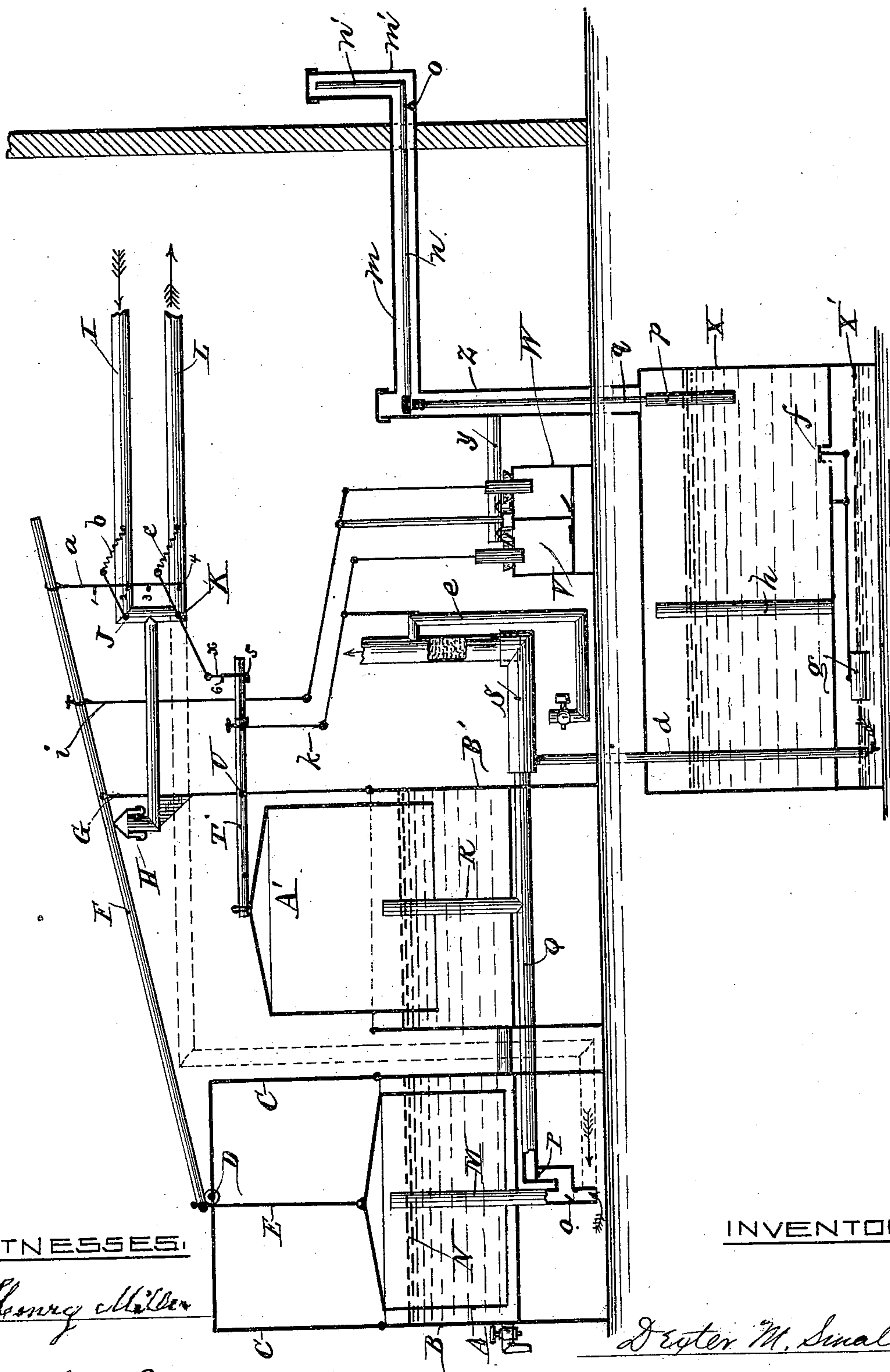


(No Model.)

D. M. SMALL.
GAS GENERATOR.

No. 291,948.

Patented Jan. 15, 1884.



WITNESSES:

Henry Miller

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DEXTER M. SMALL, OF PROVIDENCE, RHODE ISLAND.

GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 291,948, dated January 15, 1884.

Application filed March 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, DEXTER M. SMALL, of Providence, county of Providence, and State of Rhode Island, have invented an Improved Gas-Generator, my object being absolute safety combined with simplicity of construction and operation in a device for automatically producing a uniform quality of gas suitable for either heating or illuminating purposes and at minimum cost.

My invention in brief consists of a device for generating gas from liquid hydrocarbon, having the following elements combined and operating substantially as herein set forth, to wit: some suitable motive power, a device operated thereby for supplying the necessary air to be mixed with the vapor of the hydrocarbon for producing gas, which motive power also operates another device for conveying the liquid from a tank (under ground) up into a vaporizing-chamber, where it is mixed with the incoming air to form the gas, and in exact proportion thereto.

The accompanying drawing, which forms a part of this specification, is a sectional front view of a device illustrating my invention, being partly broken away to show interior construction thereof.

A and A' are air-cylinders playing up and down in their respective tanks B and B'.

C C is a frame-work that supports the truck or pulley D, over which the cord E plays as the cylinder A is raised by means of the lever F with fulcrum at G, and operated by a piston, H, water being admitted thereto through the pipe I and stop-cock J, and emitted therefrom through the stop-cock K and pipe L, both cocks being operated by the lever F through the rod a, in connection with the springs b and c, the rod a having little pins 1, 2, 3, and 4 thereon. The lever opens or closes them a little more than half-way, when the springs operate to completely open or close them, one being open when the other is closed.

M is a pipe having a valve, O, therein, through which air is received into the cylinder A above the water-line N as the cylinder is raised, the air therefrom being emitted through the valve P into the pipe Q, thence up through the pipe R into cylinder A', or a portion directly to point of consumption through the vaporizing-chamber S. The cylinder A is heavier than A', so that the latter rises as the

former descends until sufficiently high, when through the lever T, with fulcrum at U, it operates to close the exhaust-valve or stop-cock K, pressing down upon the little pin 5 on the perpendicular rod x, connected therewith, as represented, thus preventing the farther descent of the cylinder A until the cylinder A' has descended sufficiently to again open the cock. To prevent its descending too far, another little pin, 6, is secured to the rod x, against which the lever strikes after the cylinder descends a short distance, thus opening it again, the arrangement of the pins on the rod x permitting the lower stop-cock to be operated independently of the upper one, though both are simultaneously operated by the lever F. While cylinder A is ascending the cylinder A' descends, so that a constant flow of air is maintained. The air-pumps V and W, through intermediate levers and rods, as represented, are respectively connected with the levers F and T, and thus operated simultaneously with upward and downward movements of the cylinders A and A', each pump, as it descends, forcing air into the tank X through pipes Y and Z, thus causing the liquid therein to ascend through pipe d into the vaporizing-chamber S at a rate exactly proportioned to the air that is also passing through it. Above the vaporizing-chamber it is well to have, as represented, one or more layers of fine wire-gauze or other suitable substance for the vaporized air to pass through, to insure a thorough mixture thereof.

e is a small pipe, conveying gas to a burner beneath the vaporizing-chamber for heating the same, to facilitate evaporation and warm the air, which, when cold, quickly drops the vapor. In warm climates or in basements this might be omitted, but is decidedly preferable to retain it under all circumstances.

In order that the varying height and consequently varying pressure of the liquid in the tank X may not affect the working of the apparatus, I separate the tank into two compartments, in the latter of which, X', (whence the pipe d extends,) I maintain a constant and uniform level of the liquid by means of the valve f, operated by the float g, the two compartments being connected by the air-pipe h.

By simply varying the position on the levers F and T of the rods i and k, it is obvious that the amount of air forced into the tank X X'

can be adjusted to a nicety, and thus also indirectly the relative proportion of the hydrocarbon and air that passes into the vaporizing-chamber.

5 In order that the tank may be filled from outside of building, (it being buried in the cellar,) I connect with the pipe Z a branch arm, *m m'*, in which, to indicate when the tank is sufficiently full, I place a lever, *n n'*, supported by pivot *o* and operated by the rising
10 liquid through the float *p* and rod *q*, the part *n'* dropping below its usual position when the long arm *n* is raised, as represented.

To enable one to ascertain just how much
15 liquid there is in the tank at any time, I place a small magnet upon or magnetize the top of the rod *q*, so that by passing a small compass up and down against or near the pipe Z, the position of it can be readily ascertained, and
20 thus indirectly the depth of the liquid. The pipe Z, or a portion of it, could be made of glass, to show position of rod *q* for this purpose; but it is not as desirable on account of liability to accidents.

25 It is obvious that steam or compressed air could be used in place of water as the motive power without altering apparatus in any particular. Electricity could also be used, in which case the levers F and T could readily
30 be connected with the electrical machine and operate to close and break the circuit, as required. Moreover, instead of the upright cylinders A and A', a revolving cylinder or bellows could be used, (though not as simple
35 and practical,) the air-pumps being operated in connection therewith, and, instead of using air-pumps, any other style of pumps operated in same manner could be used for drawing or forcing the liquid from the tank into the
40 vaporizing-chamber; but air-pumps as described and represented in the drawing are by far the most preferable, as they obviate all risk of leakage and consequent danger. The packing in the air-pumps is kept soft and
45 tight by means of oil contained in the oil-cups surrounding the cylindrical pistons.

The above-described device can also be profitably used for enriching ordinary coal-gas, in which case the piston H would be unnecessary, as also the exhaust-pipe L, in place
50 of which the pipe indicated by the dotted lines would convey the incoming coal-gas to and raise the cylinder A, the gas first entering through the pipe I, and being the motive
55 power.

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

1. The combination, in a device for generating or enriching combustible gas from or
60 with liquid hydrocarbon, of the following elements: a tank or reservoir for the liquid, a vaporizing-chamber, a device for supplying at a uniform pressure the air or the gas to be
65 enriched, a device for automatically compressing air within the reservoir for the purpose set forth, a device for rendering uniform the

power required to raise the liquid therefrom, a magnetic device for indicating the amount of liquid therein, and a crooked or angular-
70 jointed pipe, as represented, for filling it, with a device therein for indicating at the orifice thereof when the reservoir is sufficiently full.

2. The combination, with a device for generating or enriching combustible gas from or
75 with liquid hydrocarbon, of an underground reservoir for holding a supply thereof, having a compartment with a device for maintaining therein a uniform level of the liquid, there
80 being a communicating air pipe or passage between the two compartments, and an outlet-pipe connecting the lower one with the vaporizing-chamber, together with a pipe for filling the reservoir, and suitable mechanism for au-
85 tomatically raising the liquid as required for consumption.

3. The air-cylinders A A', tanks B B', pipes M, Q, and R, and valves O and P, all combined, arranged, and operating substantially
90 as described, together with a suitable motive power, a vaporizing-chamber, and means for supplying oil thereto.

4. The combination, with a device for generating or enriching combustible gas from or
95 with liquid hydrocarbon, of a tank for holding a supply thereof, having a compartment with a device for maintaining therein a uniform level of liquid, there being a communicating air pipe or passage between the two
100 compartments, and an outlet-pipe connecting the lower one with the vaporizing-chamber, together with suitable mechanism for automatically raising the liquid as required for consumption.
105

5. The combination, with a hydrocarbon tank or reservoir, of a device for automatically introducing air therein, to expel the liquid therefrom and convey it, as required,
110 to a vaporizing-chamber or point of consumption.

6. Pipe Z, having a branch, *m m'*, with a device therein, connected with, so as to be operated by, the liquid in the tank X, for the purpose set forth.
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7. The combination, with a hydrocarbon tank or reservoir, of a magnet connected with, so as to be actuated by, the liquid therein, for the purpose set forth.

8. The combination, in a device for generating or enriching combustible gas from or
120 with liquid hydrocarbon, of two cylinders, A A', each operating to maintain a uniform pressure within the vaporizing-chamber, of the air or gas to be enriched, and each, in-
125 dependently of the other, actuating a device for conveying the hydrocarbon to a vaporizing-chamber as required, together with a suitable motive power.

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Witnesses:

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