

(No Model.)

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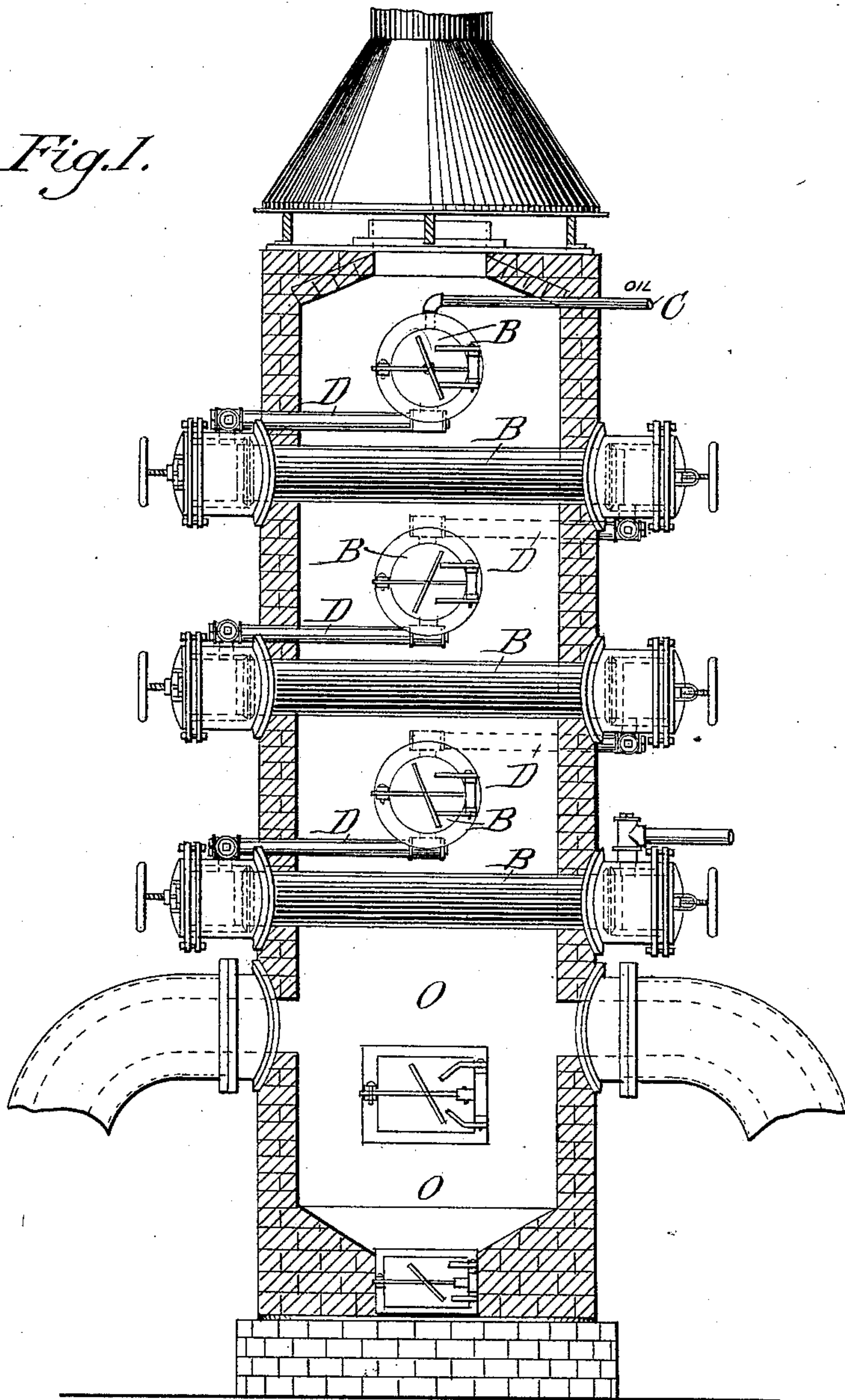
J. McKAY.

APPARATUS FOR PRODUCING GAS FROM HYDROCARBON OIL.

No. 437,315.

Patented Sept. 30, 1890.

*Fig. 1.*



*Attest:*

*H. B. Schott*

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*Inventor*  
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*by*  
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2 Sheets—Sheet 2.

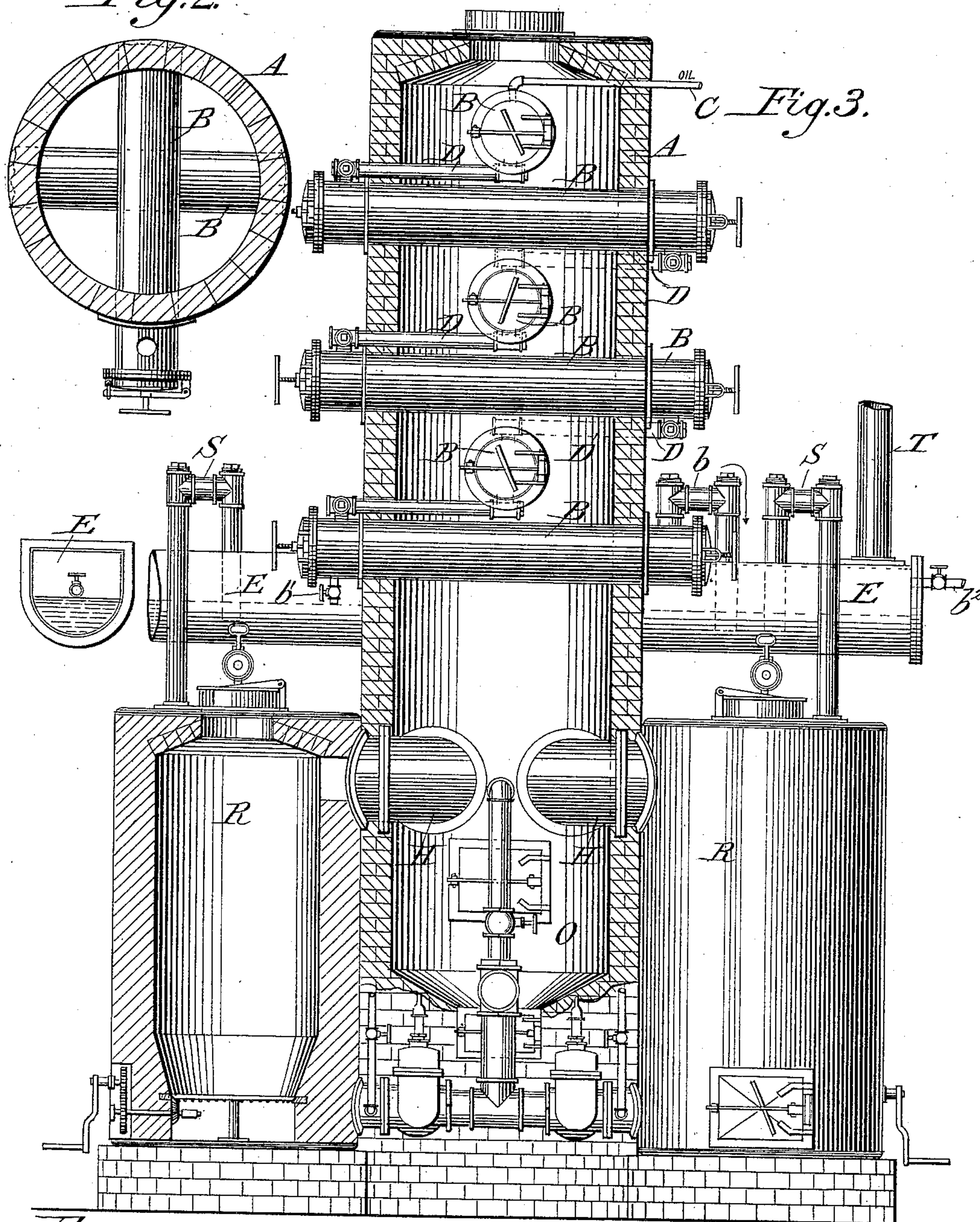
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*Fig. 2.*



*Attest:*

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# UNITED STATES PATENT OFFICE.

JOHN MCKAY, OF TITUSVILLE, PENNSYLVANIA.

## APPARATUS FOR PRODUCING GAS FROM HYDROCARBON OIL.

SPECIFICATION forming part of Letters Patent No. 437,315, dated September 30, 1890.

Application filed April 30, 1890. Serial No. 350,111. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN MCKAY, a citizen of the United States, residing at Titusville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Producing Gas from Hydrocarbon Oil; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as it will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is, in part, the utilization of the waste heat of furnaces and similar calorific agencies in vaporizing hydrocarbon oil for the production of gas; also, in part, the supplying of the gas thus set free to apparatus for producing water-gas and using the by-products of the latter as fuel in keeping up the heat for thus vaporizing the oil.

To effect these ends my invention consists in the construction and combination of devices hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a vertical section, partly in elevation, of the devices embodying my invention, except the water-gas generators. Fig. 2 represents a plan view of the furnace-stack and carburetors. Fig. 3 represents a view similar to Fig. 1, but somewhat modified, and with the apparatus for generating water-gas.

A designates a furnace-stack or other stack containing an outlet-flue through which pass the products of combustion. Across the flue or hollow interior of this stack retorts B are arranged alternately at right angles to each other. An oil-pipe C extends in through the wall of said stack and supplies the uppermost of said retorts. The ends of the latter extend through the wall of the stack and allow connecting-pipes D to be conveniently attached. Every retort, except the lowest, is connected by one of these pipes to the retort next below. In every instance the connecting-pipe D is wholly outside of said stack. The lowest retort discharges gas through a pipe *b* at one end, and liquid with other residual material through a pipe *b'* at the other end. The oil in descending from the uppermost retort to the lowest is exposed, of course, to successive increments of temperature, and by the arrangement and connections of said retorts is

compelled to travel in a circuitous course, repeatedly crossing the blast of the products of combustion, each time nearer to the source of heat. The gas which finally issues through the pipe *b* contains nearly all the volatile elements of the oil. There is no loss on the way by the oil coming suddenly in contact with an incandescent surface and being charred to an unserviceable form of carbon. The heat, though quite sufficient, increases so gradually that the oil is not injured thereby, and in each transition from one retort to another through a pipe D outside of the stack the oil is necessarily somewhat cooled by way of neutralizing any excess of heating action.

It has been found in practice essential to vaporize the oil by gradual increase of heat in order to secure the greatest yield. It has further been found impracticable to have all the vaporizing surfaces and connections within the stack, as the smaller connections are liable to clog up, thus lessening the yield and causing considerable delay.

By arranging each retort at right angles to the one below it the products of combustion ascending around them are compelled to change their direction frequently and are delayed much longer in their ascent than would be possible if the retorts were all parallel or arranged in two series with parallel members. In consequence the heating action will be considerably increased. The gas thus produced may be used by itself or employed for enriching coal-gas, or, as illustrated in Fig. 3, for carbureting water-gas. In the latter case the pipe *b* aforesaid empties into a water main or receptacle E, having closed ends. Into this receptacle the water-gas generators discharge through bent pipes S, the water-gas or separated hydrogen and oxygen passing out finally through pipe T, intimately mingled with the hydrocarbon gas from pipe *b*. The gas which passes out through this pipe conveys a considerable amount of oily residuum, which floats on the surface of the water in said main or receptacle, and is finally drawn off by an overflow-pipe *b*<sup>2</sup>.

Flues H lead from generators R to the bottom of stack A, and the carbonic-oxide and other inflammable gases escaping thereby will heat the retorts very cheaply; but I also employ a furnace O, located immediately be-



low the base of the stack A. In case it should be necessary to shut down the generators R, (or equivalent heat-producing devices which may be substituted for them,) I am enabled  
5 to continue the vaporization of the oil by merely increasing the heat of said furnace O. Generally it is best to use a cheap grade of fuel for such purposes.

The retorts are provided with valves and  
10 detachable heads and the generators with hot air and water pipes and safety-valves, beside other appliances; but these have no direct connection with my invention, and I have not considered it necessary to illustrate them.

15 I do not claim any particular process of making water-gas, nor do I claim the utilization as fuel of the waste products escaping from water-gas production; but,

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

1. In combination with a furnace stack or flue, a series of retorts arranged transversely across the same, one above the other and al-  
25 ternately at right angles, a series of connecting-pipes between them, an oil-pipe supplying the uppermost retort, and an outlet-pipe for gas from the lowest retort of the series, substantially as set forth.

30 2. In combination with a furnace stack or

flue, a series of retorts arranged transversely across the same, one above the other and al- ternately at right angles, a series of connect- ing-pipes extending from one retort to an- other throughout the series and located out- 35 side of said stack, an oil-pipe supplying the uppermost retort, and a gas-outlet pipe from the lowest retort of the series, substantially as set forth.

3. In combination with a furnace stack or 40 flue, a series of retorts arranged transversely across the same, one above the other and al- ternately at right angles, a series of connect- ing-pipes between them, an oil-pipe supply- ing the uppermost retort, an outlet-pipe for 45 gas from the lowest retort of the series, the water main or receptacle E, into which said outlet discharges, and a water-gas generator or generators discharging also into said main and provided with flues H, which conduct the 50 inflammable waste products of the water-gas process to said stack under said transversely- arranged retorts, for the purpose set forth.

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

JOHN MCKAY.

Witnesses:

F. W. PERKINS,  
EDWIN FULLER.