(No Model.) 2 Sheets—Sheet 1.

J. H. R. DINSMORE.

PROCESS OF MANUFACTURING ILLUMINATING GAS FROM COAL.

No. 383,634. Patented May 29, 1888.

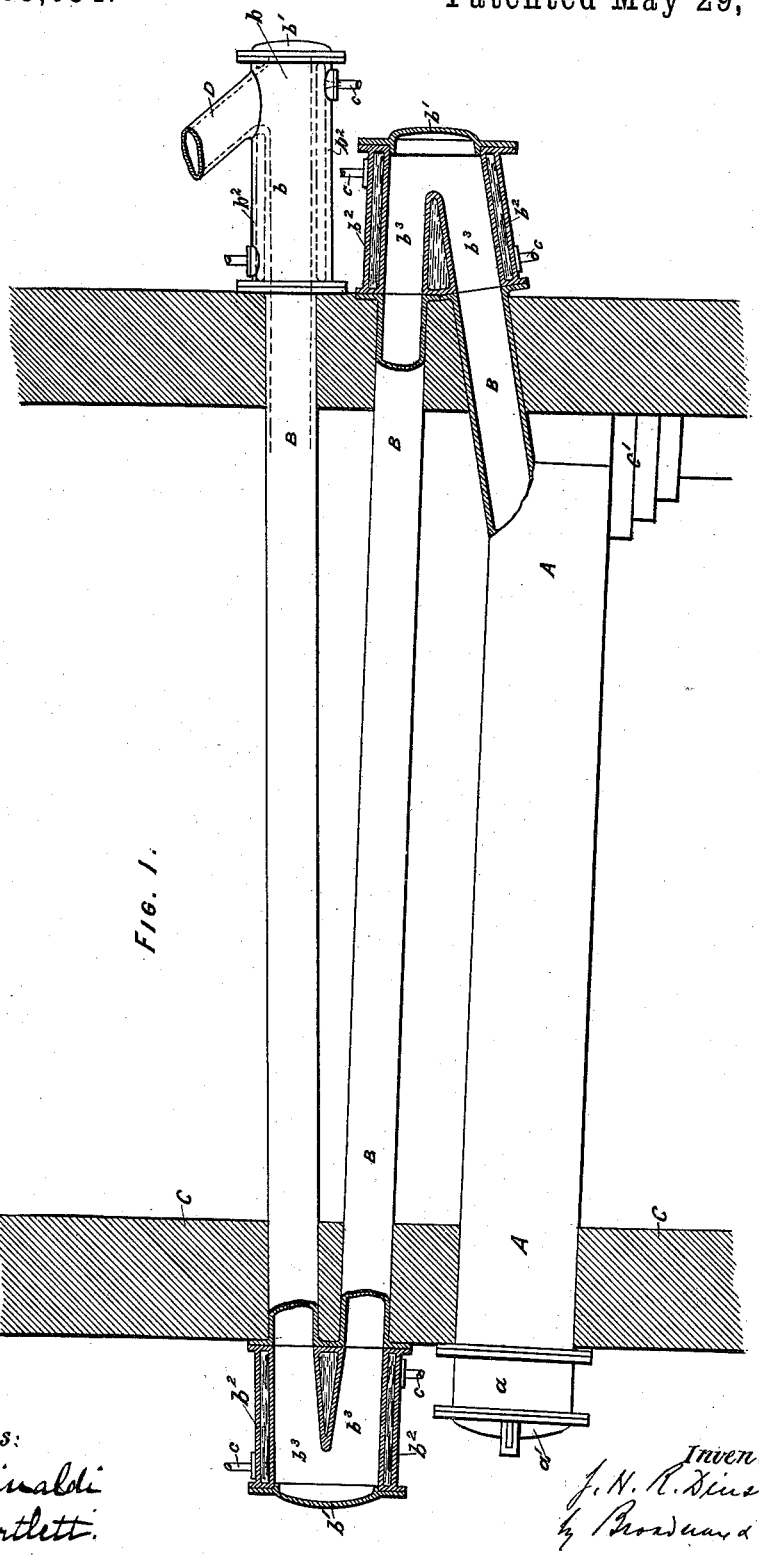

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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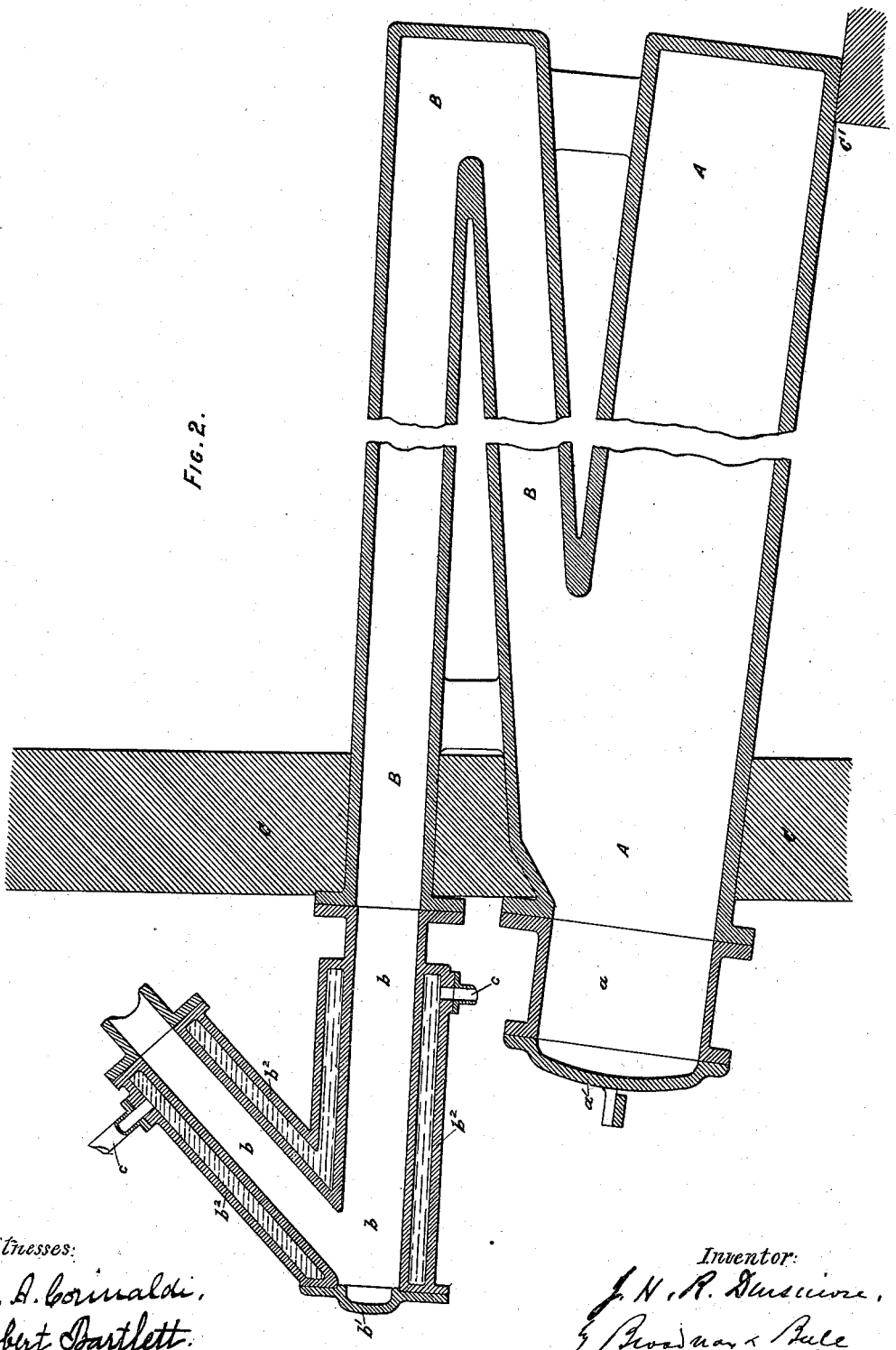
FIG. 2.



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UNITED STATES PATENT OFFICE.

JOHN H. R. DINSMORE, OF LIVERPOOL, COUNTY OF LANCASTER, ENGLAND.

PROCESS OF MANUFACTURING ILLUMINATING-GAS FROM COAL.

SPECIFICATION forming part of Letters Patent No. 383,634, dated May 29, 1888.

Application filed January 4, 1888. Serial No. 259,803. (No model.) Patented in Belgium September 28, 1887, No. 79,022.

To all whom it may concern:

Be it known that I, JOHN HENRY RICHARDSON DINSMORE, a subject of the Queen of Great Britain, residing in the city of Liverpool, in the county of Lancaster, England, have invented certain Improved Processes for the Manufacture of Illuminating-Gas from Coal, (for which a Belgian patent, No. 79,022, dated September 28, 1887, has, with my consent, been obtained,) of which the following is a specification.

This invention relates to the manufacture of illuminating-gas from coal in closed vessels or retorts, but more particularly to those processes of manufacturing illuminating-gas in which it has been proposed to render permanent, practically, all the heavy or tarry vapors, as well as the light volatile products given off from coal by distillation and useful for the production of light and heat. To obtain this result, double or multiple retorts have been proposed, in which the gas distilled in one retort was to pass through a second or third retort, such retorts being arranged and constructed in various ways and forms.

My present invention has for its object, chiefly, to effect the results abovementioned; to produce a large volume of gas of a higher illuminating power than is generally produced at gas-works, and at the same time to avoid the deposition of carbon or pitch in the ascension-pipes of gas-retorts, or at any parts of the retorts themselves that cannot be readily removed, and so avoid these and other disadvantages attending or incident to the ordinary and other processes heretofore proposed of gas-manufacture; and this I effect preferably in the manner I will now proceed to describe.

The coal is distilled by heat in a retort and passed through a heated inclined duct or ducts, and is, either at the termination of the heated duct or ducts or at certain points before it reaches such termination, passed over artificially-cooled surfaces, such as cooled passages, but whether there is employed a plurality of cooled surfaces or only one at the mouth or termination of the duct the effect is that the tarry products or vapors are condensed and arrested, and, through the ducts being inclined gravitate down them, are converted into permanent gas. It is obvious that in the case when a plurality of cooled surfaces exist, and such cooled surfaces are placed at certain points in the heated ducts, a more extended cooling and reheating effect is obtained—that is to say, whereas in the case of the one cooled surface the tarry vapors are condensed and gravitate back into the heated duct, and being so heated are converted into gas, that in the other case of the plurality of cooled surfaces the gas is subjected to a plurality of cooling and heating effects, and thereby the latter mode of treating the gas is more efficient for distilling coal, from which a large quantity of heavy or tarry vapors is given off, than the former; but of course it is quite as efficient for distilling coal from which only a small quantity of tarry vapors is given off.

The cooling surfaces may consist of passages through which the gas passes, such passages being kept in a cool state by causing water or cold air to pass over them, or they may consist of tubes or hollow bodies placed within passages through which the gas passes.

Having thus specified generally the object or objects and nature of the invention, its description will first be proceeded with, in reference to the drawings, by way of explaining more fully the construction of apparatus and operation and effects according to the invention.

The drawings and the following description of them set forth a special apparatus designed to apply to the processes of manufacturing gas, the mode of operation of which has been above explained.

In the drawings, Figure 1 is a sectional elevation of apparatus, according to this invention, having a plurality of cooled passages. Fig. 2 is a sectional elevation of apparatus, according to this invention, having a single cooled passage.

With reference, in the first instance, to Fig. 1 of the drawings, A is the retort, in which the coal is distilled in the usual manner. B are ducts, of any suitable material, arranged at an incline, and through which the gas passes after leaving the retort A. b^3 are cooled passages interposed in the ducts B, each having a jacket, b^2, and a door, b'. D is the exit or ascension-pipe, and b is the mouth of the duct, which is also cooled and provided with a jacket, b^2. The mouth b and the passages b^3 of the ducts B are provided with inlet and outlet pipes c,

through which water or cold air is led to and from the space between the jacket b^2 and the metal of the mouth b or passages b^3. a is the retort-mouth, and a' is the retort-door. The temperature to which it is preferred to heat the ducts and retorts in all cases is that denoted by a clear cherry-red color.

With reference to Fig. 2 of the drawings, it will be seen that this figure illustrates a retort in which only one cooled passage is employed—namely, the mouth b, which is provided with a door, b', and a jacket, b^2. The cooling fluid is led to and from the space between the jacket b^2 and the metal of the mouth b in the same manner as set forth with reference to Fig. 1.

The apparatus set forth with reference to Fig. 2 is suitable for those kinds of coal from which the volume of heavy or tarry vapors given off is not very large. For those kinds of coal from which the volume of heavy and tarry vapors is large the apparatus set forth with reference to Fig. 1 is more suitable. The reason for the particular applicability of the respective apparatus has been to some extent stated; but it is more fully explained below in this specification.

It will be observed that the ducts B are smaller than the retort A, the proportion shown in the drawings being one from which good results may be obtained.

The setting or support of the retorts is shown in the figures, and consists of a front wall, C, and pedestal C'. When set in a bench in the usual manner, the retorts A subject to the greatest heat would be shielded by brickwork or slabs of fire-brick throughout their length or at intervals, as in ordinary practice. Any required number of retorts may be set in a bench in the usual way; but care must be taken that they are arranged in such a way that the temperature of all shall be about equal, as in ordinary practice.

As above stated, the temperatures of the retorts are worked at that denoted as a clear cherry-red color. I have found that retorts having a duct or ducts, B, through which the gases are passed after leaving the distilling-retort A, and heated to the temperature specified, effect the best results—that is, the luminous qualities, combined with the volume of gas obtained from a given quantity of coal, give together a more valuable product than by using other temperatures.

It will be observed that each retort A, with its duct or ducts B, is an independent complete gas-making apparatus having no valves and comprising a plain receptacle and open ducts, and direct access can be had to the retort A and ducts B from the doors a' and b', and through these apertures the whole of the interior can be scraped and cleaned, and any deposited carbon or other matter adhering to the interior surfaces of them can be removed.

The mode of operation of manufacturing gas I will now proceed to describe. The coal is placed in the retorts A and distilled by heat in the usual way. The gas evolved from coal leaves the retort and passes through the heated duct B. In the condition the gas leaves the retort A it would not all be permanent; but in passing through the ducts B it is subjected to the heat of those ducts, and is thereby practically all rendered permanent. When the gas comes in contact with or under the influence of the cooled passages b^3 or b, that portion of the tar or tarry vapors existing in the gas in a non-permanent state is condensed and arrested, and the tar, being in a fluid state, will, owing to the inclination of the ducts, flow backward down them. As soon as the tar comes in contact with the hot surfaces of the ducts B, it is converted into gas.

In the case where the coal is being distilled in the retorts shown in Fig. 1 the effect will be an extension or repetition of the effect produced when making gas in apparatus shown at Fig. 2—that is, the gas coming from the retorts A is subjected to heat three times and a chilling influence three times; hence in the latter case the gas resulting from the evaporation of the tar condensed in the first cooled passage b^3 flows down the lowest duct B and is so converted into gas; but instead of going straight to the ascension-pipe D it is subjected to the heat of the remaining two ducts B, and is so rendered permanent, and in like manner the tar in the gas not condensed by the first cooled passage b^3, or still in a non-permanent condition, will be condensed by the following one, and is treated in a like manner, the manner set forth more particularly with reference to Fig. 2.

By subjecting the gas to heat and chilling effects in the manner herein described after it has left the distilling-retorts, the tar or tarry vapors are arrested, and through the ducts leading from such retorts being arranged at an inclination to the horizontal plane, as set forth, the tar flows down them and is, through the heat of such ducts, converted into permanent illuminating-gas.

Many modifications in the apparatus and the specific details of the steps described herein may obviously be made without departing from either the spirit or scope of my present invention.

The points of novelty in my invention will be designated in the claims concluding this specification.

I would state, in conclusion, that I am aware that prior to my invention it has been proposed to pass gas made from coal in a retort through heated second retorts or ducts, and that it has also been proposed to arrange the main distilling retorts at an inclination to the horizontal plane. I therefore make no claim to such mode generally of making illuminating-gas or to the arrangement of such retorts; but

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

1. The process substantially herein described, which consists in subjecting gas after

it is distilled to contact with a chilled surface composed of a material inert in the presence of said gas, for the purpose of condensing and arresting the less permanent particles, and subsequently reheating and gasifying said particles and also reheating said gas.

2. The process substantially herein described, which consists in subjecting gas after it is distilled to contact with a chilled surface composed of a material inert in the presence of said gas, for the purpose of condensing and arresting its less permanent particles, and then causing said particles to flow under the influence of gravity into contact with a heated surface and gasifying the same, and also causing said gas subsequently to pass in contact with a heated surface composed of a material inert in the presence of said gas.

3. The process substantially herein described, which consists in distilling coal and converting the distillation into a fixed gas by alternately cooling and heating the same and returning the condensed portions into contact with a heated surface and thereby gasifying the same.

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