(No Model.)

J. C. GALLAGHER.

ACETYLENE GAS GENERATOR.

No. 597,900. Patented Jan. 25, 1898.

Fig. 1.

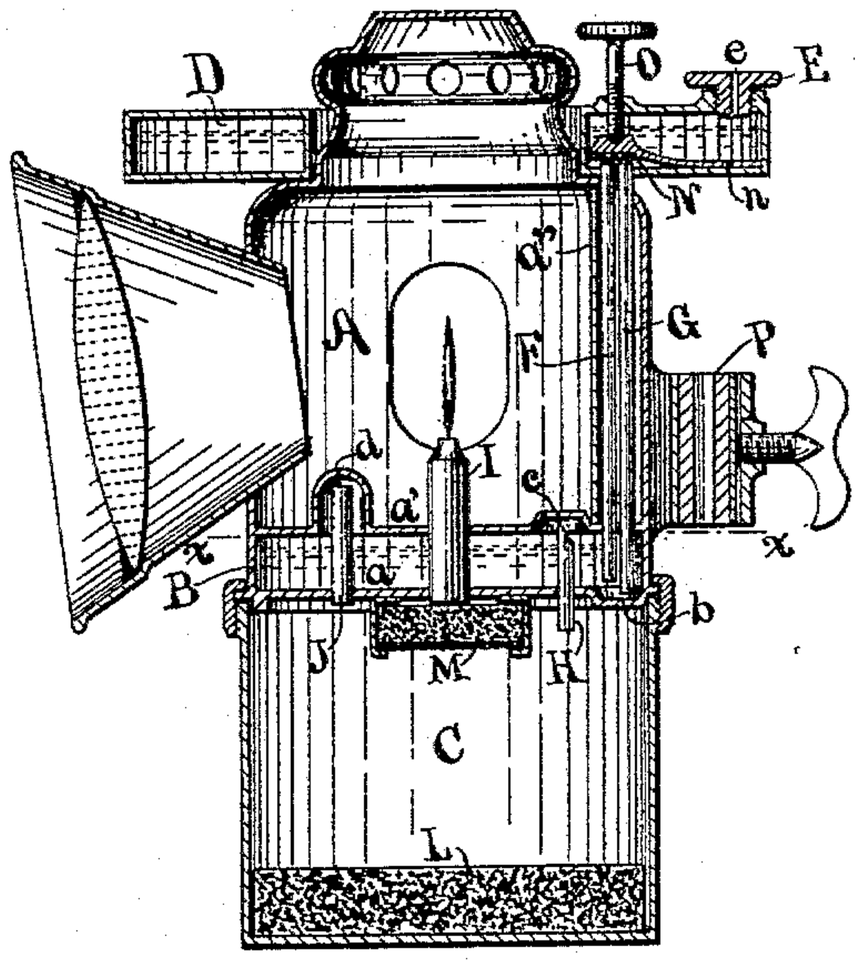


Fig. 2.

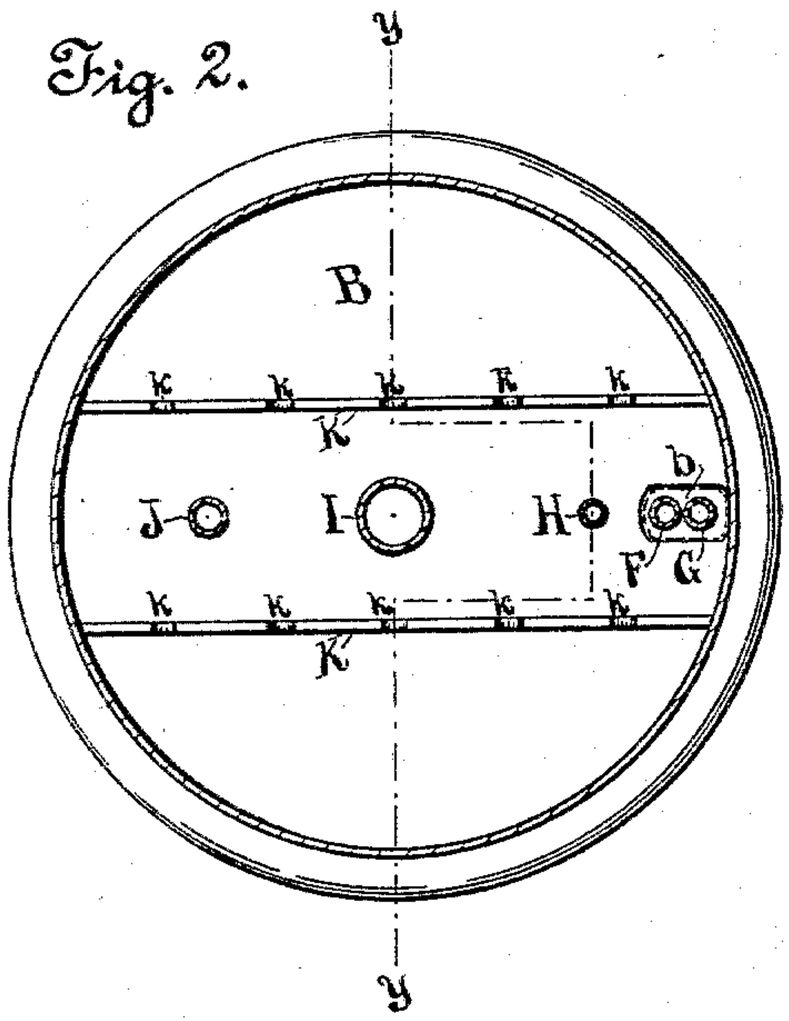
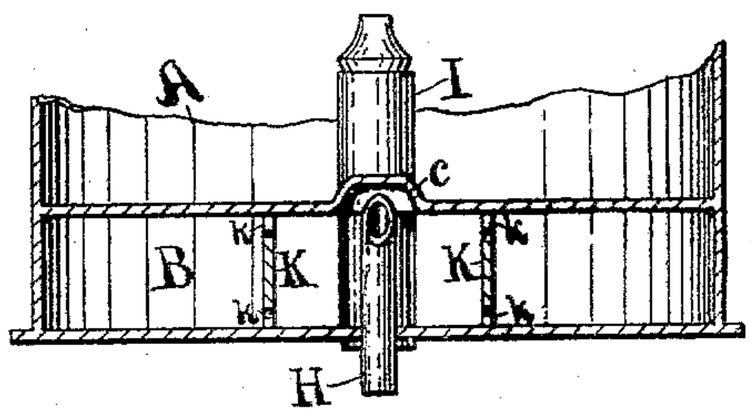


Fig. 3.



Witnesses
A. S. Diven
H. H. Mills.

Inventor
John C. Gallagher
by Eugene Diven
Attorney

UNITED STATES PATENT OFFICE.

JOHN C. GALLAGHER, OF ELMIRA, NEW YORK, ASSIGNOR OF TWO-THIRDS TO DAVID W. PAYNE AND M. C. ARNOT, OF SAME PLACE.

ACETYLENE-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 597,900, dated January 25, 1898.

Application filed December 18, 1896. Serial No. 616,111. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. GALLAGHER, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Gas-Generators for Lamps, &c., of which the following is a specification.

My invention relates to improvements in the apparatus for generating gas wherein a solid is decomposed by a liquid, and applies more particularly to generators of acetylene gas, where it is intended to produce the gas at a low pressure and in such limited quantity as may be needed for immediate consumption, the gas being taken from the generating-chamber direct and used at the same pressure under which it is being generated therein.

The objects of my invention are, first, to provide means for feeding the liquid to the solid automatically under an approximately constant head, in order to produce the gas steadily and at the desired pressure; second, to provide an auxiliary receptacle which shall receive and store up any overproduction of gas from the generating-chamber and thereby prevent the escape of gas into the atmosphere; third, to provide within said auxiliary receptacle means whereby the varying volume of gas therein shall control and regulate the feed of liquid to the generating-chamber; fourth, to so construct the liquid-column that it will act as a safety-valve when the gas is produced in excess of the capacity of the auxiliary receptacle and yet leave it in condition to supply liquid to the generating-chamber immediately the gas-pressure falls, and, finally, to adapt such a generator for use in connection with bicycle-lamps, carriage-lamps, locomotive-headlights, &c., which are subject to heavy jolting, tilting, &c., as well as to stationary or house lamps, where the conditions for perfect and steady operation are most favorable. I attain these objects by the mechanisms illustrated in the accompanying drawings, in which I have shown my invention as applied to a bicycle-lamp, and in which—

Figure 1 is a vertical section through the center of the lamp; Fig. 2, a horizontal section, enlarged, on the line *x x* in Fig. 1; and Fig. 3, a vertical section of the auxiliary receptacle, also enlarged, on the line *y y* in Fig. 2.

Similar letters refer to similar parts throughout the several views.

A is the lamp proper and is provided with the usual front glass or lens, reflector, side lights, air-vents, &c. Between the bottom *a* of the lamp and a false bottom *a'* is formed the auxiliary receptacle B, the function and operation of which will be hereinafter described. To the bottom *a* is secured by any suitable and air-tight coupling the vessel C, which constitutes the generating-chamber. Above and encircling the top of the lamp is an annular chamber or liquid-supply tank D, closed in on all sides with the exception of the hole for the filler-plug E, which plug is provided with a small vent *e* through its center. From the bottom of tank D, within a protective sheathing *a''* at the rear of the lamp, run two small tubes F and G into receptacle B, the former terminating at a little distance above the bottom of the latter. The bottom *a* is provided with a slight depression *b*, into which the tube G extends. In front of tubes F and G, within receptacle B, is a third tube H, which passes through bottom *a* and extends upward to the top of the receptacle, the false bottom *a'* being pressed upward slightly at *c*, so that the opening at the top of this tube may come quite close to the top of receptacle B. The top of tube H is cut off at an angle for a purpose to be presently pointed out. In the center of the lamp is the burner I, which passes through receptacle B and opens into the top of the generating-chamber C. At the front of the lamp is a fourth tube J, which forms a communication between the top of generating-chamber C and a dome *d* in the top of receptacle B. Transversely across the receptacle B extend two or more partitions K K, provided with a series of openings *k k k*, &c., at top and bottom. Similar partitions may also be placed in tank D.

L represents the charge of carbid, which is preferably made in the form of a disk to fit the chamber C. A smaller block of carbid M is fastened to the lamp-bottom *a* immedi-

ately beneath the opening to burner I, being held in position in any desirable manner. I have shown it supported upon a woven-wire disk held up by lugs depending from *a*.

Above the openings to tubes F and G in tank D is a valve N, held in open position by a spring *n*, attached to the bottom of the tank and operated by the thumb-screw O.

P is the clamp by which the lamp is held upon the lamp-bracket.

To fill the lamp, plug E is removed and water or other liquid is poured in through the opening until it runs out through tube H, the lamp being held vertically. The valve N is then closed and tank D filled and plug E replaced, the water then standing in tank and receptacle at the levels indicated. The charge of carbid is placed in chamber C and the chamber is screwed tightly against the bottom of the lamp, the piece of carbid M having been first placed in position.

In operation upon opening valve N water runs down through tubes F and G, raising the level of the water in receptacle B. This causes an overflow through tube H into the generating-chamber and starts the generation of gas. As soon as gas issues from the burner it is lighted and continues to burn steadily until the carbid is exhausted or the water-supply is shut off. As gas is formed it rises through tube J into the top of receptacle B. Should it be generated more rapidly than it is consumed at the burner, the excess of gas will accumulate in B and press the water-level therein down below the top of tube H, forcing the water back up into tank D through tubes F and G and stopping the flow into the generating-chamber. Continued consumption will reduce this accumulation of gas, causing the excess of pressure to fall, when the water-level will rise again in B until overflow through H is again started. This overflow is very gradual on account of the shape I give to the top of tube H. By cutting it off at a rather abrupt angle the opening presented to the water gradually enlarges, and as the water-level rises the flow through the tube will increase very slowly, so that it may be checked very quickly by a rise in the gas-pressure. Moreover, this avoids a "flashing" of the gas, since the water is prevented from entering the generating-chamber in any considerable quantity, as is apt to be the case when water rises above a level opening, where it is held back by molecular attraction around the edge of the orifice until it has risen sufficiently to overcome this force, after which it enters with a rush.

While tube H, if used alone, will allow the overproduction of gas in the generating-chamber to ascend into the receptacle and cause a very effective regulation of the water-supply, I find that better results are obtained by the use of the second tube J, which opens into the receptacle some little distance above the orifice of H, so that the water in B cannot at any time cover its top, thus providing an open communication between chamber and receptacle at all times. This tube extends above the normal water-level a sufficient distance to prevent the water reaching its orifice when the lamp is tilted or jolted, the false bottom *a'* being pressed up to form a suitable dome to accommodate the tube.

The water-level in the receptacle rises and falls according to the variations of the gas-pressure, the gas passing back and forth between generating-chamber and receptacle, and it will be found that a comparatively small receptacle under ordinary circumstances will take care of this surplusage of gas, and thereby cause a very steady flame at the burner without any escape of gas to the outer air. At times, however, from various causes, especially when the lamp is subject to jolts and jars, the generation of gas will be in excess of the capacity of the receptacle, in which case the water will be blown from the column leading from the supply-tank and gas will escape through vent *e*. One column G would provide for this relief; but when the pressure falls again in the receptacle and chamber the water would have to flow down the column and fill the receptacle before it could again enter the generating-chamber, in which time the gas-pressure would fall below the normal. To avoid this, I make the second column F shorter by a small distance than G, so that the gas will blow out through F and leave a column of water standing in G ready to start the flow into receptacle B immediately the gas-pressure falls therein, thus keeping the pressure at the burner up to the normal. In stationary lamps this escape of gas will rarely, if ever, take place; but in portable lamps it will quite frequently, but in such small quantities as to be scarcely noticeable.

To provide for dry gas and a clear steady-burning flame, I provide the small piece of carbid directly beneath the burner-orifice. Any moisture in the gas from the generating-chamber as it ascends to the burner will attack this carbid, separating itself from the passing gas and producing new fresh and dry gas to be united therewith. This piece of carbid is to be proportioned to last about as long as the charge L.

By closing down valve N the water-supply will be shut off, and the gas then remaining in chamber and receptacle will soon be consumed and the flame will become extinguished. By tilting the lamp backward and removing plug E all the water will be drained from both receptacle B and tank D. The tank is made broad and shallow, so that the supply-level will have little variation and yet insure an ample supply of water. I have shown the tank encircling the top of the lamp, which gives sufficient capacity without causing the lamp to have an ungainly appearance. It is located so that its water-level will be about three inches above the orifice of tube H, which gives a head sufficient to

produce gas-pressure enough for a one-fourth-foot burner. By arranging the various tubes in receptacle B on the diameter running from front to rear when the lamp is to be carried on a bicycle the sidewise tilting to which it is then subject will not so affect the water-level as to cause water to overflow through tube H at too great an extent. By placing the transverse partitions across the receptacle and tank and providing them with openings at top and bottom I provide against undue changes of level arising from tilting, &c., since these partitions divide the vessels into small chambers open to one another for circulation of gas and water, but to such limited extent as to prevent the water from passing bodily from side to side as the vessels are tilted.

While I have described and illustrated my invention as applied to a bicycle-lamp, I do not wish to be confined to such an application of it, since it is evident that it may be applied to a great variety of lamps and also to generators on a larger scale and for other than lamp purposes. The head of liquid-supply may be derived from various sources and may be much heavier when it is desired to produce gas at a higher pressure, and a much greater volume of gas may be produced by correspondingly enlarging the parts of the apparatus. The relative location of the parts may also be varied.

I am aware that it is not new to feed a liquid to a solid by gravity and to regulate the flow by utilizing the back pressure due to overproduction of gas within the generating-chamber to force the liquid back through the communicating channel, also that it is not new to dry the gas by bringing it into contact with a second body of the solid near the point of consumption, and I therefore do not claim these things broadly.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a gas-generating apparatus, the combination of a generating-chamber, a liquid-supply tank above the chamber, an auxiliary receptacle intermediate the two, two columns communicating between the tank and the lower portion of the receptacle, one column terminating at a point above the lower extremity of the other, and a stand-pipe communicating between the top of the generating-chamber and the upper portion of the receptacle.

2. In a gas-generating apparatus, the combination of a generating-chamber, a liquid-supply tank above the chamber, an auxiliary receptacle intermediate the two, a column communicating between the tank and lower portion of the receptacle, a stand-pipe communicating between the top of the generating-chamber and the upper portion of the receptacle, and a second stand-pipe communicating between said chamber and the receptacle at a higher point than the first within a dome provided therefor in the top of the receptacle.

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

JOHN C. GALLAGHER.

Witnesses:
H. H. MILLS,
EUGENE DIVEN.