

(No Model.)

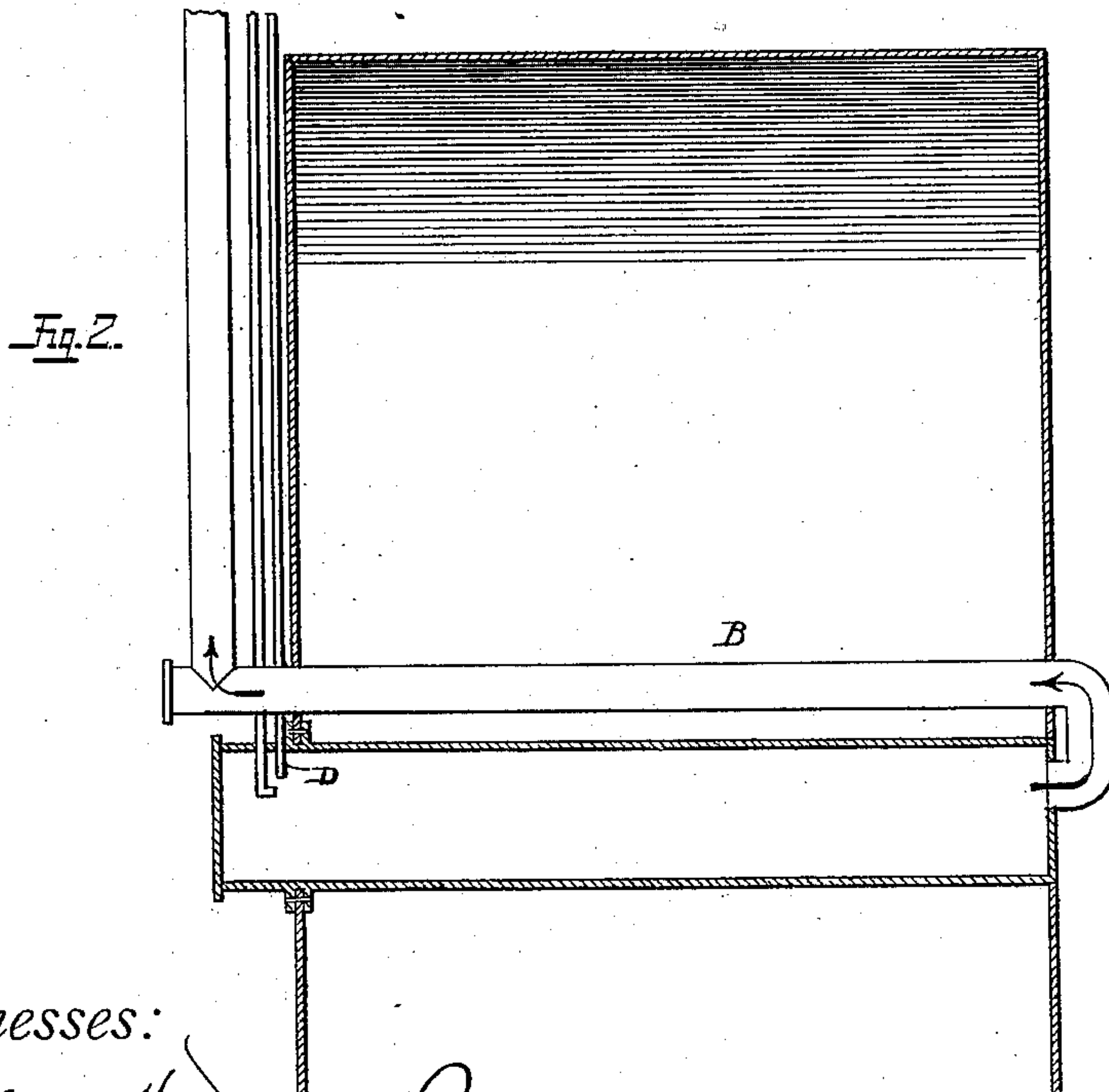
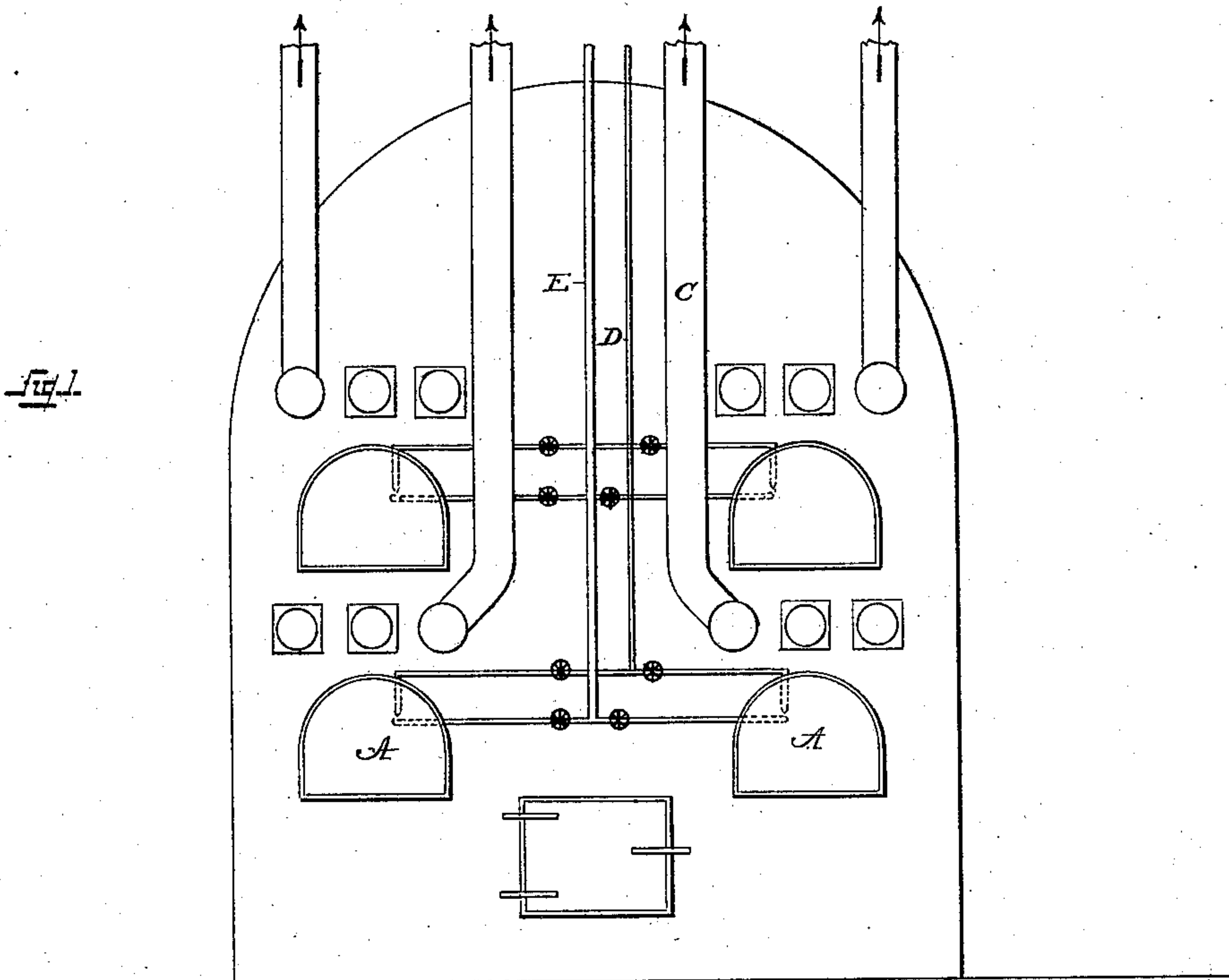
2 Sheets—Sheet 1.

A. M. SUTHERLAND.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

No. 373,158.

Patented Nov. 15, 1887.



Witnesses:

N. N. Northman
David St. Mead

Inventor :

by *Alexander M. Sutherland*
A. S. Dyrenforth
his Attorney.

(No Model.)

2 Sheets—Sheet 2.

A. M. SUTHERLAND.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

No. 373,158.

Patented Nov. 15, 1887.

Fig. 3.

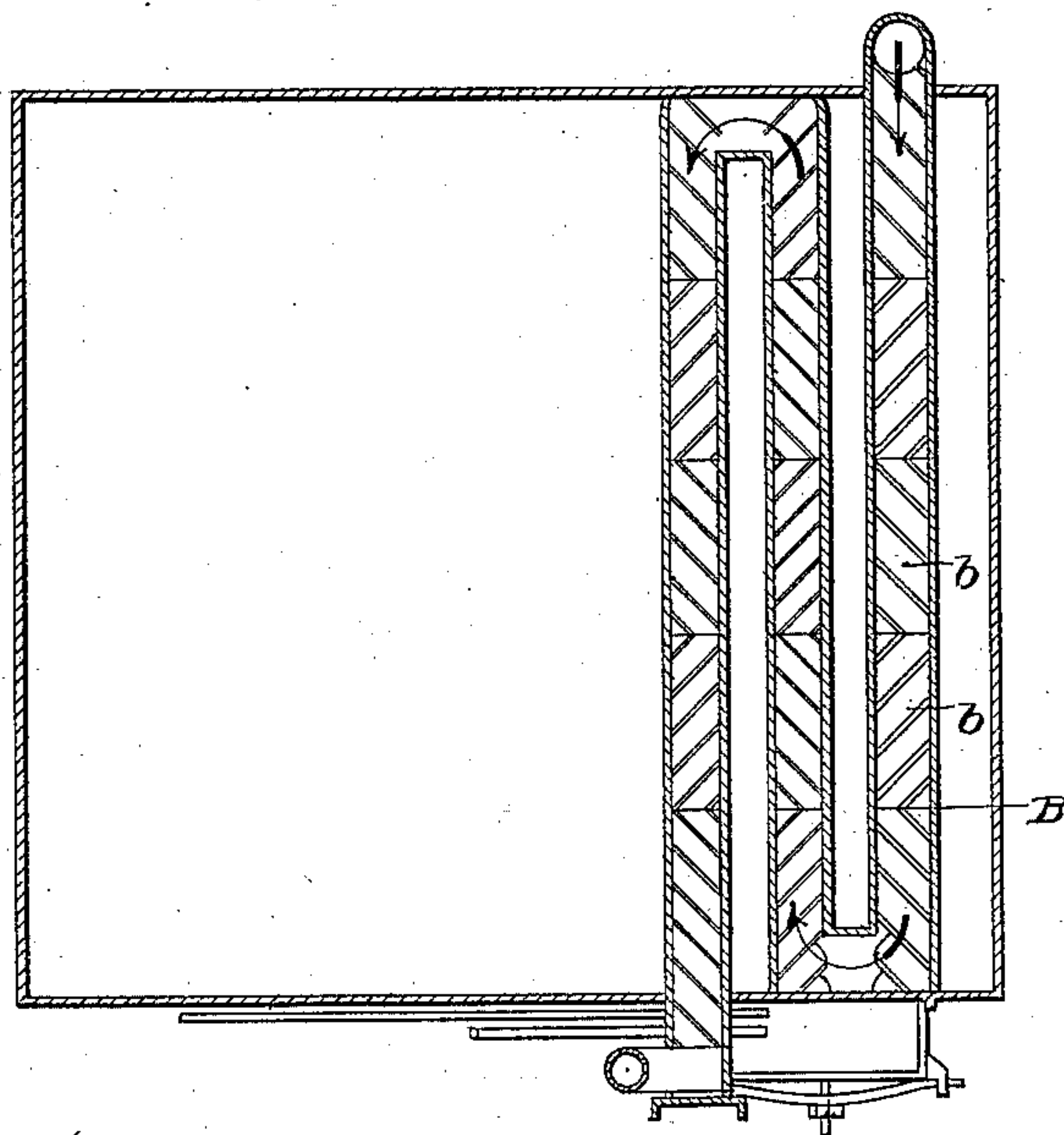
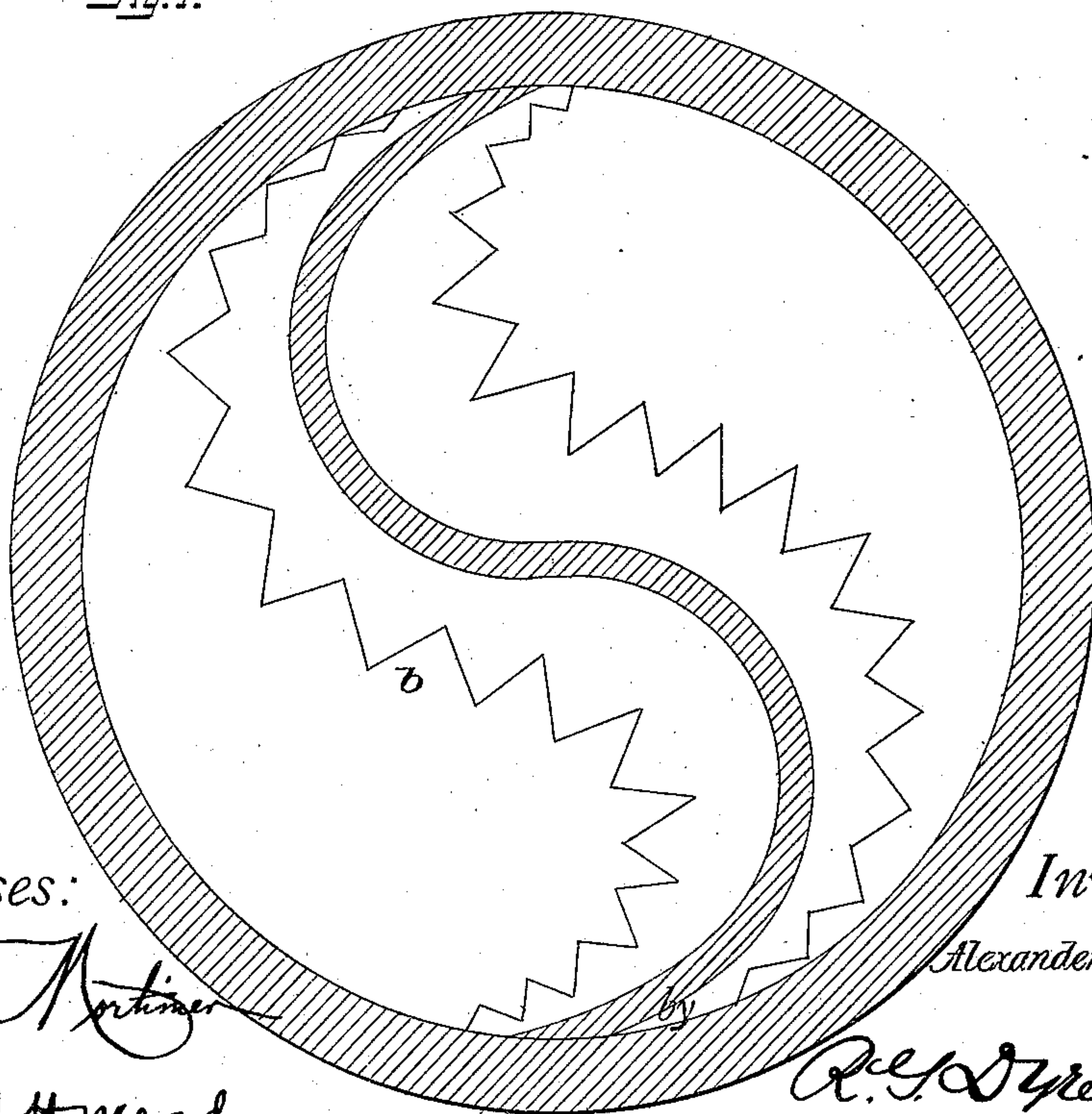


Fig. 4.



Witnesses:

W. W. Martin

David H. Mead

Inventor :

Alexander M. Sutherland.

A. E. Dyrenforth.

his Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER M. SUTHERLAND, OF ELIZABETH, NEW JERSEY.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 373,158, dated November 15, 1887.

Application filed September 8, 1886. Serial No. 213,050. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER M. SUTHERLAND, a subject of the Queen of England, residing at Elizabeth, in the county of Union and State of New Jersey, have invented a certain new and useful Improvement in Processes of and Apparatus for Manufacturing Gas; 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 the manufacture of illuminating-gas.

The prime object of the invention is to get the greatest possible quantity of gas from a gas-producing substance, and to do this in a simple and inexpensive manner.

In the procedures now generally in vogue for the manufacture of illuminating-gas, as the volatile matters distill from the retorts they are passed directly to the hydraulic main and to coolers, &c., and by this act a large amount of gas substance is lost by condensation and otherwise.

With a view to overcoming this defect and to producing the maximum quantity of gas from gas-stock, my invention resides in the process of making illuminating-gas by subjecting the usual gas-coal or other suitable gas-producing material to heat in closed vessels or retorts in the manner ordinary in gas-making, and then thoroughly mixing and breaking up the entire mass that comes off in the distillation and subjecting it to a reheating at a lower temperature to prevent baking or hardening immediately after its passage from the retorts.

Furthermore, the invention consists in the process of making illuminating-gas by subjecting coal or other suitable matter to heat in the usual manner, disintegrating and reheating the generated products at a lower temperature to prevent deposit of carbon immediately after they come off, and before or during the reheating introducing petroleum or other suitable enriching substance atomized by steam.

Finally, the invention resides in apparatus consisting of retorts or pipes provided with disintegrating devices; also of the usual retorts, supplemental reheating retorts or pipes connected to them and provided with disintegrating means, and atomizing oil-feed.

In the accompanying drawings, in which like letters of reference indicate corresponding parts, Figure 1 is a front elevation showing a bench of retorts and appurtenances arranged to carry the first part of my invention into effect. Fig. 2 is a central vertical section through one of the main retorts and through one of the superheaters or supplemental retorts, showing the supplemental retort connected to the main retort at the rear, showing the stand-pipe leading from the front of the supplemental retort, and showing the oil and atomizing steam-pipes entering the main retort and at the front. Fig. 3 is a horizontal section through one of the retorts first shown as supplemental retorts, but which may be employed without the others, showing the convolutions of the same, and showing it provided with auger-shaped sections; and Fig. 4 is a vertical cross-section of a portion of one of the supplemental retorts, showing the position in the retort of the auger-shaped section.

When making gas in accordance with my invention, ordinary gas-coal or other suitable gas-producing material is charged into the main retorts A, and these are subjected to the usual heat to which gas-making is subjected in the manufacture of illuminating-gas, according to the substance undergoing distillation. From the main retorts, then, the entire product which comes off is passed into and through a series of supplemental retorts or pipes, B, which are kept at a lower or any desired temperature to prevent deposit of carbon, and which are provided internally with means for breaking up and thoroughly mixing the products which come from the main retorts; but the retorts shown first as supplemental retorts may be employed without the others and be used with their internal devices for making oil-gas or oil and steam gas.

The preferred means of accomplishing the mixing is shown in the drawings, and consists of a number of auger-shaped ribs, *b*, made in sections and of such size that their helices bear against the retorts, the sections being placed a short distance apart, and those edges against which the products of distillation impinge in their passage being of irregular shape, in order more thoroughly to effect the disintegration. The sections of the ribs are alternately right-hand and left-hand auger-shaped, and the edges

serve in a measure as triturating-surfaces, and the auger-shaped sections effect a thorough disintegration and intercommingling of the products of distillation, while, the heat being brought to bear upon them while they are thus divided up into small streams or bodies or separate particles, there is little or no deposit of carbon, and the greater portion of the mass is thus transformed into a fixed gas. Since the products of distillation are thus subjected to a reheating or separate heating immediately after leaving the main retort, instead of being passed up the stand-pipe into the hydraulic main and to coolers, portions of these products which would otherwise be condensed and separated out are transformed into gas, and thus the greater portion of the volatile mass that comes from the coal may be directly transformed into gas. Toward the end of a heat, however, owing to a deficiency in carbon, the gas may not be sufficiently rich, and the amount of gas produced in the manner in which I have described being also so much greater in quantity than that produced in the ordinary manner, it may generally be of somewhat lower candle-power than requisite. To enrich the gas, then, and compensate for this deficiency, I inject oil either directly into the main retort during the entire distillation or only toward the close, or I inject the oil into the supplemental retorts; and in order that the oil may be in condition readily to be acted upon by the heat, and that there may be present a prolific source of hydrogen to combine with any superabundance of carbon, I atomize the oil by a jet of steam. The quality of the gas can be determined in advance by the quantity of oil and steam introduced.

Even after the coal has been exhausted in the main retorts, I may continue the production of gas by injecting the oil and steam—that is, by using a spray of oil or a steam-atomized spray of oil—thus making oil-gas without coal-gas, or oil and steam gas without coal-gas. From the point of juncture of a retort, A, with a supplemental retort, B, this runs forward, then rearward, and again forward, presenting convolutions and extended heating-surface, to a point where it communicates with its stand-pipe or a conduit, C, by which the gas is conducted to a gasometer or other place of storage.

I have shown the inlet-pipes for oil and the

steam-pipes entering the main retorts, and it will be observed that they enter these at their front ends, whereby the steam and oil will traverse the entire mass in the retort before finding exit; but they may be on the other retorts.

The oil-pipe is marked D and the steam-pipe E.

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

1. The process of manufacturing illuminating-gas, which consists in subjecting gas-coal or other gas-producing substance to heat in closed vessels or retorts, thoroughly breaking up and disintegrating and commingling the volatile products as they come off, and, while being disintegrated and commingled, reheating them in their finely-divided condition at a lower heat than that to which they have previously been subjected, substantially as and for the purpose set forth.

2. The process of manufacturing illuminating-gas, which consists in subjecting gas-coal or other suitable gas-producing substance to heat in the usual manner, immediately disintegrating the products as they come off, reheating the same at a lower heat, and introducing oil and steam, substantially as and for the purpose specified.

3. In apparatus for making oil-gas, the combination, with an oil-feed, of retorts provided with disintegrating devices and means for heating said retorts, the disintegrating devices consisting of toothed or roughened partitions or auger-shaped sections, serving as triturating-surfaces and commingling devices, substantially as described.

4. In apparatus for manufacturing gas, the combination, with a main retort, with a supplemental retort containing toothed or roughened partitions, and with means for heating said retorts, of an atomizing oil-feed, substantially as described.

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

ALEXANDER M. SUTHERLAND.

Witnesses:

E. P. CONE,

WILLIAM M. STEWART, Jr.