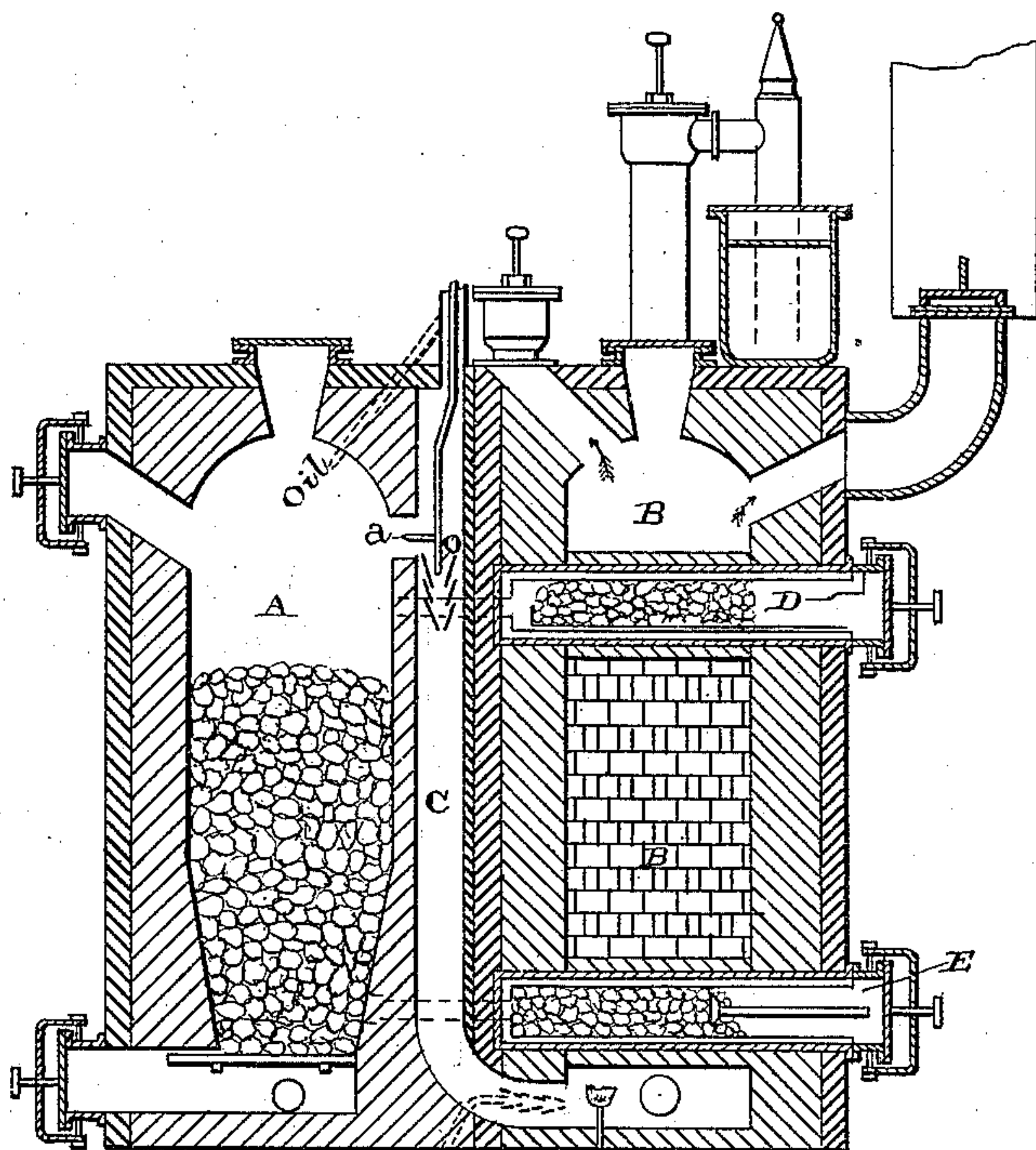


(No Model.)

J. FLANNERY.
HYDROCARBON GAS GENERATOR.

No. 294,862.

Patented Mar. 11, 1884.



— Witnesses. —

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 294,862, dated March 11, 1884.

Application filed March 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH FLANNERY, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Hydrocarbon-Gas Generators; and I do hereby 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 pertains to make and use it, reference being had to the accompanying drawing, which forms part of this specification.

My invention relates to an improvement in hydrocarbon-gas generators; and it consists, first, in a gas-generator, the combination of the generator-chamber, a pipe which introduces oil into the chamber, and a steam-jet pipe projecting into the gas-outlet passage, whereby the jet of steam may be introduced into the chamber at the point at which the gas makes its escape; second, in the combination of two chambers, a connecting-passage between them, and a steam-jet nozzle placed below the opening in the generator-chamber, so as to exhaust the gas therefrom; third, in the combination of two chambers, a connecting-passage between the two, a pipe for the introduction of oil, and a steam-pipe provided with two jet-nozzles, one of which discharges into the generating-chamber and the other into the passage between the chambers, as will be more fully described hereinafter.

My improvement is intended to be used in connection with all gas-generators where there is a generating-chamber and a superheating-chamber used, and which chambers are connected together by means of a pipe or duct which conveys the gases from the generating-chamber to the superheater.

The accompanying drawing represents the vertical section of an apparatus which was patented by me October 18, 1881, and to which my present invention is applied; but it is to be distinctly understood that I do not limit myself to the construction here shown, or to any other particular arrangement or construction of parts.

As described in the patent which was granted to me October 18, 1881, and bearing number 248,439, A is the generating-chamber, and B the superheating-chamber, and the two are connected together by means of a pipe, C.

This pipe may either extend down through the inside of the walls of the generator, as shown in the drawing, or the pipe may be a diagonal one, and placed upon the outer side of the walls, as shown in the patent granted to me February 8, 1881. I do not limit myself in any manner to the method of uniting these two chambers together, for this forms no part of my invention.

As shown in Patent No. 248,439, the two retorts D E may be passed through the chamber B and connected with the chamber A, or these may be dispensed with, and the hydrocarbon oil, which is to be used in connection with this generator, may be introduced into the top of the chamber A, as shown in the well-known low generator or process. The manner of introducing the oil into this chamber may be varied at will, for it forms no part of this invention. Where the oil is dropped into the generating-chamber A, as shown in the low generator, the oil is brought into direct contact with the fire which is made in this chamber, and is presumably destructively distilled, but at a very great loss, for the following reasons: First, the oil coming in direct contact with the fire cools the coals, so that the efficiency of the fire for the decomposition of the water is greatly impaired—to such an extent that the time required for producing the gas is lengthened to a very great extent, and the price of the gas produced correspondingly enhanced; second, the oil or its vapors coming suddenly in contact with the highly-heated surfaces is decomposed into its elements, so as to liberate the hydrogen and to deposit the carbon in the form of lamp-black or carbon, thus greatly detracting from the illuminating qualities of the oil by robbing it of its proper combination; third, the oil being injected into the chamber, or flowing in from its own gravity, is retained unnecessarily long in contact with the heated surfaces, and it or its vapors being in contact with the coal, some of the hydrogen being set free, especially from the paraffine compounds, combines with the sulphur and forms sulphureted hydrogen, which has to be removed at a future step in the process. In order to overcome these great disadvantages, I inject into the top of the chamber A, at any suitable point that may be found best adapted for the purpose, a small jet of

steam, *a*, which forms an envelope, covering, guard, or protector, between the highly-heated surfaces and the oil, or the gas produced therefrom, and thus prevents the deposit of carbon in the shape of lamp-black or other solid form. This steam serves to envelop the gaseous vapors produced from the oil, and to keep it in a gaseous form, so as to prevent the deposit above referred to. The hydrogen of the steam combining with this gaseous product, not only is a much higher illuminating quality imparted to the gas, but the amount of oil necessary to produce the given quantity of desirable vapor or gas is reduced about one-fourth. This jet *a* will preferably be used in connection with the steam-exhauster O, as shown in the accompanying drawing, and in this case will be located in the connecting-pipe, or connection of any kind between the two chambers. In case the exhauster is used at the bottom of the connecting-pipe which unites the two chambers, as shown in dotted lines, this small steam-jet may be introduced in the top of the chamber A, as shown in dotted lines, or in case the exhauster is used near the top of the pipe the two will be used together, as is here shown.

The exhauster consists of a steam-jet of sufficient size and power to exhaust the gas from the generating-chamber A, and thus relieve the pressure of gas in this chamber. By the use of this exhauster the gaseous product of the oil is prevented from remaining in the chamber A unnecessarily long, and the steam is made to intimately unite with the gas, which is drawn from the chamber by means of the cones or any other similar devices, as shown. This jet, withdrawing the gases rapidly from the generating-chamber A, prevents the concussive impact upon the highly-heated surfaces, prevents the fire from becoming cooled, and prevents the oil, or its vapors, or the gas therefrom, from commingling with the coal, and prevents the setting free of the hydrogen from the oils, and especially from the paraffine compounds, and thus reduces the sulphureted-hydrogen products to a minimum. The gas which has been produced in the generating-chamber in the usual way is now made to intimately commingle with all of its deleterious compounds, the latter consisting of lamp-black, sedimentary matter, tarry particles, carbonic acid, and sulphureted hydrogen, with the steam from the jet, and the steam and the gas are forced into the regenerating-chamber B. The steam first acts mechanically to form an envelope or protector for the gas, and then, as the steam and the carbon particles come in contact with the highly-heated surfaces, actual decomposition takes place, and the oxygen combines with the carbonaceous products, getting as a product carbonic acid and oxide. The hydrogen set free from the steam combines with the hydrocarbon products of the tarry particles, and thus produces a valuable illuminating-gas. The remaining free carbon in the chamber B combines with the carbonic

acid, it in this change taking up an additional particle of carbon in the reaction, thus changing from a deleterious to a valuable and combustible gas. The excess of oxygen that may be present in the chamber B, together with the steam, combines with the sulphur which has been brought over from the chamber A, and produces a sulphurous gas which is eliminated in the subsequent steps in the treatment of the gas.

All of the chemical effects above described can be obtained by injecting steam into the superheater B at any suitable point, and I do not therefore limit myself to the injection of the steam together with the gas, for this steam-jet may be introduced into the regenerator B at any desired point. It is obvious that this steam-jet may be used in connection with the other chambers used in connection with my system, and fully described in the patents above referred to.

If so desired, a current of cold combustible or illuminating gas may be injected into the chamber B, and this gas, mingling with the heated gas coming from the chamber A, will form an envelope for the gas, and will protect it in the same manner as the steam. I do not therefore limit myself to steam, for I may use either steam or cold gas.

Having thus described my invention, I claim—

1. In a gas-generator, the combination of the generator-chamber A, a pipe which introduces oil into the chamber, and the steam-jet pipe projecting into the gas-outlet passage, whereby the jet of steam may be introduced into the chamber at the point at which the gas makes its escape, the steam being made to form an envelope for the oil and the gas resulting therefrom, substantially as described.

2. In a gas-generator, the combination of the generating-chamber A, the chamber B, and a connecting-passage, C, with the steam-jet nozzle or injector O, placed below the opening in the generator-chamber, and which serves to exhaust the gas from the generator-chamber and drive it into the chamber B, substantially as shown.

3. In a gas-furnace, the combination of the generating-chamber A, into which the oil is passed at any suitable point above the fire, the steam-pipe provided with the jet-nozzle *a* O, the passage C, and the chamber B, the jet O being made to exhaust the gas from the chamber A against jet *a*, which is passed into the chamber A at the point from which the gas escapes, whereby the gas and steam are intimately commingled, substantially as specified.

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

JOSEPH FLANNERY.

Witnesses:

J. W. GARNER,
GEORGE B. READ.