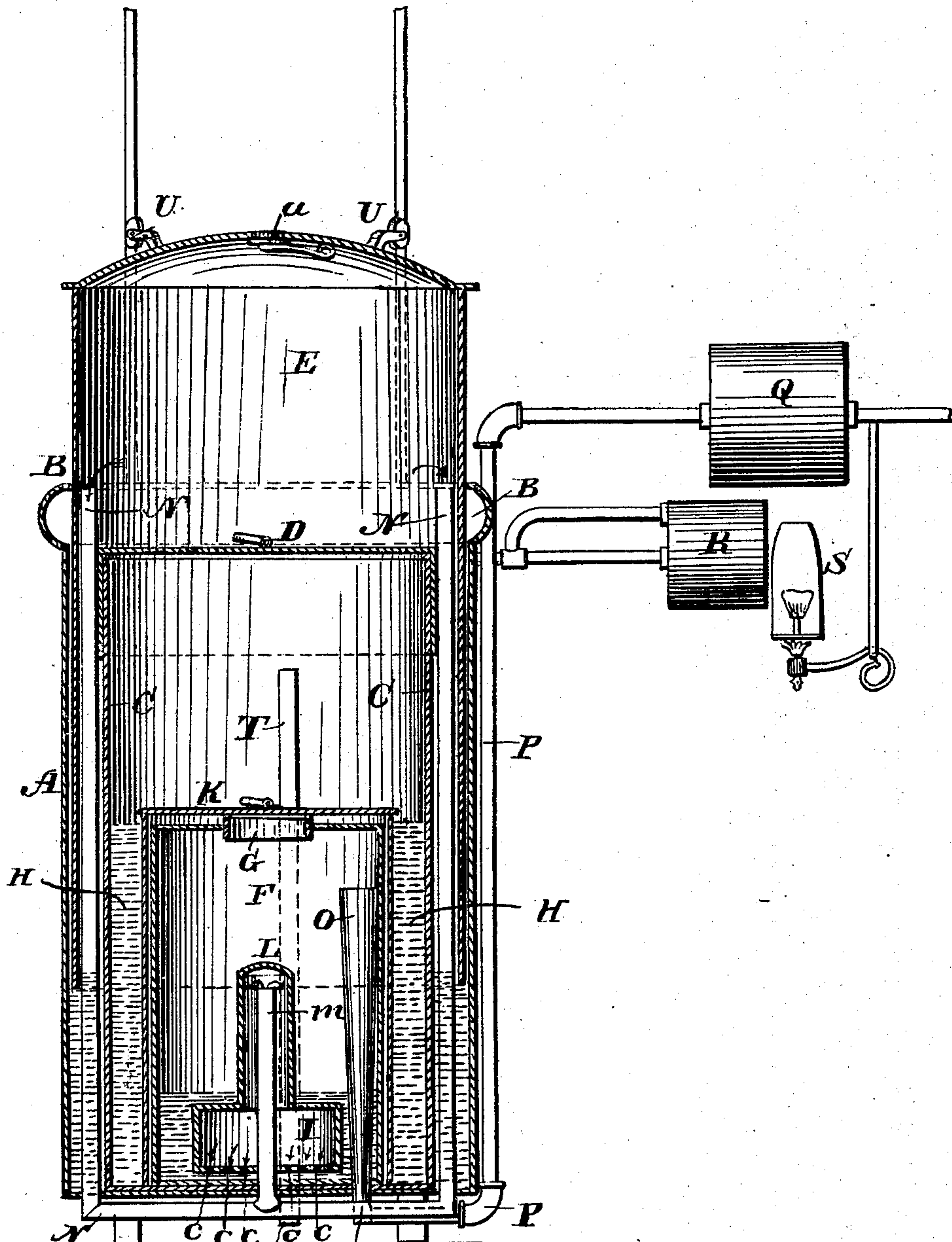


D. M. GRAHAM.

Gas Machine.

No. 80,404.

Patented July 28, 1868.



Witnesses: T N  
J. W. Burris  
William H. H.

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per C. B. Fowles

# United States Patent Office.

DAVID M. GRAHAM, OF EVANSVILLE, INDIANA.

Letters Patent No. 80,404, dated July 28, 1868.

## IMPROVED GAS-MACHINE.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, DAVID M. GRAHAM, of the city of Evansville, in the county of Vanderburg, and State of Indiana, have invented a new and useful Improvement in Gas-Apparatus; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification.

The drawings represent a vertical section of the apparatus, showing the arrangement of all the cylinders, chambers, pipes, &c.

#### Nature.

I design this as an improvement on my patent issued September 3, 1867, and the nature of this invention consists in—

First, the construction of a gas-generating apparatus, combining in one cylinder an air-chamber, gasometer, oil-chamber, and rarefier.

Second, the construction and arrangement of a rarefier, having a perforated bottom, and an air-tight condensing-tube on the top thereof.

Third, the arrangement of an air-pipe inside of and extending nearly the whole length of the air-tight tube, connected with pipes, which communicate with the air-chamber, for conducting air therefrom through the condenser into the rarefier, by which the air is distributed into the gasoline, which increases the quantity and improves the quality of the gas.

Fourth, the combination and arrangement of gas and water-heaters with the gas-apparatus, for heating and expanding the gas, and thus preventing condensation in cold weather, and for heating the water in the water-chambers or joints, and thus preventing freezing.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is an outside cylinder, open at the top, and provided with a concave rim, B.

C is an inside cylinder, open also at the top, and provided with a cap, D, and made enough smaller in diameter than cylinder A to form the water-chamber or joint, in which work the sides of the cylinder, which forms the air-chamber E, the lower end of which is open, and the top is provided with an air-valve, a.

F is an oil-chamber, formed by the cylinder, with an opening, G, in the top thereof. Over the oil-chamber is the gasometer-cylinder K, the lower end of which is open, and the sides of which work in the water-chamber or joint H H.

I is a rarefier, with perforations c c c c in the bottom thereof, and an air-tight tube, L, on the top thereof. Inside of this tube, and extending nearly the whole length thereof, is the air-pipe M, the upper end of which is open, and the lower end is connected with the air-pipes N N, which pass through the water-joint between cylinders A and C, and communicate with the air-chamber E.

Inside of the oil-chamber is a flaring or funnel-shaped pipe, O, the upper and large end of which is open, and extends above the oil, and the lower end is connected with gas-pipe P.

Q is a gas-heater, and R is a water-heater, both of which are heated by the gas-burner S, for expanding the gas, and preventing condensation in cold weather, and for heating the water in the water-chambers or joints to prevent freezing, which, however, I contemplate, may be accomplished by introducing into the water a sufficient quantity of alcohol.

The opening G in the top of the oil-chamber is provided with flanges above and below, to prevent water from entering the chamber, or oil escaping from the chamber, in case of the upsetting of the apparatus on boats, railroad-cars, or otherwise.

T represents one of two air-pipes, extending through the water-joint H H. Both ends of these pipes are open, the upper ends extending above the oil-chamber, and the lower ends through the bottom of cylinder A, as shown in the drawings, for the purpose of admitting air to and ejecting it from the space in which the gasometer-cylinder K operates, to facilitate its movements up and down as gas is generated and discharged into the gas-pipes.



The red dotted lines represent the gasoline or oil in the oil-chamber, and the blue dotted lines represent the water in the water-chambers or joints.

U represents pulleys and guides for guiding and aiding the motion of the air-chamber cylinder E.

The oil in the oil-chamber should never be more than four or five inches in depth.

#### *Operation.*

Air is admitted into the air-chamber E through the valve *a*, and, by the pressure of the aerometer, the air is pressed through the pipes N N and M into the condenser L, through which it passes into the rarefier, and is distributed through the perforations *c c c c* into the gasoline, and thus uniting the carbon with the nitrogen and oxygen, forming a superior quality of gas, which I call nitrous-oxide carbonic gas.

As the gas is generated, it passes out of the oil-chamber F, through the opening G, into the gasometer K, raising it until it is full, and then, by the pressure of the gasometer and the aerometer, the gas is forced back into the oil-chamber, and down the pipe O into the gas-pipe P.

The concave rim B serves to prevent the escaping of the water from the first water-joint, while the cap D prevents the water from flowing into the water-joints H H in case of the jostling of the apparatus on boats or railroad-cars.

The heaters are to be used in cold weather only. The burner S heats and expands the gas while it passes through heater Q, and thus prevents condensation, and the burner at the same time heats the water in heater R, producing steam, which passes through the proper pipes into the water-chambers, preventing the water therein from freezing.

#### *Claims.*

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

1. The construction of the rarefier I with an air-tight condenser L, in combination with the air-pipe M, substantially in the manner and for the purpose as herein described.
2. The construction of the cylinder A with the concave rim B, substantially as and for the purposes described.
3. The rarefier I, condenser L, air-pipes M, N N, and T T, gas-pipe O, aerometer-cylinder E with valve *a* and pulleys U U, cylinder C with movable cap D, oil-chamber cylinder F with opening G, provided with flanges, and gasometer-cylinder K, all combined and operating in the one cylinder A, substantially in the manner and for the purpose as described.
4. The combination and arrangement of the heaters Q R, substantially in the manner and for the purpose as herein described.

As evidence that I claim the foregoing, I have hereunto set my hand in the presence of two witnesses.

D. M. GRAHAM.

Witnesses:

ALEX. DARLING,  
J. S. CATLETT.