(No Model.)

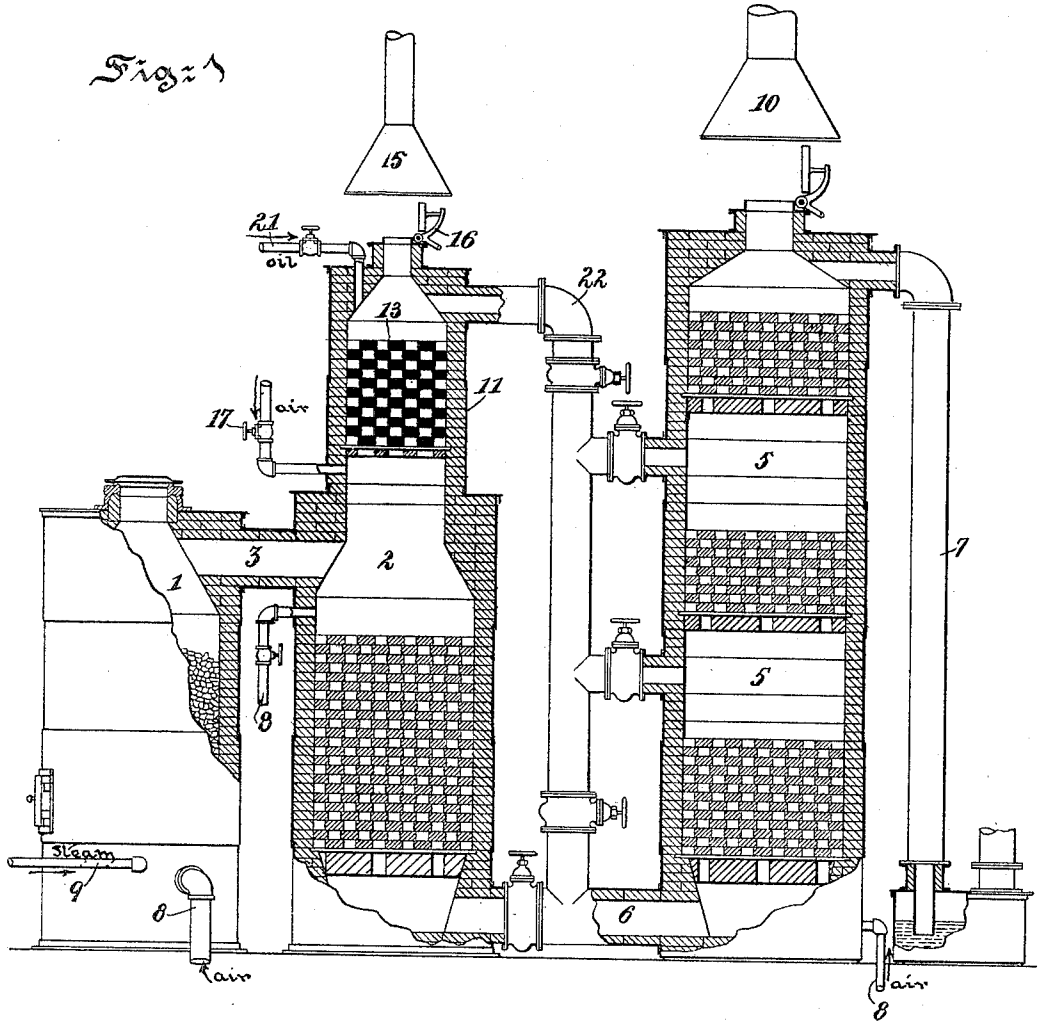
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R. NORRIS.

APPARATUS FOR CARBURETING WATER GAS.

No. 581,666. Patented Apr. 27, 1897.

Fig. 1



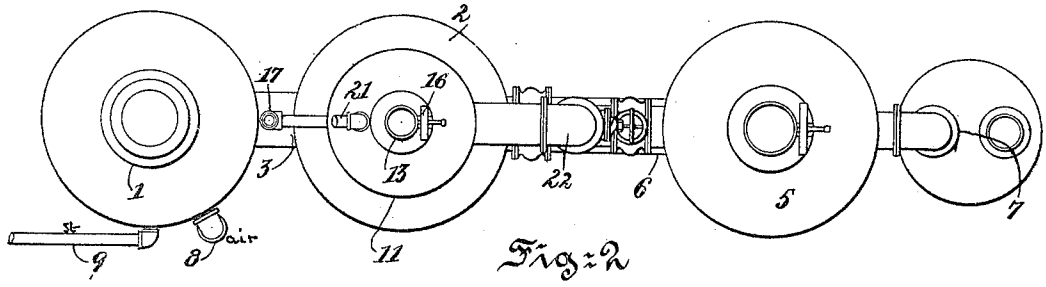


Fig. 2

Witnesses:
H. J. Jackson.
L. M. Gilligan.

Inventor.
Rollin Norris.
By Augustus B. Stoughton.
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

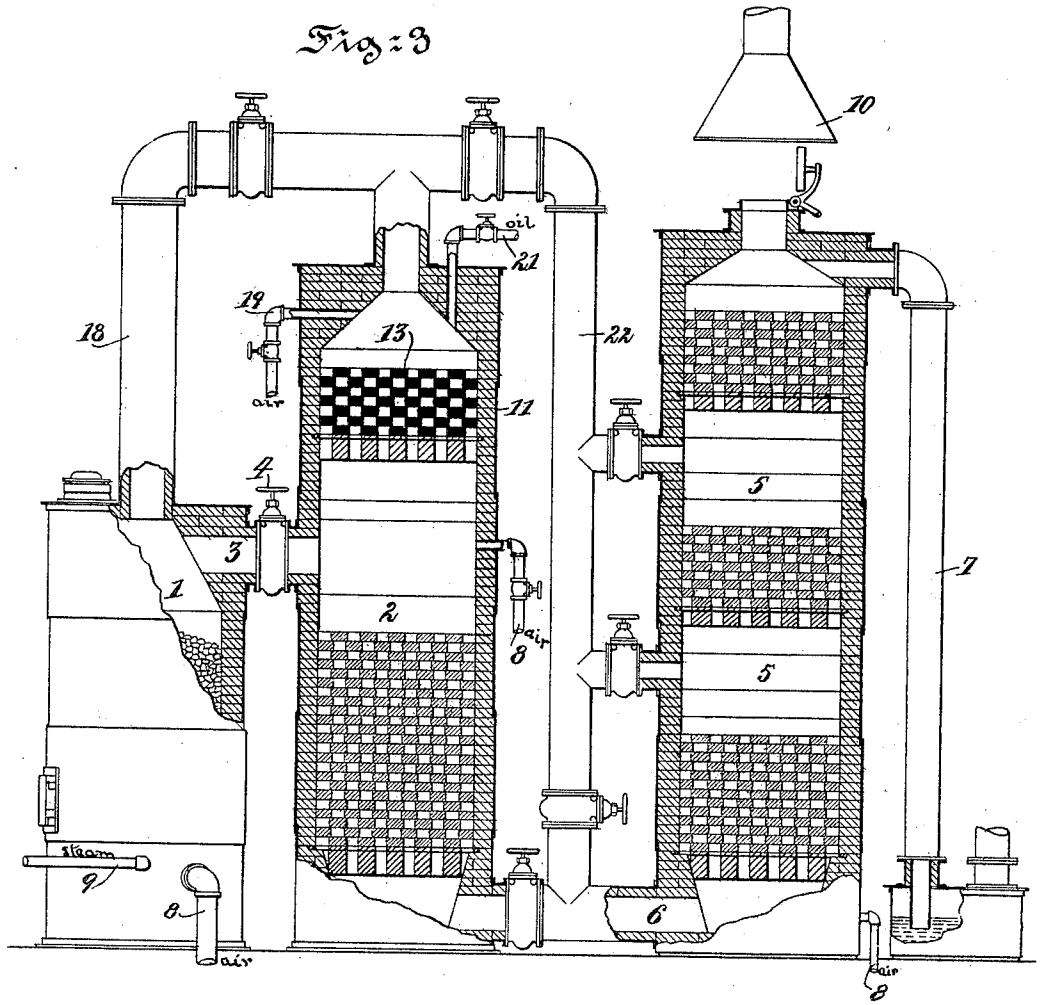
(No Model.) 4 Sheets—Sheet 2.

R. NORRIS.

APPARATUS FOR CARBURETING WATER GAS.

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Fig. 3.



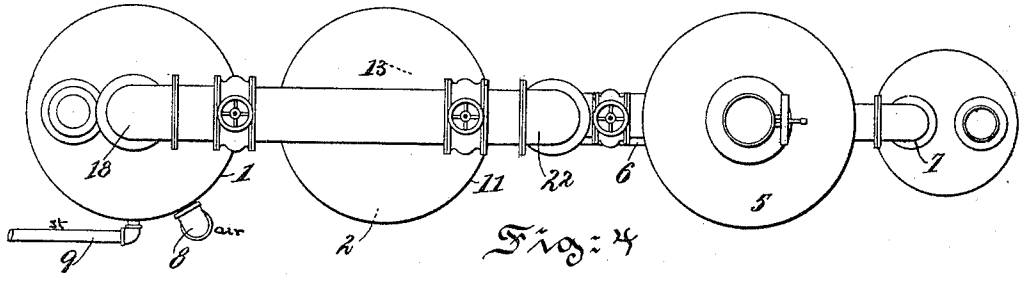


Fig. 4.

Witnesses:
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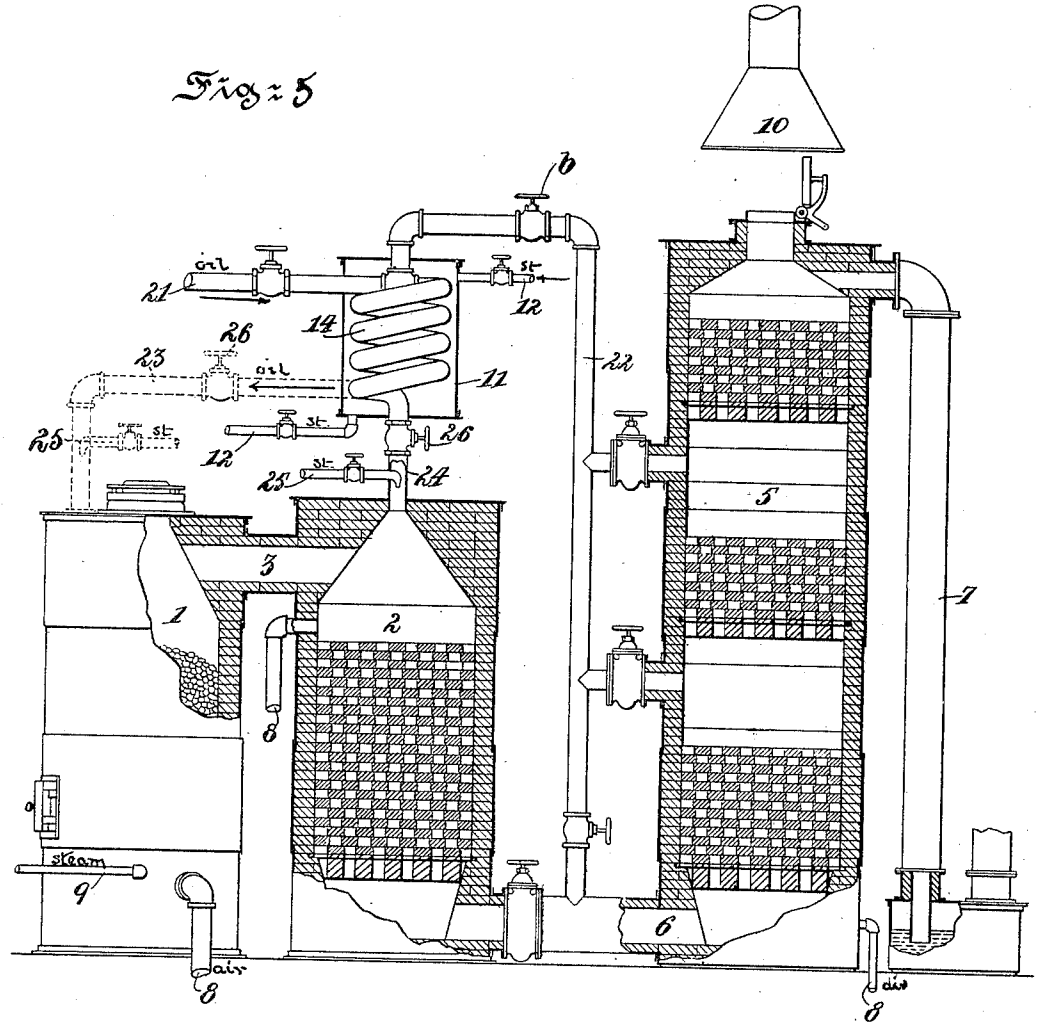
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R. NORRIS.

APPARATUS FOR CARBURETING WATER GAS.

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Fig. 5



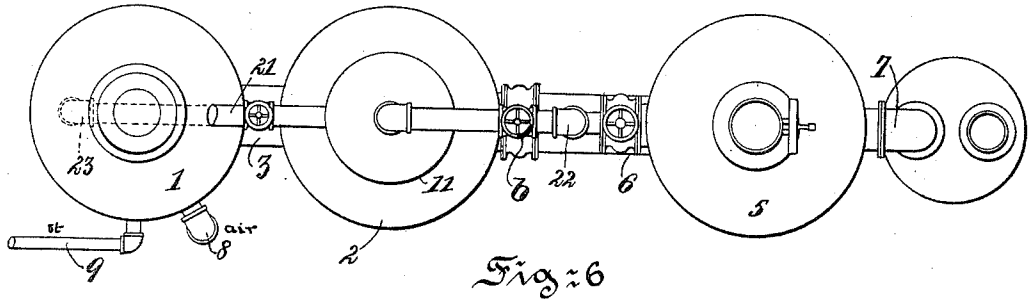


Fig. 6

Witnesses:
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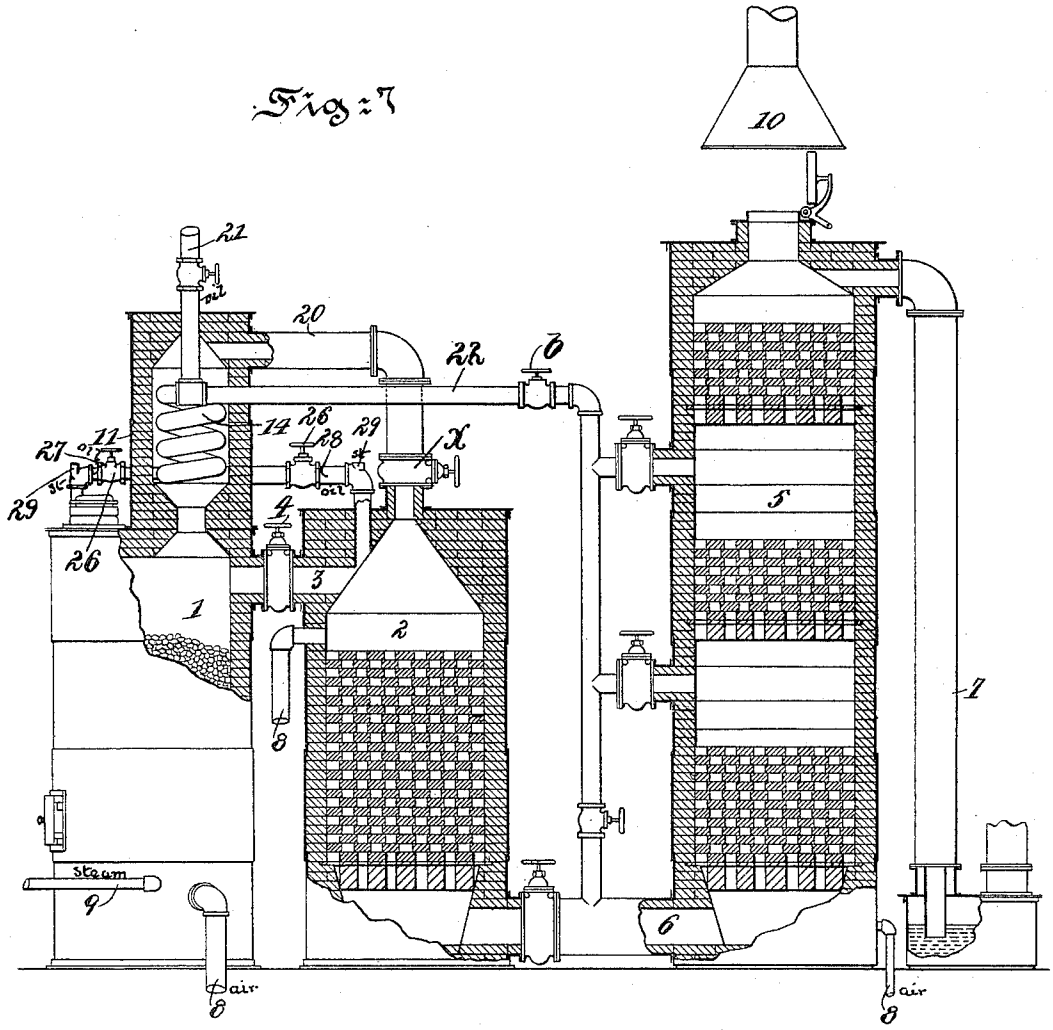
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R. NORRIS.

APPARATUS FOR CARBURETING WATER GAS.

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Fig. 7



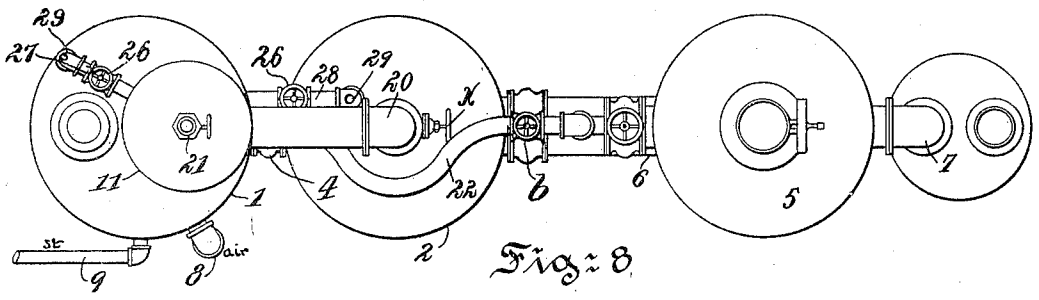


Fig. 8.

Witnesses:
W. J. Jackson.
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UNITED STATES PATENT OFFICE.

ROLLIN NORRIS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE UNITED GAS IMPROVEMENT COMPANY, OF SAME PLACE.

APPARATUS FOR CARBURETING WATER-GAS.

SPECIFICATION forming part of Letters Patent No. 581,666, dated April 27, 1897.

Application filed August 13, 1895. Renewed March 12, 1897. Serial No. 627,223. (No model.)

To all whom it may concern:

Be it known that I, ROLLIN NORRIS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Carbureting Water-Gas, of which the following is a specification.

The principal object of my present invention is to provide economical, efficient, and comparatively inexpensive apparatus for carbureting water-gas in such manner that the lighter oil-vapors are at least approximately separated from the heavier components and are subjected, in company with the current of gas to be enriched, to an appropriate and milder treatment than is given to the heavier components; and to this end my invention consists of the improvements hereinafter described and claimed.

The nature, characteristic features, and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, formings part hereof, and in which—

Figure 1 is a view illustrating, partly in section, a well-known Lowe type of water-gas apparatus and showing in application thereto an oil-heater and pipe connections for separating the components of oil and discharging the same into the gas-current in such manner that the heavier components are introduced into the apparatus comparatively near the generator and the lighter vapors are introduced comparatively remote from the generator. Fig. 2 is a top or plan view of the apparatus shown in Fig. 1, and Figs. 3, 4, 5, 6, 7, and 8 are respectively sectional elevation and plan view of three types of apparatus embodying modifications of my invention.

In the drawings, 1 is a generator.

2 is a fixing-chamber provided with a checker-work or other suitable filling of refractory material and adapted for communication with the generator—for example, by way of the pipe or conduit 3, which may be provided with a valve 4, as shown in Figs. 3, 4, 7, and 8, for purposes to be hereinafter described; or this valve 4 may be omitted, as shown in Figs. 1, 2, 5, and 6. 5 is a second and similar fixing-chamber that may be employed and that communicates with the chamber 2—for example, by way of a suitable pipe or conduit 6—and with an offtake 7 for carbureted water-gas.

8 are air-blast pipes which communicate with the generator and in the present instance with each of the fixing-chambers.

9 are pipes that are provided in the type of plant selected for purposes of illustration for introducing steam into the generator.

10 is a stack that may be provided for the escape of the products of combustion that traverse and heat by secondary combustion the interiors of the fixing-chambers 2 and 3 when the air-blast is on.

The above description relates to parts of the apparatus that are adapted for use in carrying out the so-called and well-known "Lowe" process for producing water-gas by an alternating operation which consists in first blowing air through the apparatus, the gaseous products of combustion not being collected, but permitted to escape, and then blowing steam, the products of reaction being enriched or carbureted by means of oil, as will be hereinafter described, and converted or fixed by passing them through the previously-heated apparatus and collected through the offtake 7.

Having thus pointed out certain parts of a well-known type of intermittent or alternating plant for producing water-gas, I will now proceed to describe in connection therewith parts embodying features of my invention and arranged to separately introduce the components liberated by heat from oil for the purpose of enriching or carbureting the water-gas in accordance therewith; but it must be borne in mind that my invention is not limited to the particular or specific type of apparatus shown and above described, because it is obviously applicable to other analogous types of apparatus operating in substantially the manner above set forth.

Referring to the drawings, 11 is an oil-heater in which the lighter vapors and heavier components of the oil are at least approximately separated by heat. In Figs. 1, 3, and 7 this oil-heater 11 is heated by utilizing available heat from the apparatus, and in Fig. 5 the oil-

heater 11 is heated by means of steam, hot air, or the like that may be introduced and lead away by means of the pipe connections 12.

Referring to Figs. 1 and 3, the oil-heater 11 comprises a chamber containing refractory material or non-porous checker-work 13, and in Figs. 5 and 7 it comprises a chamber within which is located a coiled or otherwise-disposed pipe or communicating series of pipes 14. In Fig. 1 the oil-heater 11 is mounted on the fixing-chamber 2 and communicates therewith, as shown. The upper portion of this oil-chamber is provided with a suitable offtake 15 and valve 16. In use blast-gas generated while the blast is on passes by way of the conduit 3 and enters the fixing-chamber 2. So much of this blast-gas as is found necessary is permitted to rise into the interior of the oil-heater 11 and is there ignited and burned to heat the same by the introduction of air through the pipe 17, and the products of combustion pass off at the offtake 15, the valve 16 being open for this purpose. A portion of this waste gas, or so much of it as is not necessary for heating the chamber 11, is led down through the fixing-chamber 2, conduit 6, and fixing-chamber 5, and is burned in the usual and well-known manner by the admission of air for the purpose of preheating the apparatus.

In Fig. 3 the waste products or blast-gases generated while the air-blast is on traverse the pipe or conduit 18, the valve 4 being closed, and are led into the top of the heater, where they are ignited and partially burned by means of air introduced through the pipe 19, and thus heat the oil-heater. Subsequently these gases are completely consumed by secondary combustion in the usual manner and for the purpose of internally heating the fixing-chambers 2 and 5.

In Fig. 7 the blast-gases during the "blow" are passed through the conduit 3 and are subjected to secondary combustion in the fixing-chambers 2 and 5 in the ordinary and well-known manner and for the purpose of preheating the same, the valve x being closed; and the oil-heater is heated during the run by means of the current of water-gas which for this purpose is led through it and thence through the pipe 20 to and through the fixing-chambers 2 and 5, the valve 4 being closed and the valve x open.

Having thus referred to several different constructions and arrangements of parts whereby the oil-heater is heated, I will now proceed to describe the separation of the oil into its lighter and heavier components by means of the oil-heater, and also the introduction of the components of the oil into the current of gas to be enriched in separate streams and at different points between the generator and the offtake.

Oil is admitted to the oil-heater by way of the pipe 21, and upon entering it is separated by heat into its lighter vapors and heavier components. The lighter vapors leave the oil-heater by way of the pipe 22, which is provided with valved branches communicating with various parts of the apparatus, as shown, and comparatively remote from the point of generation of the current of water-gas. In Figs. 1 and 3 the heavier components produced by heating the oil pass through the opening at the bottom of the heater and enter the gas-current comparatively near its point of generation and traverse in its company a greater extent of heated chamber than do the lighter vapors. As shown in Figs. 1 and 3, these heavier components enter the fixing-chamber 2, for the reason that the oil-heater is mounted upon and communicates with it. However, the oil-heater could, without the exercise of invention, be mounted on the generator 1 and made to communicate with it, in which case the heavier products would be introduced into the gaseous current in the generator. In Fig. 5 the heavier products may be introduced at the generator by way of the pipe 23 (indicated by dotted lines as communicating with the lower end of the coil 14) or by means of the pipe 24, that leads from the lower end of the coil 14 into the top of the fixing-chamber 2. In this connection it may be stated that the valved pipes 23 and 24 are provided with a nozzle 25, through which steam may be introduced into and discharged through these pipes, for the purpose of feeding and spraying the heavier products, and the supply of the heavier products fed by this steam-jet may be increased or diminished by means of the valve 26, which is located between the nozzle and the oil-heater.

In Fig. 7 the heavier products may be passed from the coil 14 into the generator 1 by way of a pipe 27, having a valve 26, or into the fixing-chamber 2 by way of a pipe 28, having a valve 26, as preferred, and these pipes may be provided with inlets, as 29, for the accommodation of steam-jets similar to the part 25 of Fig. 5.

If desired, the described course of the lighter and heavier components may be varied in Figs. 5 and 7 to cause all, or nearly all, of them to pass out at the bottom of the oil-heater by properly manipulating the valves b and 26.

The mode of operation of my invention is as follows: The heat of the oil-heater 11 serves to break up the oil into its heavier and lighter components, and these are led in separate streams and introduced into the gas-current at different and appropriate distances from its point of generation, so that they travel in its company through different extents of heated chambers, whereby the heavier components are vaporized and fixed and the lighter components or vapors are fixed.

It will be obvious to those skilled in the art to which my invention relates that modifications may be made in details without departing from the spirit thereof. Hence I do not limit myself to the precise construction

and arrangement of parts hereinabove set forth and illustrated in the accompanying drawings; but,

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a water-gas apparatus comprising a generator and a fixing-chamber, an oil-heater, means for heating the oil-heater, a pipe leading from the top of the oil-heater, valved branch pipes from said pipe directly to different portions of the interior of the fixing-chamber, a pipe for admitting oil to the heater, and a direct communication from the bottom of the oil-heater to the interior of the apparatus, substantially as described.

2. The combination of a water-gas apparatus comprising a generator and fixing-chamber, an oil-heater, means for heating the oil-heater, a pipe from the top of the oil-heater, valved branch pipes from said pipe directly to different portions of the interior of the fixing-chamber, a pipe for admitting oil to the heater, a pipe provided with a valve and extending from the bottom of the heater directly to the interior of the apparatus, and a steam-discharge nozzle interposed between said valve and the discharge end of its pipe, substantially as described.

3. The combination of a water-gas apparatus comprising a generator and a fixing-chamber, an oil-heater, means for heating the oil-heater, a pipe leading from the top of the oil-heater directly to one portion of the interior of the apparatus, a pipe for admitting oil to the heater, a second pipe leading from the bottom of the heater to another portion of the interior of the apparatus, and valves as 26 and *b*, substantially as described.

In testimony whereof I have hereunto signed my name.

ROLLIN NORRIS.

In presence of—
F. H. MACMORRIS,
K. M. GILLIGAN.