

G. W. CLARK.  
VAPOR GENERATOR.

Patented Sept. 24, 1889.

Fig. 1. A plan view of a steam engine mechanism. It shows a horizontal cylinder with a piston rod (B) and a connecting rod (C) attached to a crank (A). The piston rod is connected to a crosshead (D) which moves vertically within a guide (E). A valve gear mechanism (F) is shown on the right, with a valve rod (G) and a valve (H). The cylinder is labeled "Water" and the valve rod is labeled "Oil".

The diagram illustrates a steam engine mechanism. A vertical cylinder is shown with a piston rod labeled 'B' and 'Steam Generator'. The piston rod is connected to a connecting rod labeled 'D' and 'E'. The connecting rod is further connected to a crankshaft labeled 'F' and 'b'. The crankshaft is shown in two positions, one at the top and one at the bottom, with arrows indicating the direction of rotation. The base of the cylinder is labeled 'C' and 'A'.

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## VAPOR-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 411,712, dated September 24, 1889.

Application filed May 19, 1888. Serial No. 274,428. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. CLARK, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Vapor-Generators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 is a top view, Fig. 2 a front elevation, Fig. 3 an end view, and Fig. 4 a transverse and median section, of an apparatus embracing my invention, the nature of which is defined in the claim hereinafter presented. Fig. 5 is a longitudinal and vertical section taken through the jet-tube and the uppermost tube of the coil or retort and also through the conduit leading from the steam-generator, to be described, said section being taken on line 1 1 of Fig. 3.

My improvement relates to apparatus by which steam is generated and petroleum or a hydrocarbon reduced to a vaporous condition and mixed or combined with the steam, and in highly-heated condition burned for heating or lighting or other purposes in the arts.

In the said drawings, A denotes a flat plate rectangular in shape and constituting the bottom of a steam-generator B, and that of a trough or pan C, arranged in front of such generator. From the said steam-generator, provided at one end with a water-supply pipe *a*, there leads out of the top of said generator a conduit or pipe D, communicating with the tubular coil or retort E, at the upper end thereof, such retort at its lower end opening into one end of a tube F, arranged over or within the trough or pan C. This tube F has in it a series of holes *b*, for the emission from it of the vapor produced by the apparatus when in operation, the tube being closed at its other end by a head *b'*, provided with a prismatic part *b''*, to admit of a wrench being applied thereto to turn the tube F in its sup-

porting-elbow, so as to direct the flame issuing from it against any portion of the retort or against the steam-generator, as may be desired, the tube F being so applied to its connection with the retort as to enable such to be done.

A conduit or pipe G, for supplying the retort with petroleum or a hydrocarbon, enters said retort at its upper end and extends within the retort to a short distance beyond the junction of it with the eduction pipe or conduit D of the steam-generator.

In using the apparatus it is designed to be placed directly upon the grate of a stove or fire-place, with the plate A resting upon such grate. The steam-generator is to be suitably supplied with water from a reservoir B', the bottom of which is level with the bottom of the steam-generator. Said reservoir is provided with a float C', applied to a stem D', so as to be adjustable thereon in altitude in the reservoir. The stem is provided with a conical top *e*, which, with a correspondingly-shaped seat *f* in the pipe *a*, constitutes a valve E'; and the tank B', attached to the water-supply pipe *a*, the float C', stem D', and valve E' constitute a device for automatically regulating the flow of water into the steam-generator, so as to maintain it at a uniform height therein. The water enters the tank or reservoir B' through the holes *g g* in the pipe *a*, and when it rises in the tank sufficiently to reach the desired height therein the float C' forces its plug *e* against the seat *f* and stops the flow of water into the tank. When the water lowers in the tank, the float will fall and draw its plug away from the seat and again allow the water to flow into the said tank.

The coil or retort is to be properly furnished with the petroleum or hydrocarbon in the necessary amount, the flow of which is to be controlled by a cock in the pipe G. On pouring a small quantity of alcohol or petroleum into the trough and lighting the same, the flame will strike against the steam-generator, and the water therein will very soon be caused to boil; and as soon as steam is observed to flow from the holes *b* in the jet-tube the petroleum or hydrocarbon is to be admitted to the



retort, which also has been heated to a high degree of temperature by the flame. As the petroleum or hydrocarbon leaves the pipe G, it will be blown by the steam as it rushes  
5 past the end of the pipe G into the retort, and on mixing or combining with the steam will be reduced to a vaporous condition. The mixture, or "water-gas," as it is usually termed, being discharged with force through  
10 the holes of the jet-tube, will be enflamed and will maintain the heating of the retort and steam-generator, the flame rising above the apparatus to such an extent as to admit of its being utilized for heating purposes.  
15 Furthermore, it will be seen by inspection of the drawings that the steam-generator constitutes the rear wall or boundary of the trough, such a construction not only saving the necessity of a rear wall separate from the  
20 generator, but enabling the petroleum, when in the trough, and the flame therefrom to come into direct contact with the generator.  
I do not claim, broadly, a coil or retort hav-

ing a tube at one end and communicating with it at its other end a steam-generator, 25 and means of introducing a hydrocarbon into such coil or retort; but

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

The combination of the trough C, having 30 as its rear wall or boundary the steam-generator B, the water-supply pipe *a*, connected with said generator, the retort E and tube F above the trough and connected together, said tube F having the holes *b*, the steam- 35 conduit D, leading from the generator B into the retort E, and the hydrocarbon-supply pipe G, leading also into the retort E, as set forth.

In testimony whereof I affix my signature 40 in presence of two witnesses.

GEORGE W. CLARK.

Witnesses:

S. N. PIPER,

C. F. DANIELS.