

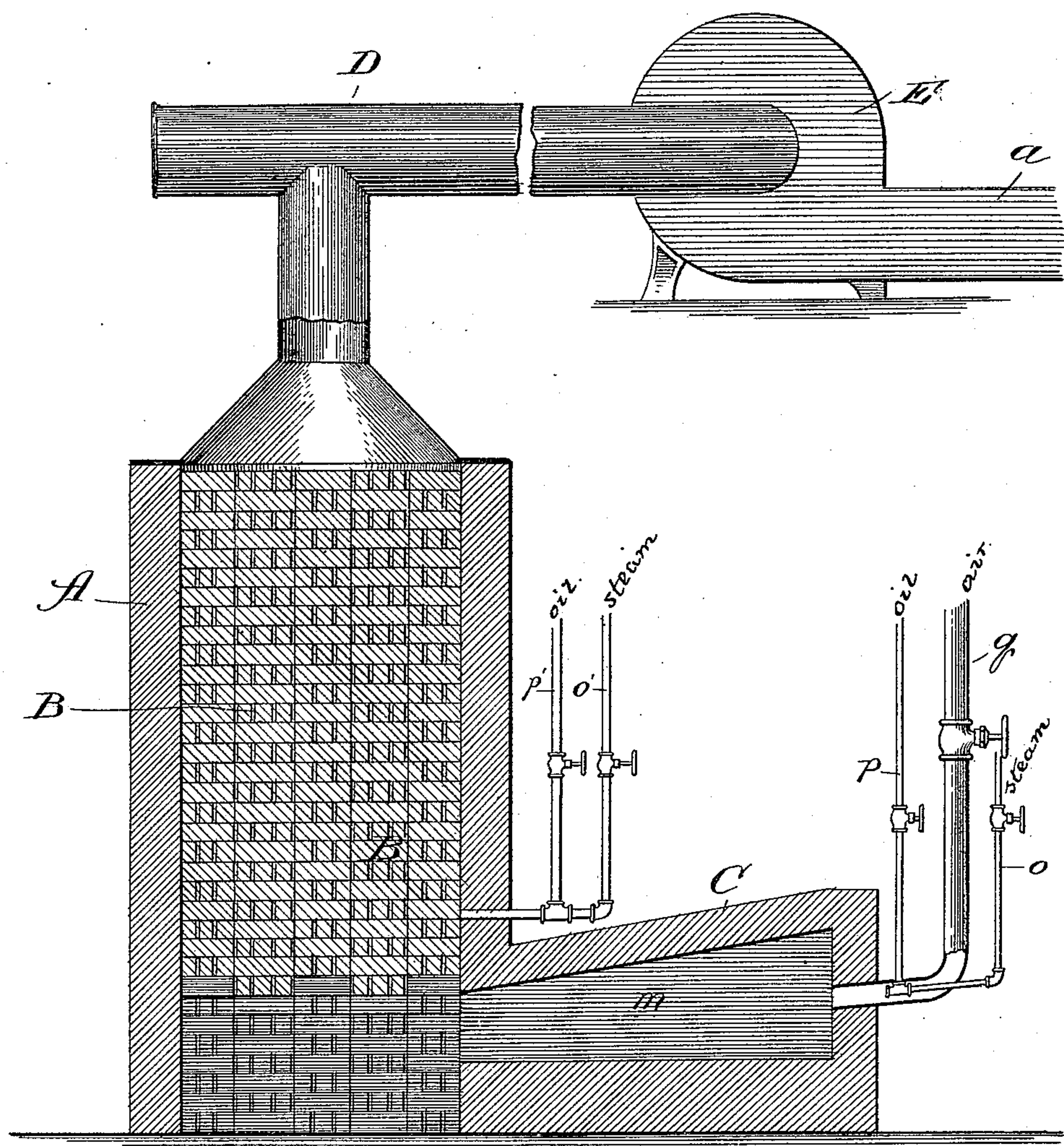
(No Model.)

W. A. KONEMAN.

APPARATUS FOR MANUFACTURING FUEL GAS.

No. 464,700.

Patented Dec. 8, 1891.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MANUFACTURING FUEL-GAS.

SPECIFICATION forming part of Letters Patent No. 464,700, dated December 8, 1891.

Application filed July 14, 1890. Serial No. 358,606. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. KONEMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Apparatus for Manufacturing Fuel-Gas from Hydrocarbon, of which the following is a specification.

The object of my invention is to provide an improved apparatus which will produce a fixed fuel-gas from hydrocarbon oil (crude petroleum) by a simple and comparatively inexpensive but direct and continuous (or single) proceeding.

My improved apparatus is shown in broken sectional elevation in the accompanying drawing, and involves a heat-storage chamber A, comprising a shell filled with spaced fire-brick forming a checker-chamber B, a "fore-hearth" C, communicating with the chamber A near its base, and a conduit D, leading from the contracted upper outlet end of the chamber A to the point of storage or of utilization of the generated gas and containing an exhaust appliance or compressor—such as the fan E—for forcing the gas as it is generated, if it is to be stored, (as in a gasometer,) to the outlet end of the conduit, and maintain it under pressure in the receiver, the compressor also serving to relieve the chamber A of the gas as rapidly as it is generated, and thereby preventing back-pressure by the generated, combustion-impeding, carbonic-acid-gas element of the products of the primary combustion. The fore-hearth C, which is practically like that set forth in my pending applications serially numbered, respectively, 353,995 and 353,996, and both filed on the 2d day of June, 1890, comprises a structure forming internally a vertically-tapering flue *m*, into the flaring or rear portion of which the hydrocarbon oil, with air or steam, or both, are injected and therein ignited, and wherein the products of combustion in their course to the contracted outlet become so thoroughly compacted and intermixed by the tapering form of the flue that they are reduced therein to a condition of complete or approximately complete combustion, whereby practically only carbonic-acid gas emerges therefrom.

Into the rear portion of the fore-hearth C, and preferably through the rear wall thereof, extends a supply-pipe *q* for air under pressure, and an oil-pipe *p* and a steam-pipe *o* also lead into the fore-hearth, preferably by way of the horizontal portion of the pipe *q*, into which they should extend, as shown. The supply sources of the compressed air, oil, and steam are not illustrated, as they will readily be understood without illustration, and to present them in the drawing would be superfluous and would unnecessarily crowd it. I also lead an oil-pipe *p'*, and besides, if desired, a steam-pipe *o'*, into the chamber A through its wall at a point above the fore-hearth C, and they may be respectively supplied from the same sources as the pipes *p* and *o*. The passage through the various supply-pipes is controlled by suitable valves, as indicated, or by other suitable contrivances.

To start the operation, the first step required is to supply the necessary heat to the storage-chamber A, which is done by introducing into the fore-hearth C, through the pipes *p* and *q*, oil and atmospheric air and igniting the oil. If desired, steam may, but not necessarily for producing the heat to be stored, be simultaneously introduced through the pipe *o*. The liquid fuel thus forced into the chamber *m* of the fore-hearth, which chamber is gradually contracted vertically toward its mouth, is supplied with sufficient oxygen from the fluid introduced with it and so thoroughly intermixed and compacted by the contracted form of the passage *m* that its combustion is forced to an extent which renders it complete, or approximately so, by the time it reaches the storage-chamber A, so that only, or practically only, the hot products of combustion enter the heat-storage chamber. Thus the material forming the checker-chamber is gradually heated to a great intensity, the fire-brick thereof being reduced to a white heat, and to maintain that condition only so much heat need be supplied to it continually through the medium of the fore-hearth as will compensate for that abstracted by the gas-generating process hereinafter described. So it will be understood that only so much air need be supplied with the amount of oil fed to the

fore-hearth as is necessary to generate sufficient heat to maintain the intensity thereof required in the chamber A. When the heat-supply in the storage-chamber has been attained, the supply thereto of oil and steam is admitted from which to generate the gas, this supply being introduced through the pipes p' and o' , though a surplus of oil beyond what is required for heating the storage-chamber may also be introduced with steam through the pipes p and o . In the chamber A the carbonic-acid gas generated in the fore-hearth C and injected into the chamber A is thus supplied with sufficient carbon in the additional supply of oil (vaporized by the heat in the chamber A) to force the disunion of one atom of the oxygen in the carbonic-acid gas to tie such atom of oxygen to a corresponding atom of free carbon, resulting in a double volume of inflammable protoxide of carbon gas. The steam injected is superheated to such a degree by absorption of heat in the chamber A that its chemical decomposition is readily thereby produced, the oxygen forming with the carbon protoxide of carbon gas, and the hydrogen one or another of the various combinations of hydrocarbon gas or remaining in the free state and entering the ultimate complex gas as free hydrogen. The purpose of the air and steam is of course primarily to supply the oxygen necessary for combustion to generate the heat for the heat-storage chamber and to combine with the free carbon of the oil for producing the protoxide-of-carbon gas, so that to that end air without steam could be used for producing simply a hydrocarbon fuel-gas, though not so advantageously, owing to its smaller proportion of oxygen compared with water and to its large proportion of useless nitrogen; also, steam could be used without air; but I prefer to employ both and in the manner described. Whether or not the gas-product of my im-

proved apparatus is a so-called "water-gas" depends, of course, upon the proportionate quantity of steam used. From the gas-generating heat-storage chamber A the gas is removed as fast as formed, the action of the fan taking it out rapidly and forcing it under pressure into the holder, whence it may be taken for use as required. If it is to be rendered an illuminating-gas, any of the known or suitable methods of purification and abstraction of the nitrogen and of carbureting it may for the purpose be resorted to.

While it is desirable to maintain the supply of heat in the chamber A in the proportion as stated of its abstraction by the gas-generating operation therein, it would be feasible to interrupt the action through the fore-hearth C or the supplying of heat to the chamber A after it has once become adequately heated and again supply it as often as the gas-generation therein has lowered the heat thereof sufficiently to require replenishment.

What I claim as new, and desire to secure by Letters Patent, is—

An apparatus for manufacturing fuel-gas from fluid hydrocarbon, comprising, in combination, the following elements: a chamber A, formed of a shell filled with spaced fire-brick, a fore-hearth C extraneous to the said chamber and formed with a vertically-tapering flue m , leading at its contracted end into the base of the said chamber, supply-pipes for the hydrocarbon and combustion-inducing fluid leading into the rear portion of the fore-hearth and into the chamber A above the flue m , and an exhaust-fan communicating with the upper end of the said chamber, substantially as and for the purpose set forth.

WILLIAM A. KONEMAN.

In presence of—

J. W. DYRENFORTH,

M. J. FROST.