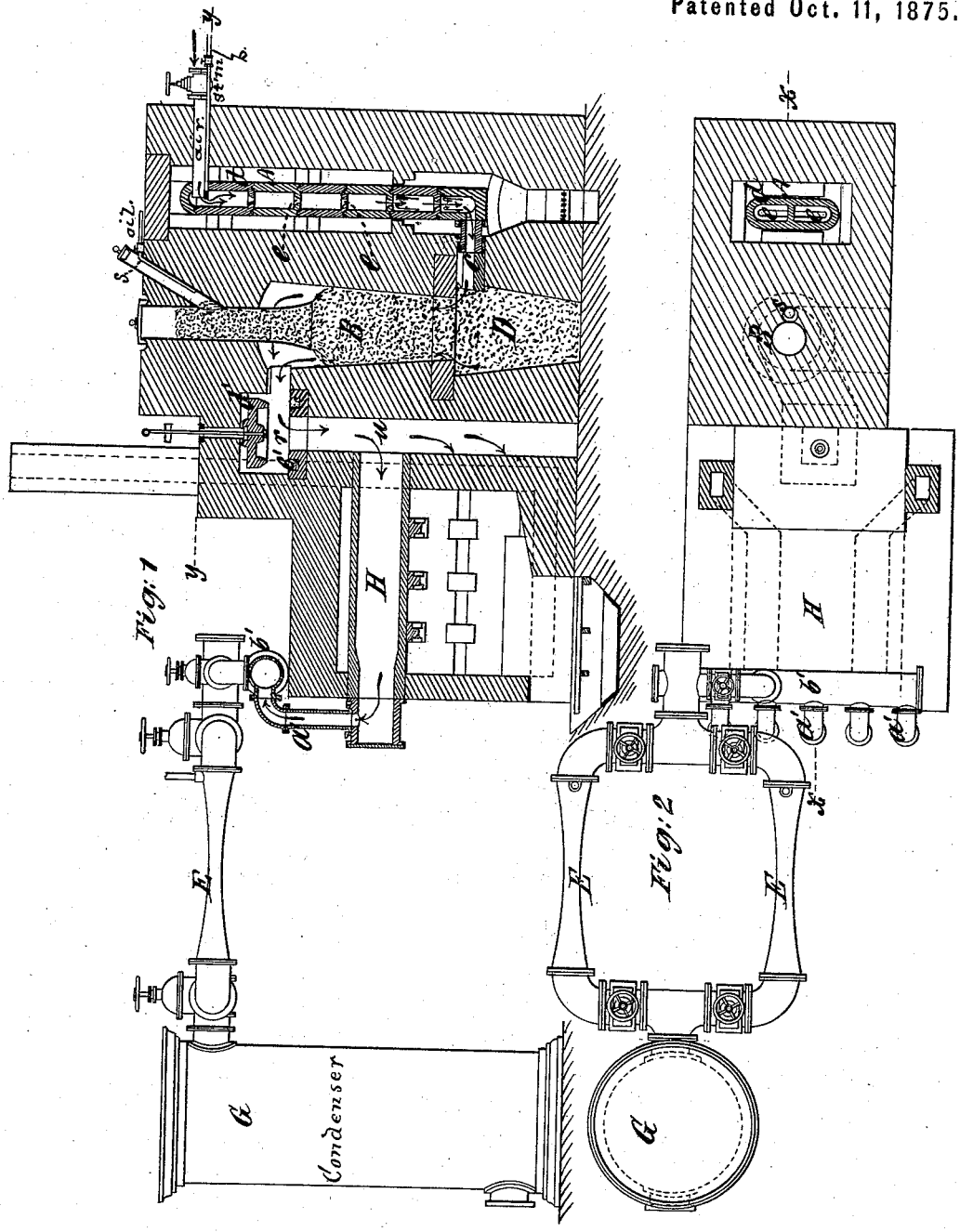
P. W. MACKENZIE.

Apparatus for the Manufacture of Illuminating Gas.

No. 168,758.

Patented Oct. 11, 1875.



Witnesses:
Michael Ryan
Fred. Haynes

P. W. Mackenzie
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

PHILIP W. MACKENZIE, OF BLAUVELTVILLE, NEW YORK.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF ILLUMINATING-GAS.

Specification forming part of Letters Patent No. **168,758**, dated October 11, 1875; application filed November 7, 1874.

CASE B.

To all whom it may concern:

Be it known that I, PHILIP W. MACKENZIE, of Blauveltville, in the county of Rockland and State of New York, have invented certain Improvements in Apparatus for the Manufacture of Illuminating-Gas, of which the following is a specification:

This invention relates to the manufacture of illuminating-gas from coal or other solid substance rich in carbon, or partly from gas-coal and hydrocarbons.

The invention consists in a combination of an externally-heated vertical and chambered steam-retort, having an upper steam-inlet and lower superheated steam-outlet, with a grateless decomposing-chamber and one or more separately-heated fixing-retorts. The invention also consists in a like combination of parts or devices, together with an upper hydrocarbon-supply pipe to the decomposing-chamber.

The primary retort for superheating the steam which passes to the decomposing-chamber, as also said chamber or furnace, are not here separately claimed as new, but are the same as described in another application for patent made by me for an improvement in apparatus for the manufacture of gas by the combustion of water with carbon.

Figure 1 represents a vertical section, mainly on the line *x x*; and Fig. 2, a longitudinal section on the line *y y*.

A is the retort, to which steam is admitted by a pipe, *b*, above, and which is constructed of compartments *d*, mounted one upon the other, and in communication with each other by contracted central openings *e*, to promote a perfect circulation up and down within the retort, so that the steam passes in a highly-heated condition by the outlet *c* to the decomposing-chamber B, which latter it is preferred to make without a grate, and with its cinder or ash pit D of larger area at its top than the base of the decomposing-chamber, to insure a free supply of the highly-heated steam of the decomposing-chamber, and to prevent loss by radiation from below. The chamber B, in the present instance, is filled with gas-coal, or other gas-producing solid substance rich in carbon, and is charged from time to time as required, said chamber being self-feeding, and the coke, cinders, and ash being removed from below. When hydrocarbon is used in addition, it is applied through a small pipe, *s*, in communication with the coal, the vapor of which, with the vapor of the hydrocarbon, prevents the caking of the coal. The temperature in this stage of the process does not carbonize or decompose the vapor of the hydrocarbon or of the coal, but the hydrocarbon passes down into the decomposing-chamber, and there combines with the hydrogen and carbonic oxide from below, and this combination is not hot enough to make permanent gas. To make permanent gas, one or more retorts, H, heated by a separate fire or fires, are arranged in close proximity to the decomposing-chamber B, and the vapors drawn, by one or more steam-jet exhausters, E, through an upper flue, *r*, and down a vertical flue, *u*, to and through the retort H, which is provided with fire-places, the vapors and gases passing from the retorts H up stand-pipes *a' a'*, and through a hydraulic main, *b'*, and from thence by the steam-jet exhausters to the condenser G. The retorts H enable the operator to control the heat required to carbonize and convert the gases and vapors issuing from the decomposing-chamber B into a permanent gas. Without these retorts H the gas would pass off as vapor containing tar rich in carbon, and be condensed and washed out and wasted. The importance of the retorts H will be readily understood when it is considered that if a very high heat be imparted to the upper portion or furnace of the decomposing-chamber B, when the vapors of hydrocarbon are used, said vapors would then be converted into lamp-black; but the bottom of the decomposing-chamber cannot be too highly heated. When the retort or retorts H require cleaning, a valve, *d'*, is dropped into a sand-sealing seat, *e'*, and the valves of the hydraulic main closed, thereby shutting off communication of said retorts both with the decomposing-chamber and the hydraulic main.

I claim—

1. The combination of the externally-heated

vertical and chambered steam-retort A, having upper steam-inlet *b* and lower superheated steam-outlet *c*, with the grateless decomposing-chamber B and one or more separately-heated fixing-retorts, H, substantially as specified.

2. The combination of the externally-heated vertical and chambered steam-retort A, having upper steam-inlet *b* and lower superheated steam-outlet *c*, with the grateless decomposing chamber B, having an upper hydrocarbon-supply pipe, *s*, and with one or more separately-heated fixing-retorts, H, as and for the purposes described.

P. W. MACKENZIE.

Witnesses:
FRED. HAYNES,
FERD. TUSCH.