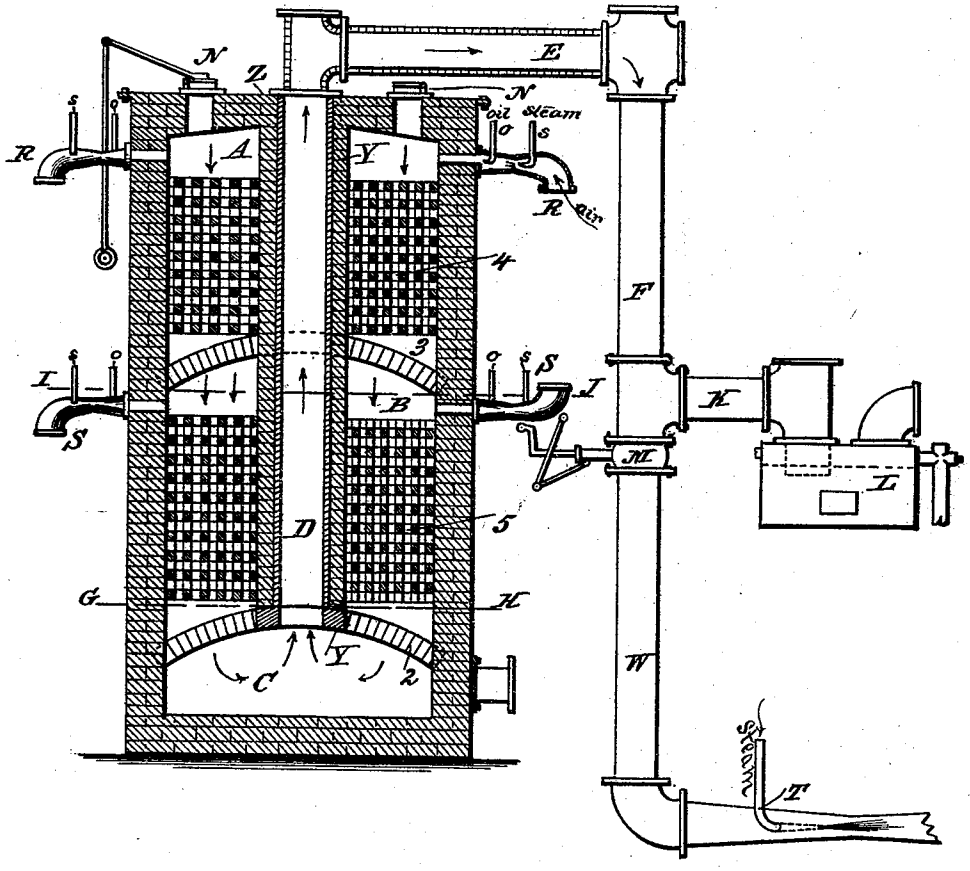
(No Model.) 2 Sheets—Sheet 1.

J. J. KIRKHAM.

GAS GENERATOR.

No. 479,647. Patented July 26, 1892.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

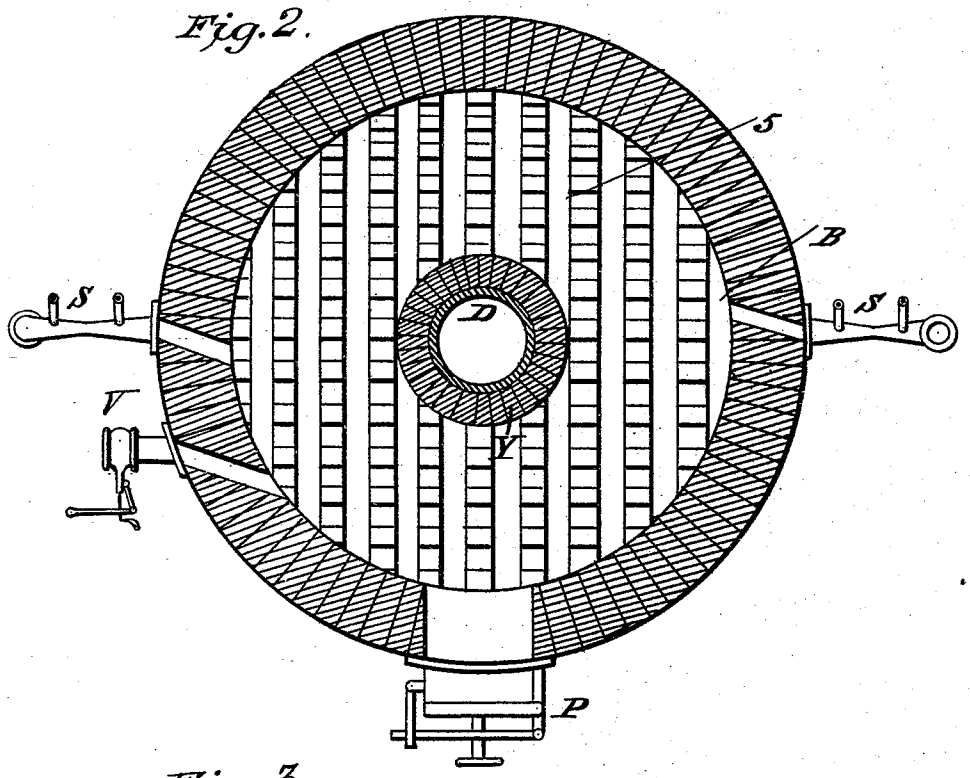
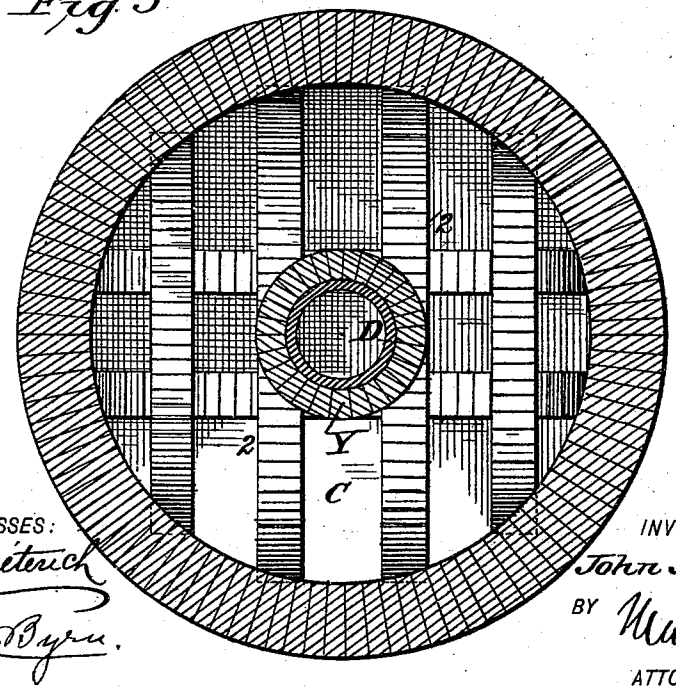


Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN J. KIRKHAM, OF TERRE HAUTE, INDIANA.

GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 479,647, dated July 26, 1892.

Application filed June 23, 1891. Serial No. 397,244. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. KIRKHAM, of Terre Haute, in the county of Vigo and State of Indiana, have invented a new and useful Improvement in Gas-Generators, of which the following is a specification.

Figure 1 is a vertical central section. Fig. 2 is a horizontal section on line I J of Fig. 1, and Fig. 3 is a horizontal section on line G H of Fig. 1.

My invention is in the nature of a gas-generator for the manufacture of fuel and illuminating gas and for enriching air and natural gas, in which generator oil shall be exclusively used for heating the generator and superheater and supplying the carbonaceous ingredients of the gas. With this class of gas-generators the difficulty has been that the generator and superheater could not be heated uniformly or deep enough through the fire-brick checker-work to properly fix the gas, since, on the one hand, if the heat were carried high enough at one point, it would cool in the more remote portion of checker-work and distill tar, while, on the other hand, if the heat were carried high enough to prevent this result, the first portion of the checker-work would be heated too hot and would burn the oil and cause a deposit of lamp-black, in either case involving the choking of the generator and the production of an imperfect gas. My invention is designed to obviate these difficulties; and to that end it consists in the peculiar construction and arrangement of the gas-generator, as will now be described.

The generator is constructed of masonry as a vertical stack and is divided into several chambers A B C by means of transverse arches of brickwork 2 and 3. These arches do not entirely separate these chambers, but are formed with open spaces in them, as shown in Fig. 3, through which the contents of one chamber can pass to the chambers below it. Above the arch 3 in chamber A is arranged the superheater composed of checker-work 4, made of alternated fire-bricks to give large superficial heating-surface, and a similar mass of fire-brick 5 is arranged in chamber B, below arch 3, to form the superheater for that chamber. Into the space of upper chamber A there open laterally above the checker-work the injectors R R, and into the space of the chamber B above the checker-work there open the injectors S S. These injectors are all alike and may be of any desired pattern. The simple form shown, however, works well, and this consists simply of an outer case of a double conical shape open at its outer end to draw in air and having an oil-pipe *o* entering laterally and terminating in a nozzle directed inwardly and a steam-pipe *s* outside of the oil-pipe and terminating in the case in a nozzle also directed inwardly to the generator, so that when steam passes in through the pipe it draws in air at the open end of the case, and, spraying the oil entering through pipe *o*, mixes it with the air, and thus furnishes the materials to be converted by the heat of the checker-work into gas. Into the upper chamber A there opens also through the top of generator air-valve N, and into the chamber B there also opens through the side of the generator air-valve V, Fig. 2. A manhole closed by door P also opens into the chamber B to allow workmen to enter to repair the arches and checker-work. There may be any number of these vertical chambers similarly equipped.

Centrally in the generator, in vertical position and passing through the arches 3 and 2 and supported upon the latter, is arranged a retort D, twelve or fourteen inches in diameter, surrounded by fire-brick Y and communicating at its bottom end with the lowest chamber C and at its upper end emerging through the top of the generator and communicating with a horizontal pipe E. This pipe E communicates with a vertical pipe F, which has a right-angular branch K, leading to the hydraulic seal L, and also communicates through valve M, just below branch K, with a pipe W, which has at its lower end a draft-inducing steam-nozzle T.

The operation of my improved generator is as follows: When the machine is being heated, a draft is induced through the same in the direction of the arrows by the steam-jet T or other suction device, valve M being open. This draft passes down through the chamber A, checker-work 4, through the spaces of arch 3, down through chamber B and checker-work 5, and thence down through arch 2 and up through the retort and out pipes E F W. If the machine is, when started, entirely cold, a

quantity of wood is first placed in the combustion-chambers A and B and ignited; but ordinarily the machine after once being heated up to about 2,000° will remain hot enough even after twelve to fourteen hours to ignite automatically the spray of oil and air when started up next day.

Assuming that the machine has been in operation the previous day and it is desired to continue on the next day the making of gas, the following is the order of procedure: Air-valves N and V are opened, as is also the valve M, and the steam-exhauster T starts the draft, as above indicated. The injectors R R in chamber A are now set into operation by the admission of steam and oil through their respective pipes, and the steam sprays the oil and also draws in air, which, becoming intimately mixed, at once unite and burn from the high temperature. Injectors S are also started into action in the same way to heat the lower chamber B, and so on with as many other chambers as there may be in the apparatus. These hot currents traversing the checker-work pass downwardly through the same and by their distribution of heat equally through all the chambers bring all of the superheaters to the same degree of heat, the currents passing downwardly through the arches to chamber C and thence upward through the retort, heating the sides of the latter. About eight to fifteen minutes suffices for the heating, and after the desired high temperature is obtained the injectors R and S in the chambers A and B are shut off and air-valves N and V closed, the steam-exhauster T is stopped, and valve M is closed. The injectors R in the chamber A are then started into action again and oil, steam, and air pass in intimate admixture, and upon passing through the superheaters and retort are fixed into a gas, which passes out pipes E F K to the hydraulic seal L and to the cleaning apparatus, gas-holder, and mains. This operation of making gas is continued as long as the heat lasts, and practice has shown that it may continue through about the same period of time that it takes to heat up the apparatus—*i. e.*, from eight to fifteen minutes.

The advantage of the central retort opening through the top of the generator is that it saves a great quantity of heat and renders the apparatus more effective and economical.

There may be any number of chambers A and B, with their superheaters of fire-brick, and they may be of any size. The preferred size is a diameter of six feet for the chambers and a space of eighteen inches between the checker-work and the arch above it. With this construction it will be seen that with the superheaters arranged in series in separate chambers communicating with each other and each provided with its own injectors and air-valves every part of the generator is heated alike and there is neither any deposition of lamp-black from excessive heat at one point nor any distillation of tar from deficient heat at another.

Having thus described my invention, what I claim as new is—

1. An oil-gas generator consisting of two or more chambers arranged vertically one above the other and communicating with each other, checker-work arranged in each chamber, air-inlets and oil-injectors opening into each chamber above the checker-work, and a central retort or outlet-flue communicating at the bottom with the lowest chamber and passing out through the top of the generator and communicating with the conduit-pipes, substantially as shown and described.

2. An oil-gas generator consisting of a series of vertical chambers each containing a body of checker-work and each having independent oil-injectors and separate air-inlets, a central retort or outlet-flue opening at its lower end into the lowest chamber and passing out through the top of the generator, and a conduit-pipe connecting therewith and having one branch leading to a hydraulic seal and another branch provided with a valve and a suction apparatus, substantially as shown and described.

JOHN J. KIRKHAM.

Witnesses:
JOHN O. PIETY,
JAMES E. PIETY.