(No Model.) 4 Sheets—Sheet 1.

J. H. R. DINSMORE.

PROCESS OF MANUFACTURING GAS.

No. 413,177. Patented Oct. 22, 1889.

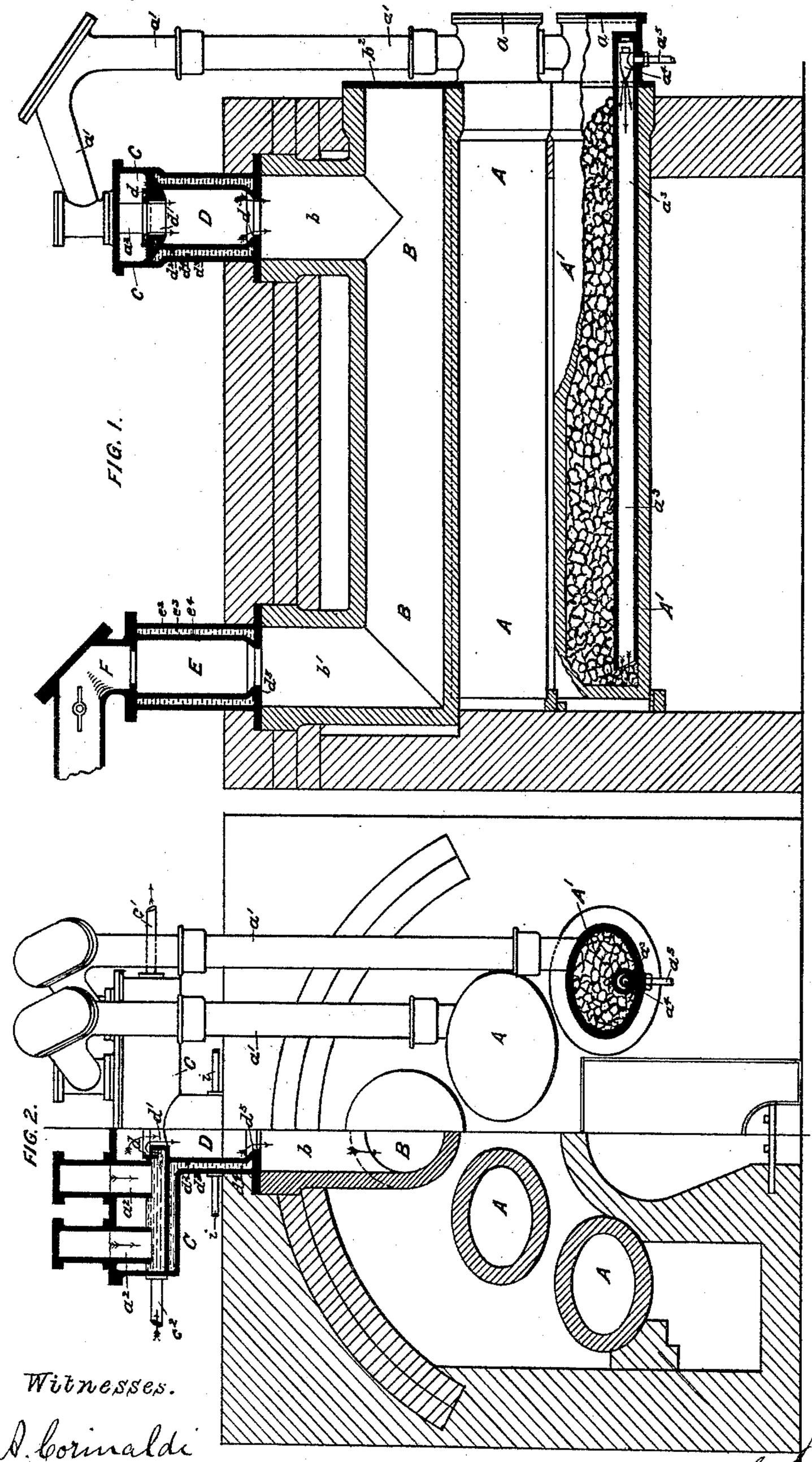

FIG. 1.

FIG. 2.

Witnesses.

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(No Model.) 4 Sheets—Sheet 2.

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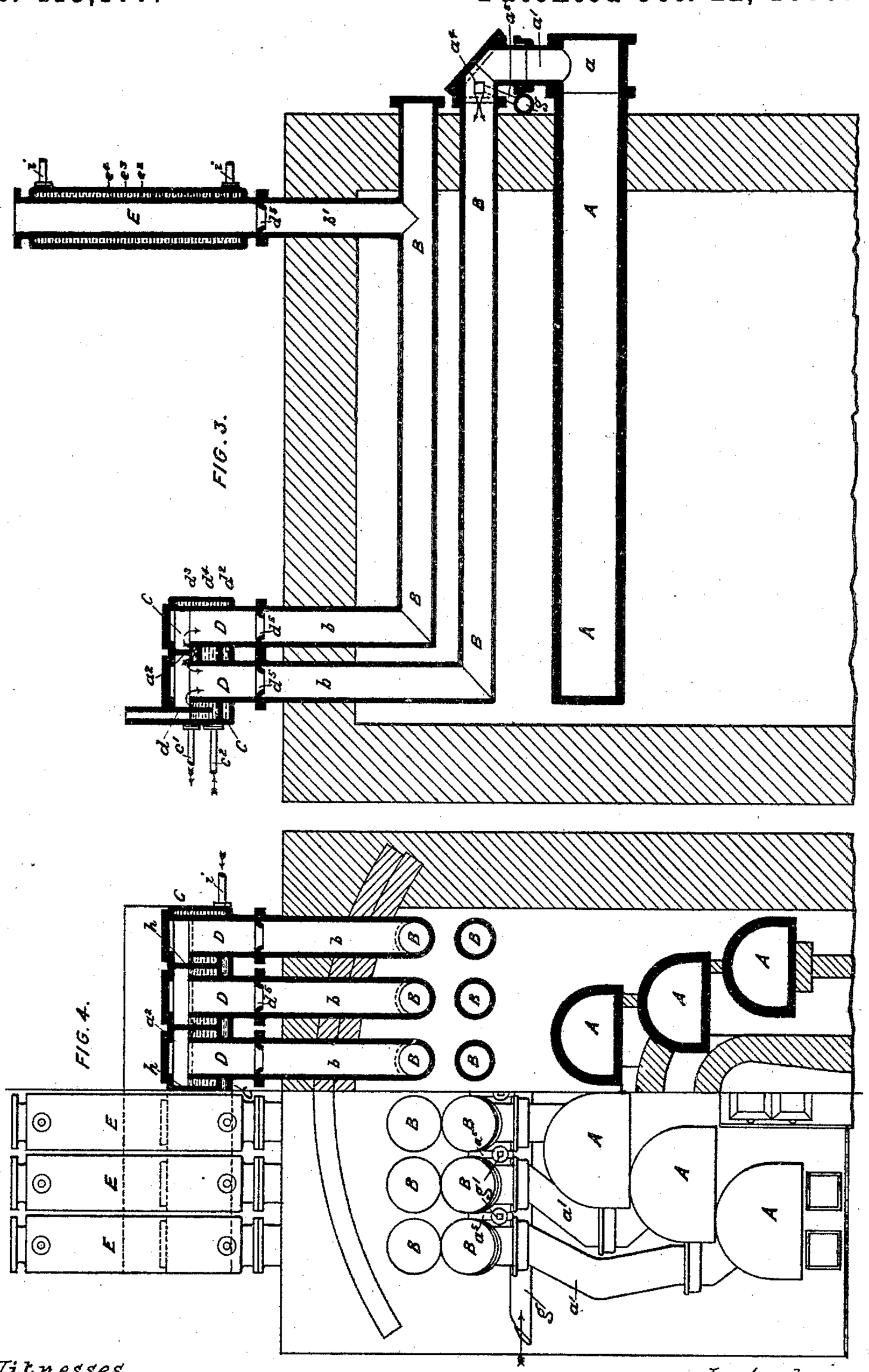
PROCESS OF MANUFACTURING GAS.

No. 413,177. Patented Oct. 22, 1889.



Witnesses.

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(No Model.) 4 Sheets—Sheet 3.

J. H. R. DINSMORE.

PROCESS OF MANUFACTURING GAS.

No. 413,177. Patented Oct. 22, 1889.

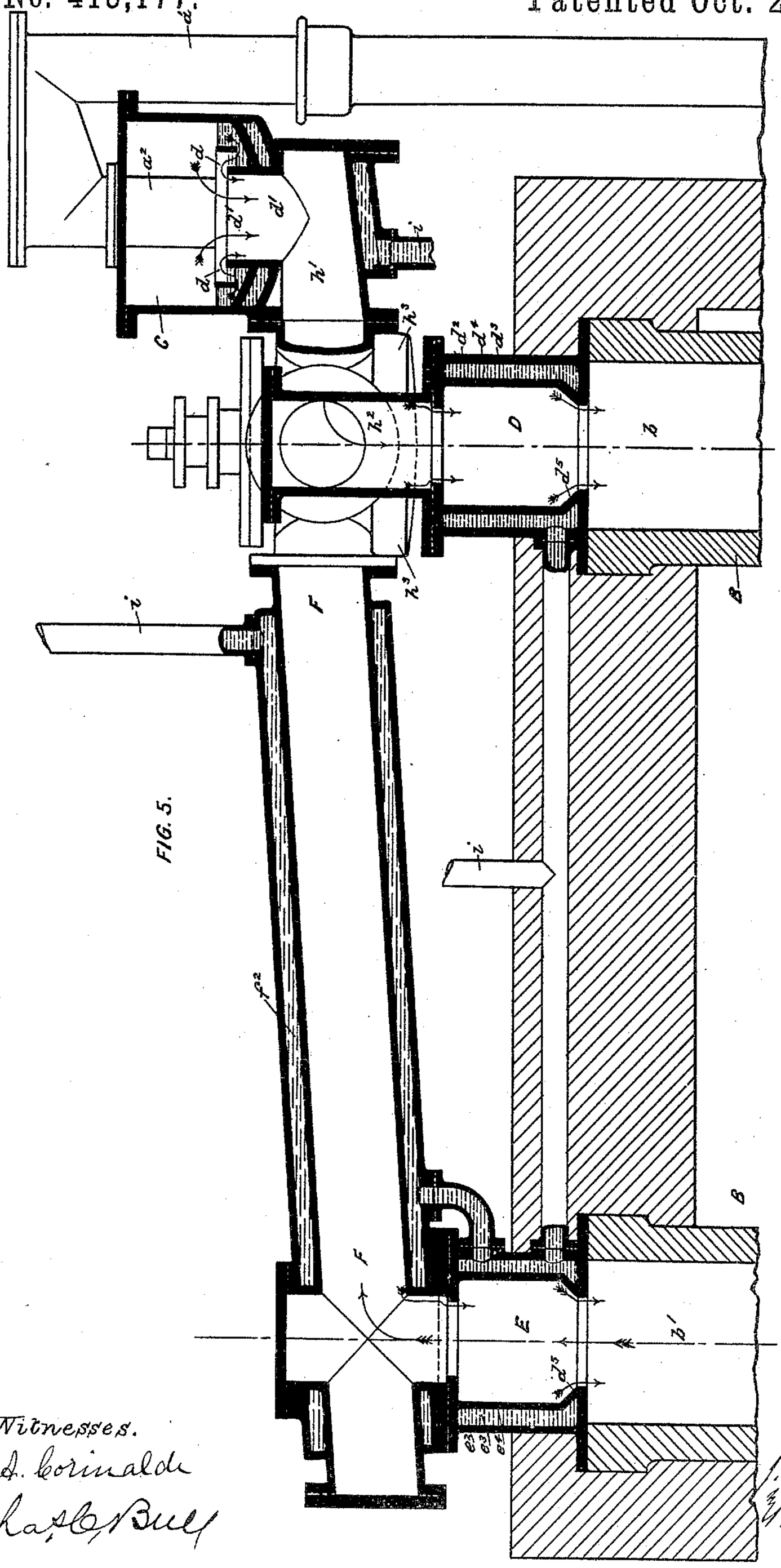

FIG. 5.

Witnesses.
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(No Model.) 4 Sheets—Sheet 4.

J. H. R. DINSMORE.

PROCESS OF MANUFACTURING GAS.

No. 413,177. Patented Oct. 22, 1889.

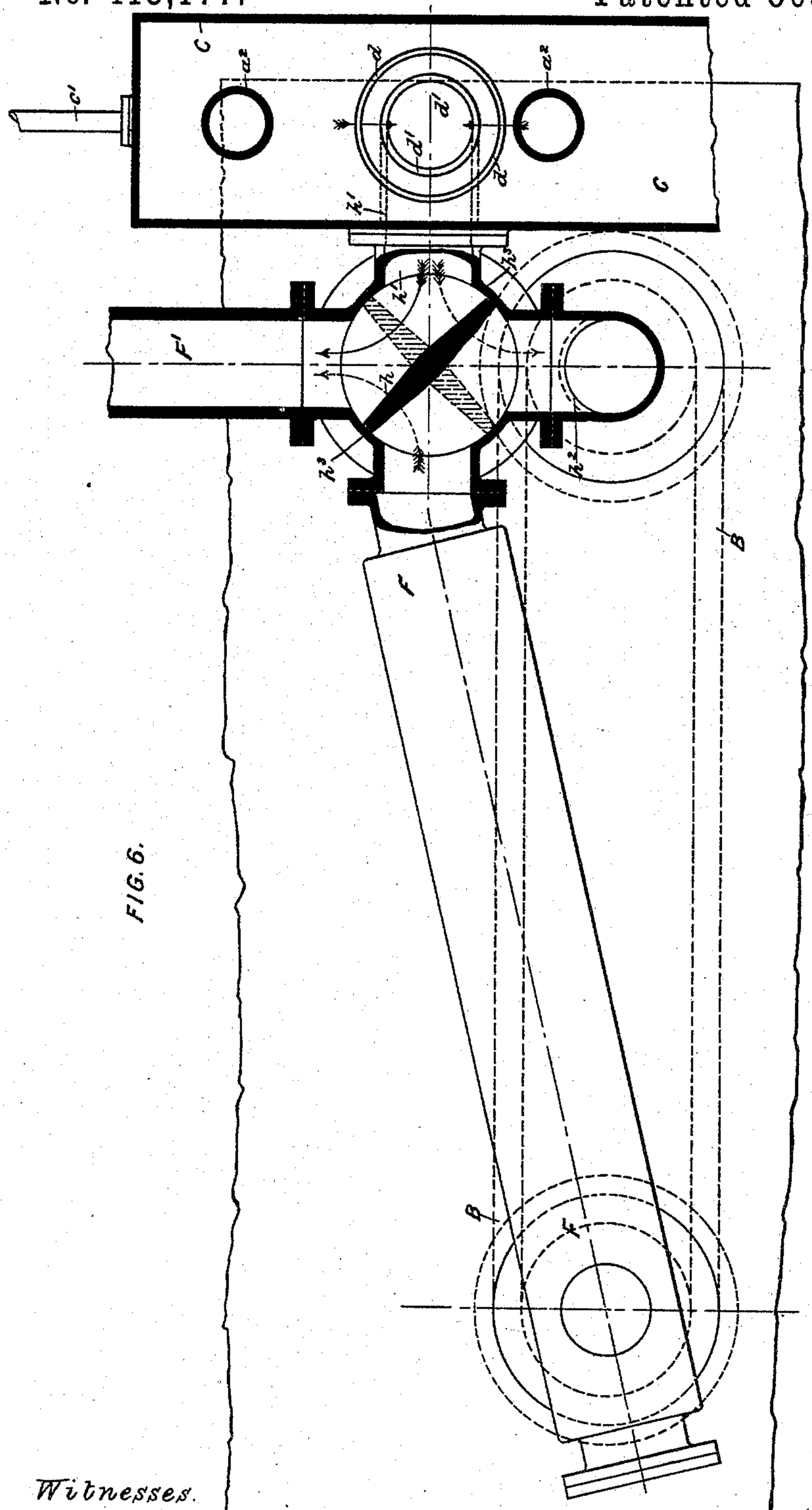

FIG. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN HENRY RICHARDSON DINSMORE, OF LIVERPOOL, COUNTY OF LANCASTER, ENGLAND.

PROCESS OF MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 413,177, dated October 22, 1889.

Application filed July 18, 1888. Serial No. 280,308. (No model.) Patented in in France July 17, 1888, No. 191,851; in Belgium July 18, 1888, No. 82,605; in Spain October 2, 1888, No. 8,519; in Canada November 16, 1888, No. 30,201, and in Austria-Hungary January 13, 1889, No. 29,683 and No. 49,982.

To all whom it may concern:

Be it known that I, JOHN HENRY RICHARDSON DINSMORE, a subject of the Queen of Great Britain, and a resident of Liverpool, county of Lancaster, England, have invented a certain Process of Manufacturing Gas, (for which I have obtained Letters Patent in France July 17, 1888, No. 191,851; in Belgium July 18, 1888, No. 82,605; in Spain October 2, 1888, No. 8,519; in Canada November 16, 1888, No. 30,201, and in Austria-Hungary January 13, 1889, No. 29,683 and No. 49,982,) of which the following is a specification.

This invention relates to the manufacture of illuminating-gas from coal or analogous substances in closed vessels or retorts, and more particularly to those processes of manufacturing illuminating-gas by which it is or has been proposed to render permanent practically all the heavy or tarry vapors or liquids, as well as the lighter products given off from the coal by distillation, and to so make them useful for the production of light and heat. For instance, it has reference to that type of processes of making illuminating-gas set forth in the specification of Letters Patent of the United States No. 383,634, granted to me.

My present invention has mainly for its object, among other things, to convert the tar or tarry vapors or liquors given off from or resulting from the manufacture of gas from coal into permanent gas.

My invention consists of certain steps and combinations of steps constituting novel processes of manufacturing illuminating-gas from coal and analogous substances.

The following is a description of the manner in which I prefer to practice my invention.

The several and specific features of novelty which I desire to protect by these Letters Patent will be pointed out in the claims concluding this specification.

Coal is distilled from heat in the ordinary way, and from the gas evolved a portion of its tar and condensable matters—such as ammoniacal vapors—are separated. The lighter and heavier matters thus arrested are also separated, so that the tar may be subsequently converted into a fixed gas and the lighter matters discarded. The gas is then artificially cooled, whereby further quantities of the tar and other condensable matters in it are arrested and separated from it. The gas is then heated, and thereby the greater part of the non-permanent portion of it is rendered permanent. The gas is then again artificially cooled, and the greater portion of the tarry or non-permanent vapors still existing in it are condensed and arrested. The tarry matters separated from the gas are suddenly brought in contact with a highly-heated refractory material or surface, by means of which they are converted into gas, in the presence of freshly-distilled gases, while they are being fixed. I have found that if tar be brought suddenly into contact with a highly-heated surface—that is, directly onto a red-hot surface—nearly the whole of the tar is converted into permanent illuminating-gas; but if the tar be allowed to flow over a surface of gradually-increasing heat, or one not at a red heat, to one that is red hot, the greater part of the tar will not be distilled or gasified, a large proportion of it being deposited as pitch upon that part of the gravitating surface which is not red hot. A suitable temperature to and at which the retorts and duct may be heated and worked is that denoted by a clear cherry-red color, known in gas-making as a "medium temperature."

In the main leading to the reservoir, and also in the process of washing and condensing, a certain quantity of tar will be removed from the gas. This tar I also bring back and convert it into gas in the manner above described.

Preferably the tar is introduced into the fixing-retort at the entrance end, where it is made into gas, which gas then passes through the fixing-retort to make it permanent, and then passes out of the exit end of the fixing-retort, when it is immediately cooled by artificial means, such as passing through a water-jacketed pipe.

The ammoniacal liquor is separated from the tar, as above described, in order to prevent the temperature of that portion of the heated surface onto which the tar drops from falling below that necessary to gasify it all or nearly all. Were the ammoniacal liquor admitted with the tar this end might not be so effectively obtained, as the extra quantity of liquor to be gasified or vaporized would materially reduce the temperature of the surface at the said part on which it would fall.

The gas resulting from the process of manufacture thus far described would, if made from ordinary bituminous gas-making coal—such as that known as "Lancashire" or "Yorkshire" coal or cannel—possess an illuminating power equal to about twenty-three candles, and the volume of permanent or fixed gas produced per ton of coal would be from about twelve thousand to thirteen thousand cubic feet, this quality of gas being higher than is desired by most gas-manufacturers. Now, the excess of illuminative properties above that required I turn to that which is more a desideratum to gas-makers—namely, an increase of volume per unit of coal. This I do by admixing hydrogen, water-gas, or other diluent gas with the coal-gas to such an extent as to reduce its illuminative qualities to that required, and by subsequently reheating and artificially cooling said mixed gases. If the quality of gas required be equal to, say, seventeen candles, the volume will be increased to about seventeen thousand cubic feet. Thus the quantity of water-gas added would be four thousand cubic feet.

The accompanying drawings illustrate examples of apparatus by means of which the manufacture of gas according to this invention may be conveniently and successfully conducted.

Referring to said drawings, Figure 1 shows in sectional elevation an apparatus by means of which the manufacture of gas herein specified may be carried on. Fig. 2 is an end view, partly in section, of the apparatus shown in Fig. 1. Fig. 3 shows a modified arrangement of the apparatus illustrated in Figs. 1 and 2; and Fig. 4 is an end view, partly in section, of this apparatus. Figs. 5 and 6 are respectively a sectional elevation and a plan of a slightly-modified form and arrangement of the parts connected by a heated duct and illustrated in Figs. 1 and 2.

Throughout the figures of the drawings like figures and letters are used to denote like or corresponding parts of the apparatus.

The retorts A are fitted to produce coal-gas. In A′, by the introduction of steam, water-gas may be produced. These open severally into the hydraulic main C, whose downwardly-extending exit D, through which the mingled gas passes, is water-cooled and provided, as shown, with a trap which permits the heavier tar to pass out with the gases into the fixing-retort B. The tar is deposited from the gases in the chambers C and D and in the exit E, which is also water-cooled. The pipes are arranged so that the tar collected in the chambers C, D, and E falls directly upon the red-hot surface of the fixing-chamber. The lighter materials deposited in the chamber C are led off through the overflow-pipe c'. The tar deposited in the main leading to the reservoir is returned to the chamber C by the pipe c^2, emptying into the chamber.

In the modifications shown in Figs. 3 and 4 there is a separate fixing-chamber for each retort, and the gas is passed through a heated chamber before it passes through the cooled chamber D D. A four-way valve may be added to permit cutting out the fixing-retort when it is to be cleaned, as is fully shown in Figs. 5 and 6.

A fuller description of the annexed drawings will be found in my pending application bearing Serial No. 280,309, filed on even date herewith, to which reference is here made.

I do not specifically claim in this patent the apparatus illustrated in the accompanying drawings and briefly above described, as said apparatus and mechanism, as distinguished from the method or process, is made the subject-matter of said pending application bearing Serial No. 280,309.

Having thus described the manner in which I prefer to practice my invention and an apparatus adapted to that purpose, what I claim, and desire to secure by Letters Patent, is—

1. The process of utilizing the tar deposited from the gases produced from coal or analogous substances, consisting in artificially cooling said gas and thereby condensing both the lighter and heavier liquids carried therewith, collecting the liquids thus condensed, separating the tar from the lighter liquids of condensation, reheating and fixing said gas, and revaporizing said tar in the presence of said gas while it is being fixed, and subsequently cooling said combined gases.

2. The process of utilizing the tar deposited from the gases produced from coal or analogous substances, consisting in mixing said gas with water-gas or other diluent gas, artificially cooling said combined gases and thereby condensing both the lighter and heavier liquids carried therewith, collecting the liquids thus condensed, separating the tar from the lighter liquids of condensation, reheating and fixing said combined gases, and revaporizing said tar in the presence of said gases while being fixed, and subsequently cooling said combined gases.

3. The process of utilizing the tar deposited from the gases produced from coal or analogous substances, consisting in cooling said gas, collecting the tar thus condensed, reheating and fixing the said gases, and revaporizing said tar in the presence of said gas while being fixed by subjecting it while chilled suddenly to the action of a cherry-red heat without its coming in contact with surfaces below said heat.

4. The process of utilizing the tar deposited

from the gases produced from coal or analogous substances, consisting in condensing and separating from said gas the tar carried thereby, reheating and fixing said gas, revaporizing said tar in the presence of the gas while being fixed by subjecting it while chilled to the action of a cherry-red heat without its coming in contact with surfaces below said heat, and subsequently passing said tar-gas through a heated retort to fix it.

JOHN HENRY RICHARDSON DINSMORE.

Witnesses:
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