

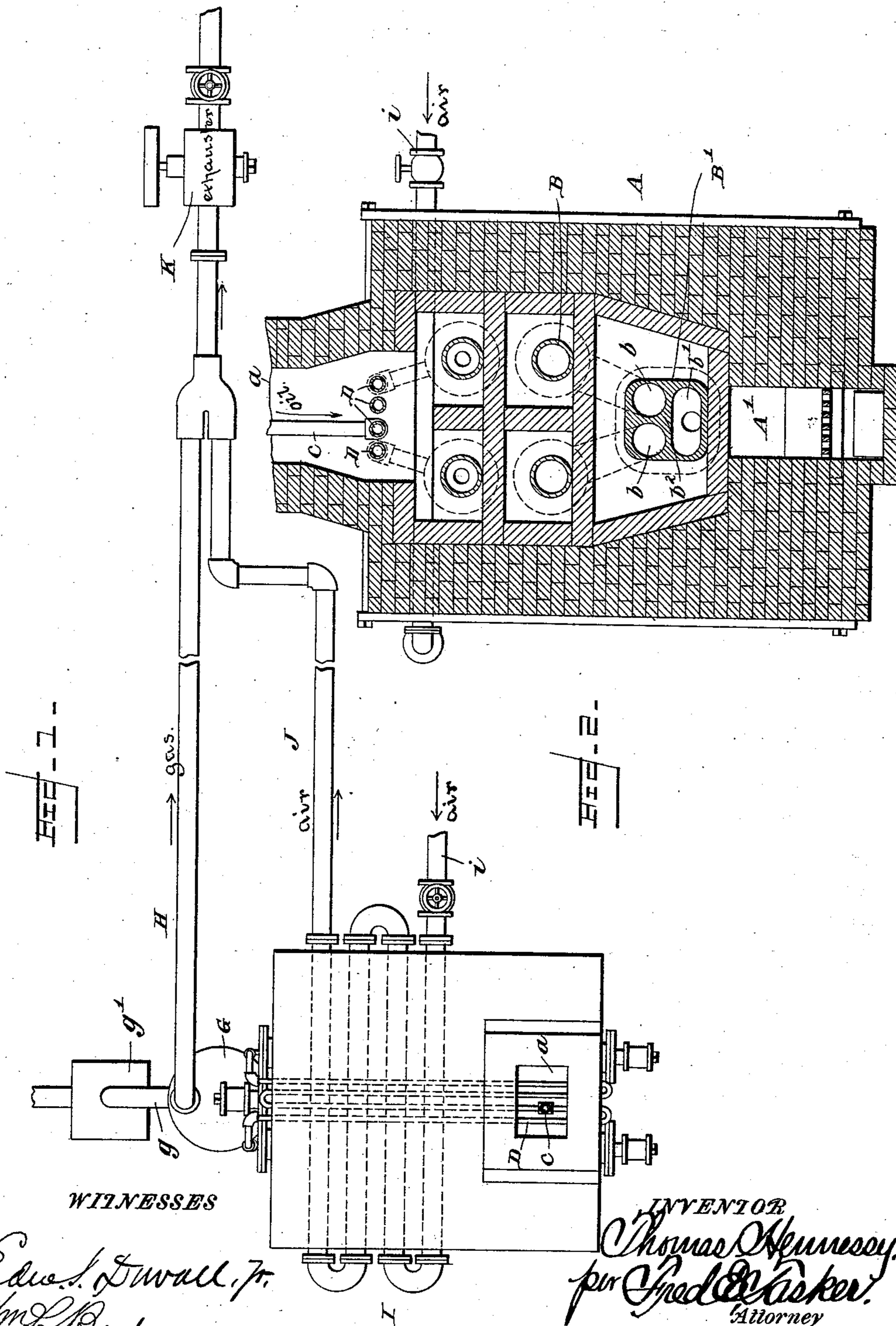
(No Model.)

2 Sheets—Sheet 1.

T. HENNESSY.
GAS RETORT.

No. 531,530.

Patented Dec. 25, 1894.



WITNESSES

Edw. L. Duwall, Jr.
Wm. L. Boyden

INVENTOR
Thomas Hennessy
per Fred A. Barker
Attorney

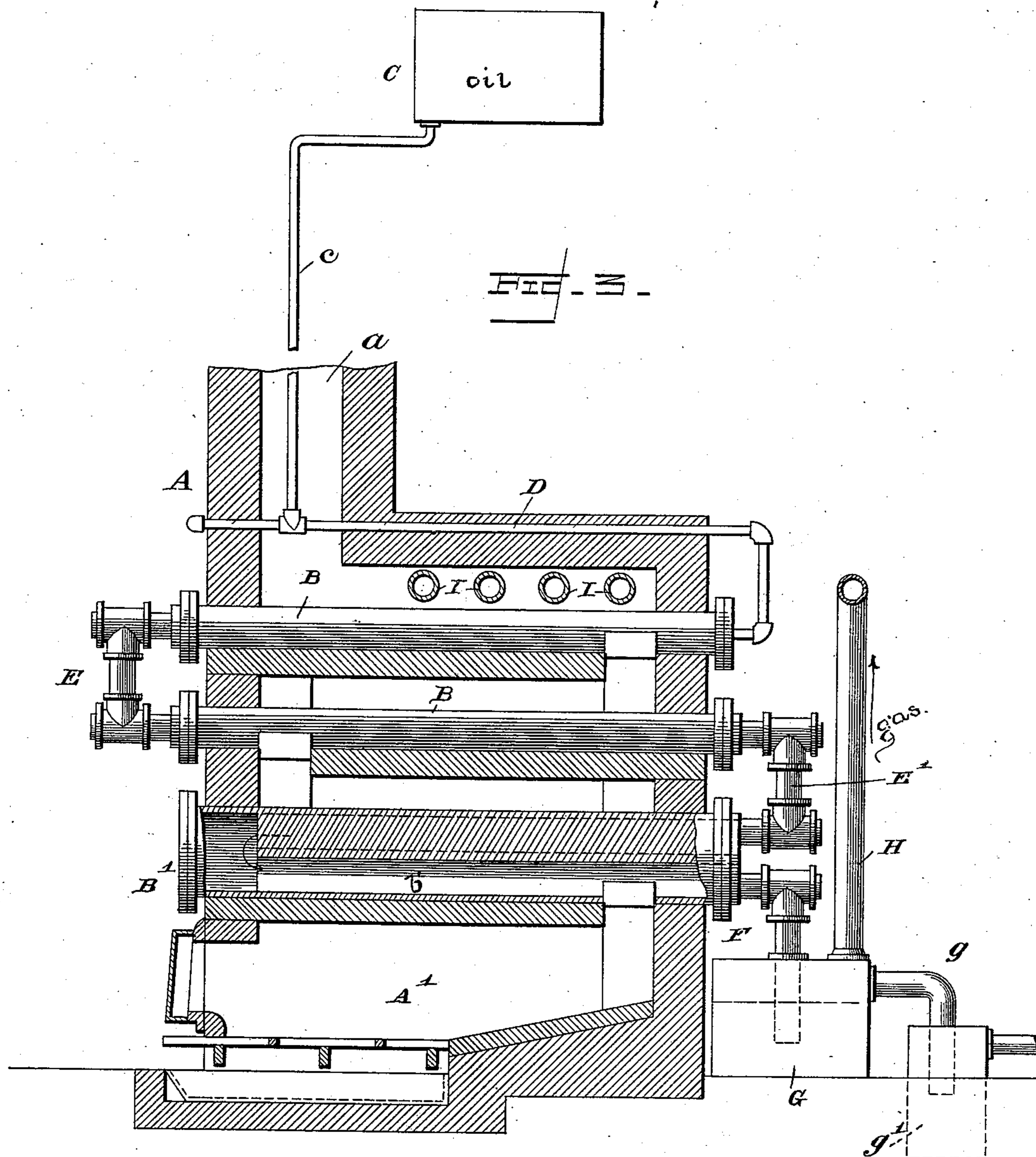
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UNITED STATES PATENT OFFICE.

THOMAS HENNESSY, OF GRAND FORKS, NORTH DAKOTA.

GAS-RETORT.

SPECIFICATION forming part of Letters Patent No. 531,530, dated December 25, 1894.

Application filed March 6, 1894. Serial No. 502,581. (No model.)

To all whom it may concern:

Be it known that I, THOMAS HENNESSY, a citizen of the United States, residing at Grand Forks, in the county of Grand Forks and State of North Dakota, have invented certain new and useful Improvements in Gas-Retorts; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in retorts for generating gas from oil or other carboniferous matter, its object being to simplify the parts and perfect the operations of retorts of this character so as to produce a more satisfactory product, and the invention therefore consists in the construction, arrangement and combination of parts, substantially as will be hereinafter described and claimed.

In the annexed drawings representing my invention: Figure 1 is a top plan view of my improved gas retort. Fig. 2 is a transverse vertical section. Fig. 3 is a longitudinal vertical sectional elevation.

Like letters of reference designate corresponding parts in the several figures.

In the example of my invention shown in the drawings, A denotes the supporting wall of masonry or other material for sustaining the various retorts and other parts. This wall has a flue or smoke-stack *a*, and a fire-box A'. In the wall A is arranged preferably a bench of five retorts B B B B and B'. The retort B' is a double retort or fixing chamber and may be made of any material suitable to be heated for the purpose of converting oil or other carboniferous matter into a fixed gas. It is located just above the fire-box A'. In its upper part are the two parallel tubular longitudinal passages *b b* and below them the larger longitudinal passage *b'* which is separated from passages *b b* by the horizontal division plate *b²*, while at one end the passages *b b* communicate with the passage *b'*.

C indicates an elevated tank into which oil or other carboniferous matter is pumped. This tank is placed at any desired height so that it can easily feed the retorts B B with oil. The oil passes down from the tank

through the oil pipe *c* which is located within the smoke-flue *a*, see Figs. 2 and 3, the pipe *c* being thus arranged so that its contents may be heated by the products of combustion, passing out through flue *a*. As the oil enters the heated pipe or pipes *c*, it will be converted into a light vapor. The pipe *c* connects at its lower end with the pipes D D D which are placed horizontally in the upper part of the wall A and which form a pipe coil or series at that point, one end of said coil or series entering one end of the upper retorts B. See Figs. 1 and 3. The light vapor therefore which is formed in the pipe *c*, passes through the pipes D and is discharged into the upper retorts B of the series of retorts. In these retorts, which are heated to a low temperature the vapor is converted into a heavy vapor gas.

The two upper retorts B are connected with the two similarly-constructed and arranged retorts beneath them, by means of suitable connecting pipes E, and the two lower retorts are connected with the double retort and fixing chamber B' by means of a suitable pipe or connection E'. See Fig. 3. The two lower retorts B, being nearer the furnace than the upper ones, are heated to a higher temperature than they are. The heavy vapor gas already mentioned passes from the two upper retorts into the two lower ones and then into the double retort and fixing chamber B', where it is converted into a fixed gas.

From the fixing chamber B', the gas passes out into pipe F and into seal G, which is partly filled with water to prevent any back pressure on the retorts. The seal G has an outflow pipe *g* and a waste tank *g'*. From the seal G the gas passes up through the pipe H, through which it is exhausted from the bench of retorts.

In the upper part of the bench of retorts and supported by wall A, at a point above the retorts B, is a pipe or series of pipes I that pass back and forth in a position as shown, where they are exposed to the flame and can therefore be heated to a high degree of temperature, but not to a temperature sufficiently high to burn the oxygen. One end of this pipe or series of pipes I, is provided with an inlet valve *i*, see Figs. 1 and 2, which I term a cold air valve, and through which

cold air is admitted and drawn into the pipes I wherein it is heated. From the pipe or pipes I, leadsoff the hot air pipe J. See Fig. 1.

Both the gas-conveying pipe H and the hot air pipe J lead to the exhauster K. See Fig. 1. The exhauster being in motion when the bench is started, the gas is taken away from the seal G. At the same time the valve *i* at the top of retorts can be opened so as to admit the necessary amount of air needed to mix with the rich oil gas which is generated in the retorts, the same meeting at a point near the exhauster, and the air being heated to a very high temperature, mixing with the gas at that point they become thoroughly mixed in their passage from there to the holder, having to pass through a receptacle or scrubber filled with coke breeze, and then through a purifying box or boxes where the temperature of both is reduced to normal.

If the gas and air are mixed before passing through the super-heating pipes I and heated to a temperature which is necessary to make a fixed gas of both products, on account of the mixing of air with the gas it would ignite and cause an explosion, thereby being dangerous and non-practicable. I have found that to be the case by actual experience. Hence my changed construction of heating the air in the retorts by drawing it separately through the super-heater, where it can be heated to any degree of temperature without fear of ignition, and mixing the same at a point beyond the retort, where it can be thoroughly mixed with the gas, which is made from the carbon.

When the oil is first vaporized and partially converted from a liquid to a gaseous form by passing it through retorts heated to a temperature of from 500° to 800°, and from there passed through a fixing chamber which is heated to from 1,800° to 2,000°, a portion of the oil which is not thoroughly converted to a fixed gas, is carried along with that which is fixed. By mixing that with air heated to as high a temperature as possible, immediately after both air and gas are taken from the superheater, without consuming the oxygen, the heated air will then thoroughly mix and the mixture can be carried along and passed through a box for the purpose of scrubbing and then passed through the purifiers to the holder where it is stored for distri-

bution. A gas manufactured from oil and heated air as before described can be reduced in candle power from say 75° to say, zero, by admitting the air in the way described in such quantities as may be required. Gas made in this way is adapted more particularly for use with the Welsbach burner and other regenerative burners. As before stated, the mixing of air and gas together and afterward passing them through a heated chamber, is found to be impracticable and extremely dangerous inasmuch as the air cannot be heated to as high a temperature as would be required to make a thoroughly fixed gas without danger of explosion and unless it is heated to this extremely high temperature, we have found by actual experience that it would stratify, and accordingly the best results are obtained by heating the air separately and mixing it with the gas after passing through the superheater.

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

1. The combination of the retorts, one of which has upper passages *b b* and lower passage *b'* and serves as a fixing chamber, a pipe leading from said retort to the seal, a gas-conveying-pipe leading from the seal to the exhauster, an oil supply pipe for the retorts which is so situated as to be heated from the products of combustion arising from the furnace, and the air supply pipe located above the retorts and connecting by a suitable pipe with the gas-conveying pipe, all arranged so that the air and gas may be separately heated before being mixed, substantially as described.

2. In a gas retort for making gas from oil and other carboniferous matter, the combination of the retort in which the gas is formed, the cooling device which receives the gas therefrom, an air supply pipe within which air is heated to a high temperature, a passage leading from the cooling device to the air supply pipe so that the cooled gas may be united with the previously heated air, substantially as described.

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

THOMAS HENNESSY.

Witnesses:

JAS. ETTNO,

W. E. PARSONS.