A. V. L. PAILLARD.

Gas-Generator.

No. 220,087. Patented Sept. 30, 1879.

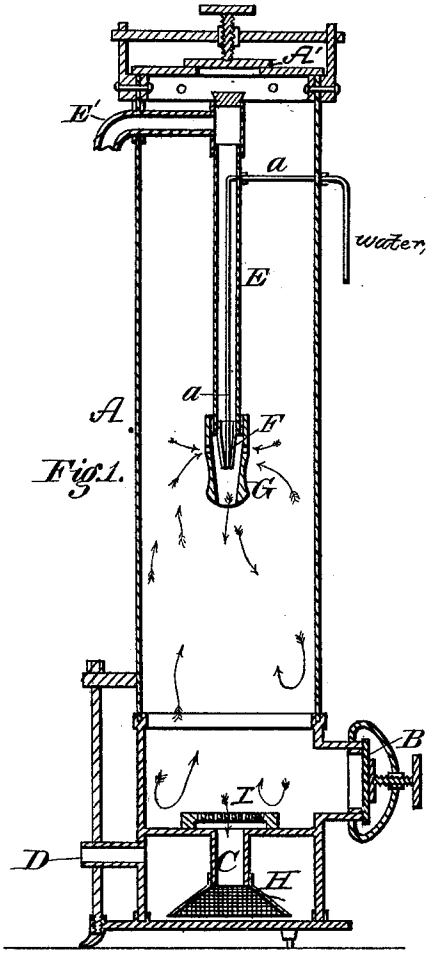


Fig. 1.

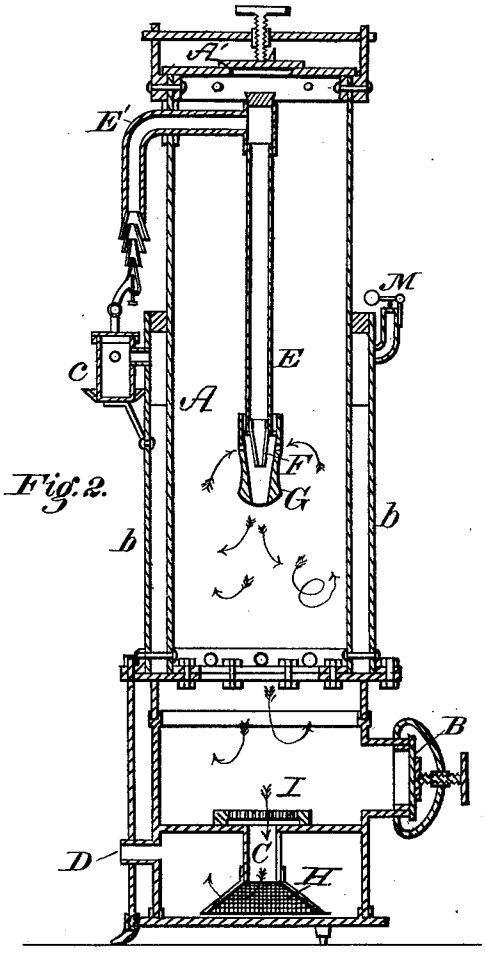


Fig. 2.

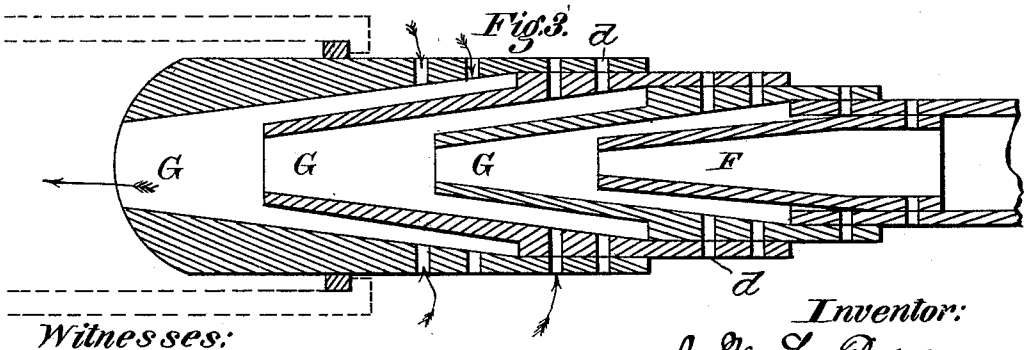


Fig. 3.

Witnesses:

Donn B. Tuttchell.

Will N. Dodge.

Inventor:

A. V. L. Paillard

By his atty.

Dodge et Sm

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

AIMÉ V. L. PAILLARD, OF PARIS, FRANCE.

IMPROVEMENT IN GAS-GENERATORS.

Specification forming part of Letters Patent No. **220,087**, dated September 30, 1879; application filed October 28, 1878.

To all whom it may concern:

Be it known that I, AIMÉ V. L. PAILLARD, of Paris, France, have invented certain Improvements in Gas-Generators, of which the following is a specification.

My invention relates to the method and apparatus for making that class of gas which is produced by passing steam and air through a mass of incandescent fuel; and consists in introducing the jet with a downward direction directly into the midst of the mass of fuel; in an injector having both its inlet and outlet openings located in the combustion-chamber, and in minor details.

Figure 1 represents a vertical central section of my improved apparatus; Fig. 2, a similar view of a slightly-different form of the same; Fig. 3, a longitudinal central section of the injector.

A represents the body of the generator, preferably cylindrical in form, and consisting of a sheet-metal body supported upon a cast-iron base, to which it may be cemented, riveted, or bolted, as may be found necessary. The body A is furnished at its upper end with a charge-opening, A′, closed by any suitable device, and the base is provided with a man-hole and cover, B, for the removal of cinders and ashes.

The generator is provided in its base with a washer, C, consisting of a large pipe or flue opening into a chamber, H, filled with fine-wire gauze, and located directly below the grate I, as shown in Figs. 1 and 2. The grate serves to hold back the cinders and prevent their entrance into the tube or pipe, while the wire gauze or cloth serves to retain the ashes, while each allows the free passage of the gases through them.

Entering at or near the upper end of the combustion-chamber A is a pipe, E, which extends centrally downward in said chamber, and is furnished at its lower extremity with a jet apparatus, F G, as shown in Figs. 1 and 2, the office of said pipe and jet being to deliver a blast of air to the coal or other substance in the combustion-chamber, for the double purpose of aiding combustion and of producing eddies within the chamber, which cause the products of combustion and the air thus introduced to travel back and forth over the burning mass until completely reduced, and until all tarry constituents thereof are completely destroyed, this eddying movement being always greater than the forward movement of the gases. The fuel is maintained constantly above the level of the injector, so that the jet is delivered not upon the surface, but into the midst of the mass. By thus holding the gases and products of combustion for a long time under the action of the burning mass they are completely reduced to inflammable gas, which, passing downward through the grate I, enters the washer C, where it is purified, and from which it passes to the service-pipe D.

By the employment of the jet or blast of air in the manner described the coal or other substance with which the chamber is supplied is caused to burn with intense heat for a short space around the jet, while beyond that space the coal is scarcely red, and at yet a little farther distance is scarcely heated at all.

Any device may be employed for supplying or producing the blast of air; but in practice I prefer to employ an injector, as shown in Fig. 2; and for the purpose of operating the injector I provide, in some cases, an annular boiler or steam-chamber, formed by surrounding the exterior wall of the generator with a strong metallic casing, *b*, closed at its upper extremity by an annular ring or plate, and at its lower end riveted upon the base of the generator, as shown in Fig. 2, the base being in such case furnished with a flange or seat to receive the casing and to close the lower end of the chamber, of which the casing forms the outer wall. The heat given off by the combustion-chamber converts the water with which this annular chamber is supplied into steam, which is conducted by a pipe to the injector, as shown.

In order that the blast may be secured at the commencement of the operation of the apparatus, a small reservoir or chamber, *c*, is arranged just below the injector, to contain a small quantity of water, which may be converted quickly to steam by means of a lamp, gas-jet, or a small quantity of burning charcoal. As soon as the heat given off by the generator-body is sufficient to convert the water in the annular chamber to steam, the lamp or other temporary heater is removed or extinguished.

The most essential feature of this invention consists in producing the eddying movement of the gases and products of combustion within the generator; and to more effectually accomplish this result I construct the jet or blast nozzle F G in the manner represented in Fig. 3. As there shown, this jet or nozzle consists of the blast nozzle or tube F and a series of concentric nozzles, G, each extending beyond the end of the preceding one and beyond inlets or perforations *d* formed through the sides of the device. The blast, rushing through the nozzles, draws the products of combustion and gases into and through the openings *d*, and discharges them at the end of the nozzle, from which point they rise, and are again drawn into and forced out of the jet or nozzle until they finally pass from the combustion-chamber.

The downward direction of the blast is advantageous, for the reason that it causes a more thorough circulation and eddying movement of the steam and gases within the mass of fuel, due to the fact that their natural tendency is to rise as their temperature is increased, and that the downward direction of the jet consequently causes it to act with a counter motion.

It is sometimes found desirable to add water or steam to the gases, and for this purpose I introduce into the combustion-chamber a pipe or tube, *a*, and pass the same centrally downward in the blast-pipe E, arranging its delivery end preferably within the jet apparatus F G. By this arrangement the pipe *a* is caused to deliver its water directly upon the heated nozzle or jet, by which it is instantly vaporized and caused to mingle with the gases in the chamber.

Instead of water, tars, heavy oils, and carbureted substances in general may be used. These I mix with coal above the blast-pipe, where they are subjected to the action of the whole heat of the furnace. By this means the substances so introduced are readily volatilized and the gas greatly enriched thereby.

As the coal burns away below the blast nozzle or jet, a corresponding quantity settles down from above, thus maintaining a constant and regular supply.

The jet or nozzle F G should be of such thickness or material as not to be fused by the heat of the burning coal.

It will be observed that the two forms of device shown in the drawings are the same in principle and operation, though differing slightly in the details of construction.

I am aware that air and steam have both been passed through a mass of burning coal in the manufacture of illuminating-gas, and that steam-jets have been blown into the top of the combustion-chamber above the coal, and also into the bottom of the furnace, and I lay no claim thereto. By delivering the steam, however, directly into the interior of the burning mass and giving it a downward direction I secure much better results than by the usual plans.

Upon the whole, what I claim as the privative right of the patent is—

1. The herein-described process of manufacturing illuminating-gas, consisting in the introduction of a jet of air and steam in a downward direction into the midst of a burning mass of fuel.

2. The combination, in a gas-producing apparatus, of a combustion-chamber and a downwardly-directed injector, F G, having inlet and outlet openings, both located within the chamber.

3. The combination of combustion-chamber A, washing-chamber H, external surrounding boiler, *b*, injector F G, and blower or injector *c*, connected with the boiler and with injector F G, as shown.

AIMÉ VICTOR LÉON PAILLARD.

Witnesses:
EDMUND CRÉOURLEY,
G. MEUNIER.