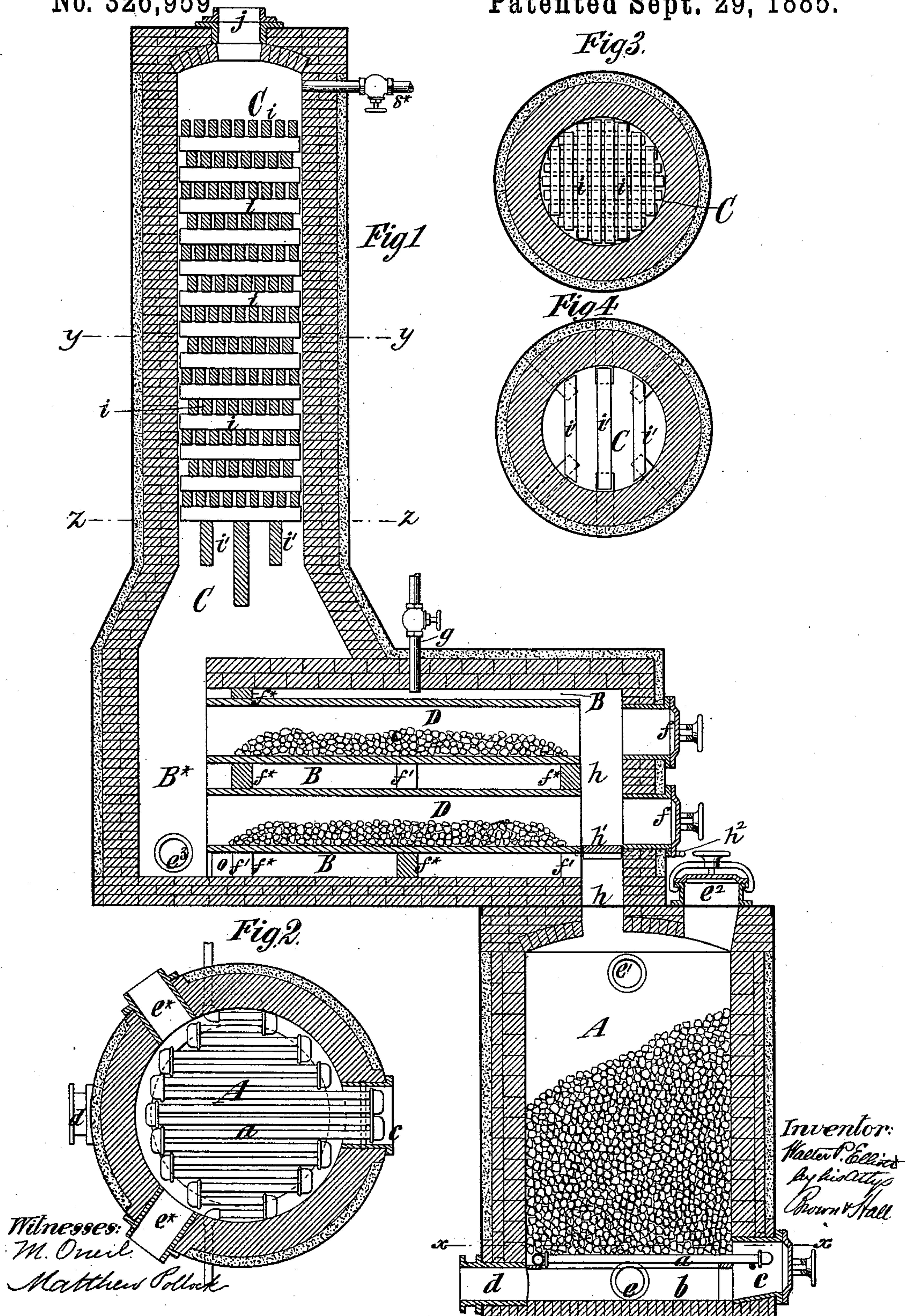


W. P. ELLIOTT.

APPARATUS FOR MAKING GAS.

No. 326,959

Patented Sept. 29, 1885.



(No Model.)

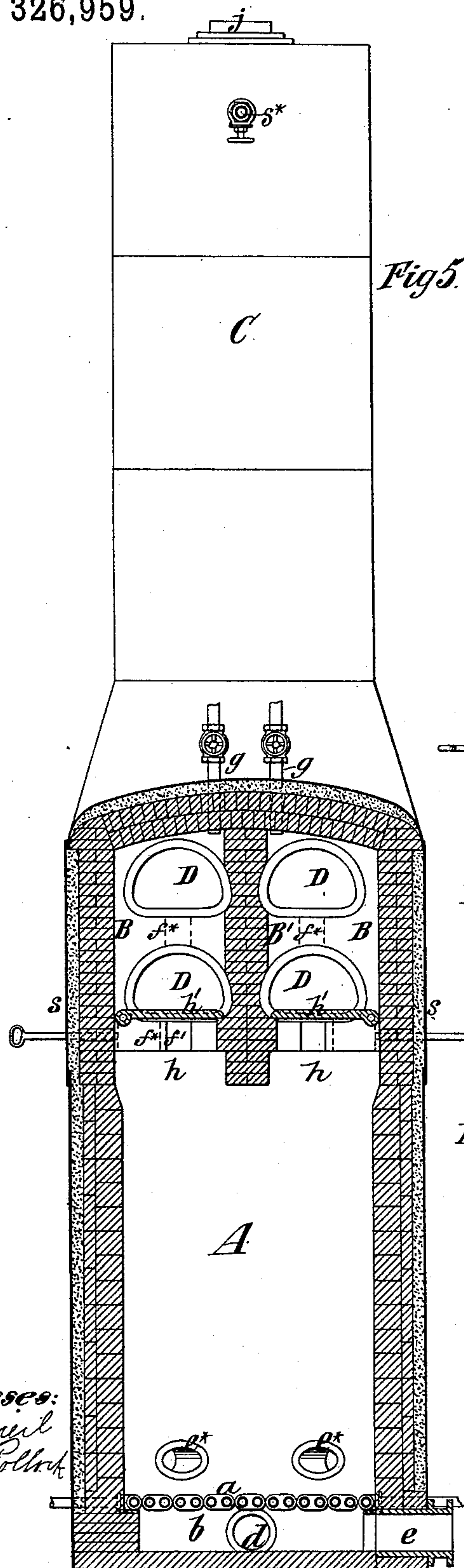
2 Sheets—Sheet 2.

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Patented Sept. 29, 1885.



Witnesses:
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M.B. Pollock

Inventor:
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by his Attys:
Brown & Hall

UNITED STATES PATENT OFFICE.

WALTER P. ELLIOTT, OF NEW BRUNSWICK, NEW JERSEY.

APPARATUS FOR MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 326,959, dated September 29, 1885.

Application filed September 5, 1884. (No model.)

To all whom it may concern:

Be it known that I, WALTER P. ELLIOTT, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented
5 a new and useful Improvement for Making Gas, of which the following is a specification.

My invention relates to the making of carbureted hydrogen gas, by first producing carbonic oxide and hydrogen, and then adding
10 thereto vaporized hydrocarbons and subjecting the mixture to a heat sufficient to permanently fix the hydrocarbon vapors.

The invention consists in the combination, with a generating-furnace and a combustion-
15 chamber extending from the top of said furnace, of open-ended retorts for bituminous coal, arranged in the combustion-chamber, whereby they are heated externally, and retort-mouths in the wall of the combustion-
20 chamber at the end of the retorts, which are over the generating-furnace, whereby provision is afforded for drawing the coke from the retorts and depositing it directly into the furnace.

In this connection I am aware that in the patent to Henry M. Pierson, No. 279,010, granted June 5, 1883, bituminous coal is intended to be distilled in coking-flues which extend from a generating-furnace. These are
25 not like my retorts, inasmuch as they are not arranged in a combustion-chamber and heated externally, but are intended to be heated and the coal in them distilled by combustion in the flues themselves or by passing the products of combustion through the flues. Furthermore, in Pierson's apparatus the mouths for charging the coking-flues are at the ends of the flues most distant from the furnace, and it is intended to push the charge of coke from
30 a flue throughout its length and deposit it in the generating-furnace. When bituminous coal reaches the coking-point, it melts and becomes so soft and plastic that it would be impracticable to push a full charge from one end
35 to the other of the retort or flue. Recognizing this difficulty, I have placed the retort-mouths at the end of the retorts which are at the generating-furnace, and can therefore withdraw the coke little by little and deposit
40 it in the furnace.

The invention also consists in the combination, with an approximately-horizontal cham-

ber, of a generating-furnace arranged below said chamber and communicating with one end thereof, a superheater extending upward
55 from the other end of said chamber, and open-ended retorts for bituminous coal arranged in said chamber, the space in said chamber around the retorts forming a combustion-chamber, whereby the retorts are heated ex-
60 ternally, and valves or stoppers, whereby communication between the furnace and superheater is afforded, either through or around the retorts, and a pipe for delivering liquid hydrocarbon into said chamber around the
65 retorts to be there vaporized.

The invention also consists in a novel combination of parts, hereinafter described.

In the accompanying drawings, Figure 1 is a vertical section of an apparatus embodying
70 my invention. Fig. 2 is a horizontal section of the generating-furnace on the plane of the dotted line $x x$, Fig. 1. Figs. 3 and 4 are horizontal sections of the superheater, taken respectively on the planes of the dotted lines
75 $y y$ and $z z$, Fig. 1. Fig. 5 is a vertical section on the dotted lines $* *$, Fig. 1, including an elevation of the superheater; and Fig. 6 is a horizontal section on the plane of the dotted line $s s$, Fig. 1.
80

Similar letters of reference designate corresponding parts in all the figures.

The several parts of the apparatus hereinafter described may be constructed of any suitable material. They may be advantageously
85 made or built up of fire-brick, having an outer covering of ashes or other light and loose non-conducting material, and an inclosing-casing of sheet or plate iron.

A designates a generating or fixing furnace, here shown as circular in horizontal section, and having grate a , which may be constructed of tubes, as shown, to provide for the circulation of water through it to keep it cool. Below the grate a is the ash-pit b , to which access is had by a suitable door, c , (shown in Fig. 1,) and from which leads a gas-outlet passage, d . In the ash-pit is a blast-pipe, e , and near the top of the furnace is a second blast-pipe, e' . In the top of the furnace A is
90 a mouth or charging aperture, e^2 , and just above the grate a are two or more stoking-holes, e^* , as shown in Figs. 2 and 5.
100

At the top of the furnace A is a retort-cham-

ber, B, which extends rearward, and at its rear end is surmounted by a superheater, C.

In the retort-chamber B are arranged retorts D, here shown as four in number, and of an ordinary form, but open at the ends, and in the front of the chamber are retort-mouths closed by doors or lids f , through which access may be had to the retorts at the ends above the furnace A for charging or discharging them. The retorts are held in place or supported by tiles or blocks f^* , which are built into the walls of the structure, and are shown, as arranged, two high and side by side, but separated by a wall, B' . (Best shown in Figs. 5 and 6.) As shown in Fig. 1, there are tile-supports f^* at each end of and at the middle of the retorts D, and they have openings f' through them, arranged as shown in Figs. 1 and 5. There is such an opening, f' , below the lower retorts at the front and rear ends thereof, and an opening, f' , in the middle support below the upper retorts. I thereby form a circuitous passage through the chamber B and around the retorts, by which the generating-furnace communicates with a combustion-chamber, B^* , located or situated at the back of the chamber B, and into which the blast-pipe e^3 enters.

In order to provide hydrocarbon vapor to mingle with the carbonic oxide and hydrogen, as hereinafter described, I may employ any suitable vaporizing-chamber into which naphtha or other hydrocarbon liquid is delivered, and which is subjected to heat to vaporize the liquid. I have here shown pipes g , through which naphtha or such other liquid as is used may be delivered into the chamber B, between the generating-furnace and superheater, and there vaporized by the heat on the outside of the retorts. In front of each tier of retorts D is a downwardly-extending passage or throat, h , through which the generating-furnace A communicates with the retort-chamber B, and in these passages or throats h are valves or dampers h' , which may be manipulated by handles h^2 , (shown in Fig. 6,) and by which the passages or throats may be closed or stopped, so as to compel all the heat from the furnace to pass into the chamber B through the openings f' below the lower retorts.

The superheater consists of an upright stack in which refractory material is loosely arranged, so that heat may have ready access to all the material. I have here shown the superheater as filled with long bricks or tiles i , piled in cob-house fashion and supported by bearers i' , of like material, extending across the superheater and supported therein. At the top of the superheater is an escape-pipe or aperture, j , as shown in Fig. 1, and a pipe, S^* , whereby steam may be admitted.

In starting up the apparatus I make a fire of hard coal, coke, wood, or other fuel in the generating-furnace A, and after stopping the front ends of the retorts D, by closing the valves or dampers h' , so as to compel the products of combustion to pass through the cham-

ber B around the retorts and through the flues or apertures f' , the blast is turned on at e under the grate, and blast in greater or less degree is also admitted through the inlet e' in the top of the furnace to consume the carbonic oxide resulting from fresh fire. The operation of the generating-furnace is continued until the retorts D are heated to a distilling-heat, whereupon the retorts are charged partly full of bituminous coal. The blast is then continued, and the gaseous products of distillation are delivered from the rear ends of the retorts into the chamber B^* . More or less blast is now admitted through the air-inlet e^3 , and uniting with the gaseous products of distillation produce an intensely hot combustion in the chamber B^* and in the superheater, whereby the filling of the latter is quickly raised to a high degree of heat. When the bituminous coal in the retorts D has reached a sufficiently active stage of distillation, the blast is shut off, and steam from the pipes S^* is passed downward through the superheater C, whereby it is highly heated, and thence through the retorts and over the coal therein in process of distillation. In order to compel the steam to pass through the retorts I close the openings f' below their rear ends by valves or dampers o , which may be arranged to slide, as shown in Fig. 6. The lighter or vaporized hydrocarbons from the coal are taken up by the products of decomposition of the steam, and at the front ends of the retorts the hydrocarbon vapors, produced from the naphtha or other liquid admitted through the pipes g , are also taken up, and the mingled carbonic oxide, hydrogen, and hydrocarbon vapors (the valve h' being open) pass downward through the fire in the generating or fixing furnace A, whereby the said vapors are fixed, and thence out at the delivery-pipe d . The heavier oils and tar, resulting from the distillation of coal in the retorts D, pass downward into the furnace and are there consumed. After the superheater and retorts become cooled to such an extent as to render them incapable of longer properly performing their work, the generating-furnace is again blown up and the operation is repeated. When the distillation of the coal in the retorts is completed, the coke remaining may be drawn outward and is delivered in its red-hot or incandescent condition directly into the furnace A, to be there used.

It will be observed that the retort-mouths are at that end of the retorts which are over the furnace A, and consequently the coke can be drawn forward or outward little by little, in the same manner that coke is withdrawn from an ordinary gas-retort, and deposited in the furnace A. The retort-mouths opposite their rear ends would not be as advantageous as their arrangement at the front ends, because the coke when highly heated is partially melted, and would render it impracticable to push the charge of coke through the length of the retort.

I am aware of Letters Patent No. 295,832, granted to J. L. Stewart, March 25, 1884, and No. 301,531, granted to J. L. Stewart, July 8, 1884, and I do not claim anything shown or described therein as included in my present invention.

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

1. The combination, with a generating-furnace and a combustion-chamber extending from the top of the furnace, of open-ended retorts for bituminous coal arranged in said chamber, whereby they are heated externally, and retort-mouths in the wall of the combustion-chamber at the ends of the retorts which are over the generating-furnace, whereby provision is afforded for drawing the coke from the retorts and depositing it in the furnace, substantially as herein described.

2. The combination, with an approximately-horizontal chamber, of a generating-furnace arranged below said chamber and communicating with one end thereof, a superheater extending upward from the other end of said chamber, and open-ended retorts for bituminous coal arranged in said chamber, the space in said chamber around the retorts forming a combustion-chamber whereby the retorts are heated externally, and valves or stoppers whereby communication between the furnace

and superheater is afforded either through or around the retorts, and a pipe for delivering liquid hydrocarbon into said chamber around the retorts to be there vaporized, substantially as herein described.

3. The combination, with a chamber containing open-ended retorts for bituminous coal, of a generating-furnace communicating with one end of said chamber, a superheater communicating with the other end of said chamber, and which is heated by escaping products of combustion, a pipe for delivering steam into the superheater, and valves or stoppers whereby the products of combustion are caused to pass through the chamber around the retorts when blowing up, and whereby the steam is caused to pass downward to and through the retorts and over the bituminous coal in process of distillation, and a pipe for delivering liquid hydrocarbon into the retort-chamber where it is vaporized and from which the vapor passes to mingle with the products of decomposition as they leave the open-ended retorts, substantially as herein described.

WALTER P. ELLIOTT.

Witnesses:

C. HALL,
FREDK. HAYNES.