consequent gas produced will check the regular flow of water through the valve.

In the modification of the generator shown in Figs. 5, 6, and 7 the purifying-chamber is omitted and the safety or trap coil is arranged between the gas-conduit and the stand and burner pipes, but does not normally act as a part of the gas-conduit. In this construction *x* represents the trap-coil, which has the form of an annular chamber surrounding the upper end of the water-tank and which is divided by a partition *x'*. The gas-pipe *y* and burner-pipe *y'* connect with the upper part of the coil *x* on one side of the partition, and the upper end of the stand-pipe y^2 connects with the lower part of the coil *x* on the opposite side of the partition, as shown in Fig. 7. Any water which gets into the coil when the generator is upset cannot pass over the elevated part of the coil nor through the gas-pipe to the generating-chamber, and this water is again drained back into the stand-pipe when the generator is righted. The coil is provided in its upper side at the junction of the gas and burner pipes with an opening for cleaning these parts, which opening is normally closed by a cap *z*.

I claim as my invention—

1. In an acetylene-generator, the combination with the base, the generating-chamber arranged above the base, the equalizing-chamber arranged above the generating-chamber and the water-tank arranged above the equalizing-chamber, of a conduit connecting the water-tank with the equalizing-chamber and extending from the water-tank downwardly on one side of the generating and equalizing chambers to the base, thence horizontally underneath the base to the opposite side thereof, thence upwardly to the equalizing-chamber on the opposite side of the generating-chamber, thence downwardly on the same side of the generating-chamber to the base, thence horizontally underneath the base to the first-mentioned side of the base and thence upwardly on the first-mentioned side of the generating-chamber to the equalizing-chamber, substantially as set forth.

2. In an acetylene-generator, the combination with the base and the elevated water-supply tank rigidly connected with the base, of a generating-chamber arranged above the base and detachably connected at its upper end with the water-supply tank, and a clamping device which is arranged wholly above the base and which is connected with the lower end of the generating-chamber, substantially as set forth.

3. In an acetylene-generator, the combination with a base having an annular shoulder on its upper side, and an elevated water-supply tank rigidly connected with the base, of a generating-chamber having its upper end detachably connected with the water-supply tank, and a clamping device which is arranged wholly above the base and which consists of a rotatable ring having a screw connection

with the lower end of the generating-chamber and bearing against the upper side of the base around the annular shoulder thereof, substantially as set forth.

4. In an acetylene-generator, the combination with the generating-chamber and the equalizing-chamber of the water-supply tank arranged above the generating-chamber, of a gas-delivery conduit connected with the generating-chamber, a stand-pipe connected at its lower end with the equalizing-chamber and at its upper end with said conduit, and a valve having its inlet opening into the equalizing-chamber and its outlet opening into the generating-chamber, substantially as set forth.

5. In an acetylene-generator, the combination with the generating-chamber and the equalizing-chamber of the water-supply tank arranged above the generating-chamber, of a gas-delivery conduit connected with the generating-chamber, a stand-pipe connected at its lower end with the equalizing-chamber and at its upper end with said conduit, and a valve arranged out of line with said stand-pipe and having its inlet opening into the equalizing-chamber and its outlet opening into the generating-chamber, substantially as set forth.

6. In an acetylene-generator, the combination with the generating-chamber, and the water-supply tank, of a stand-pipe connected at its lower end with the water-supply tank, and a gas-delivery conduit which is connected with the generating-chamber and with the upper end of the stand-pipe and which contains a coil, substantially as set forth.

7. In an acetylene-generator, the combination with the generating-chamber, and the water-supply tank, of a stand-pipe connected at its lower end with the water-supply tank, and a gas-delivery conduit which is connected with the generating-chamber and with the upper end of the stand-pipe and which contains a horizontal coil arranged above said water-supply tank, substantially as set forth.

8. In an acetylene-generator, the combination with the generating-chamber, and the water-supply tank, of a stand-pipe connected at its lower end with the water-supply tank, and a gas-delivery conduit having a horizontal coil which is arranged above said water-supply tank and which has an elevated inlet connected with the generating-chamber and a depressed outlet communicating with the upper end of said stand-pipe, substantially as set forth.

9. In an acetylene-generator, the combination with the generating-chamber, of a purifying-chamber, and a gas-conduit connecting the generating-chamber and the purifying-chamber and provided between its ends with a coil which is arranged outside of the purifying-chamber, substantially as set forth.

10. In an acetylene-generator, the combination with the generating-chamber and the water-supply tank, of a stand-pipe connected at its lower end with the water-supply tank and with the generating-chamber, a purifying-chamber connected with the upper end of the stand-pipe, and a gas-conduit connecting the generating-chamber and the purifying-chamber and provided between its ends with a coil which is arranged outside of the purifying-chamber, substantially as set forth.

11. In an acetylene-generator, the combination with the generating-chamber and the water-supply tank, of a purifying-chamber having a wide upper part and a contracted lower part, a stand-pipe connected with the water-supply tank and the purifying-chamber, and a gas-delivery conduit connected at its inlet end with the generating-chamber and opening at its outlet end into the contracted part of the purifying-chamber, substantially as set forth.

12. In an acetylene-generator, the combination with the generating-chamber and the water-supply tank, of a purifying-chamber, a stand-pipe connected with the water-supply tank and the purifying-chamber, and a gas-delivery conduit having its inlet end connected with the generating-chamber and its outlet end extending into the lower part of the purifying-chamber and provided with slits, substantially as set forth.

13. In an acetylene-generator, the combination with the generating-chamber, and the water-supply tank, of a purifying-chamber, a stand-pipe connected with the water-supply tank and the purifying-chamber, a gas-delivery conduit having its inlet end connected with the generating-chamber and having its outlet end projecting downwardly into the lower portion of the purifying-chamber, and a deflecting-plate arranged on said outlet within the purifying-chamber, substantially as set forth.

14. In an acetylene-generator, the combination with the generating-chamber and the water-supply tank, of a purifying-chamber, a stand-pipe connected with the water-supply tank and the purifying-chamber, a gas-delivery conduit having its inlet end connected with the generating-chamber and having its outlet end projecting downwardly into the lower portion of the purifying-chamber, and a screen having a fixed section which is secured within the purifying-chamber around said outlet end and a removable section which fits into the fixed section, substantially as set forth.

15. In an acetylene-generator, the combination with the generating-chamber, and the water-supply tank, of a purifying-chamber having an opening in its top which is closed by a cover, a stand-pipe connected with the water-supply tank and the purifying-chamber, a gas-delivery conduit having its inlet end connected with the generating-chamber and having its outlet end projecting downwardly into the lower part of the purifying-chamber, a deflecting-plate arranged on the gas-delivery conduit above the outlet thereof, and a screen arranged in the purifying-cham-

ber above the deflecting-plate and consisting of a fixed section and a removable section constructed to pass through the opening in the top of the purifying-chamber, substantially as set forth.

16. In an acetylene-generator, the combination with the generating-chamber, the water-supply tank and the purifying-chamber, of a gas-delivery conduit connecting the generating-chamber and the purifying-chamber, a stand-pipe connected at its lower end with the water-supply tank, and a burner-pipe having a branch which opens into the purifying-chamber and a branch which connects with the upper end of the stand-pipe, substantially as set forth.

17. In an acetylene-generator, the combination with the generating-chamber, the water-supply tank and the purifying-chamber, of a gas-delivery conduit connecting the generating-chamber and the purifying-chamber, a stand-pipe connected at its lower end with the water-supply tank, and a burner-pipe having a branch which connects with the upper end of the stand-pipe and a branch which extends into the central part of the purifying-chamber, substantially as set forth.

18. In an acetylene-generator, the combination with the generating-chamber, the water-supply tank and the purifying-chamber, of a gas-delivery conduit connecting the generating-chamber and the purifying-chamber, a stand-pipe connected at its lower end with the water-supply tank, a burner-pipe having a branch which connects with the upper end of the stand-pipe and a branch which opens into the purifying-chamber, and a perforated nipple arranged in said last-mentioned branch of the burner-pipe, substantially as set forth.

19. In an acetylene-generator, the combination with the generating-chamber, the water-supply tank and the purifying-chamber, of a gas-delivery conduit connecting the generating-chamber and the purifying-chamber, a stand-pipe connected at its lower end with the water-supply tank, a burner-pipe having a branch which connects with the upper end of the stand-pipe and a branch which opens into the purifying-chamber, a perforated nipple removably arranged in said last-mentioned branch of the burner-pipe, and a cover which closes an opening in the top of the purifying-chamber, substantially as set forth.

Witness my hand this 1st day of July, 1901.

DANIEL H. TREICHLER.

Witnesses:

GUST. A. NILHUS,

I. GOODMAN.