

(No Model.)

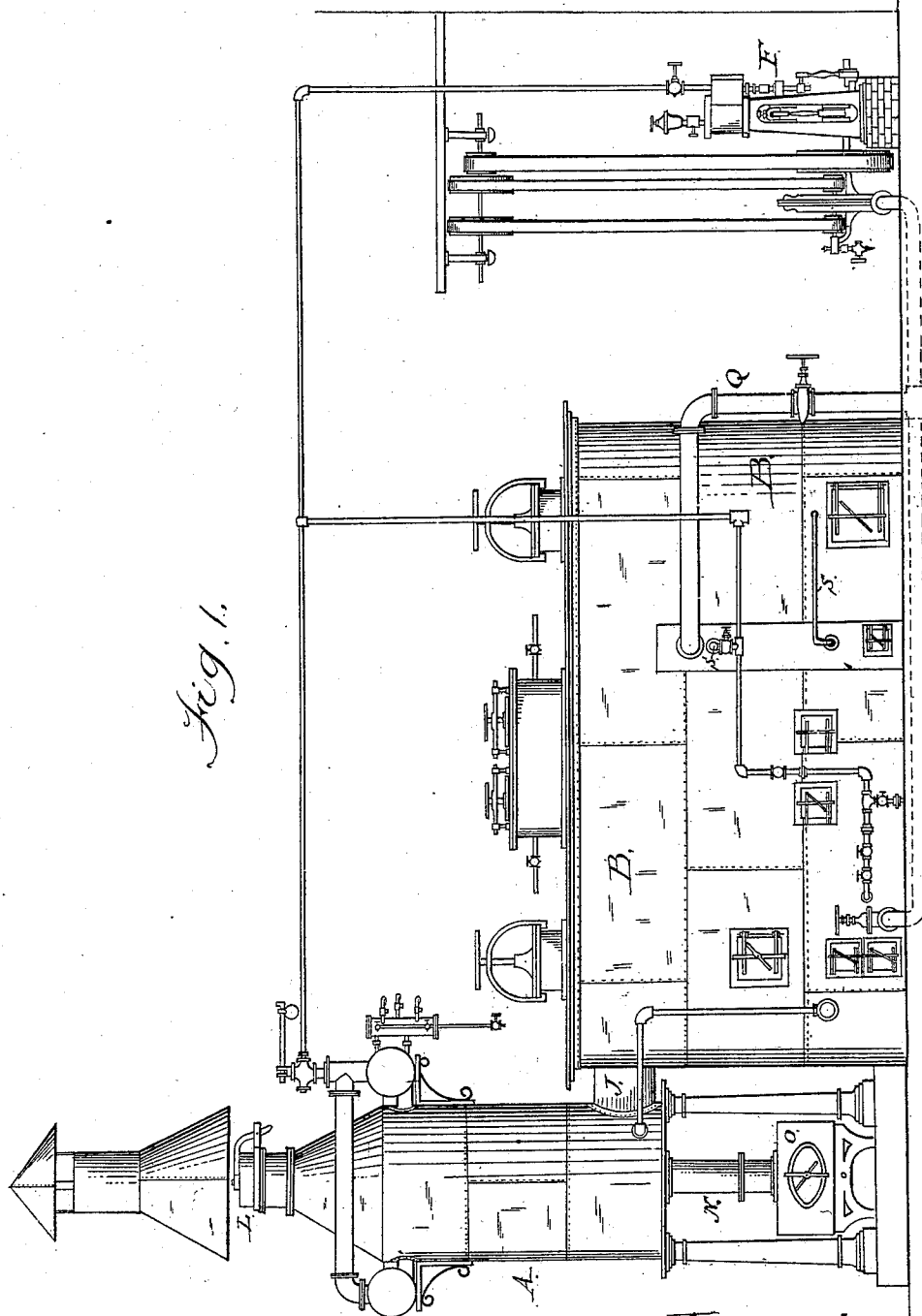
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J. HANLON, J. E. LEADLEY, & S. GIBBS.

PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

No. 273,230.

Patented Feb. 27, 1883.



Attest;
S. Walter Fowler,
Wm. A. Schenborn

Inventors
John Hanlon
James E. Leadley
Silas Gibbs
Per Atty. A. N. Evans & Co.

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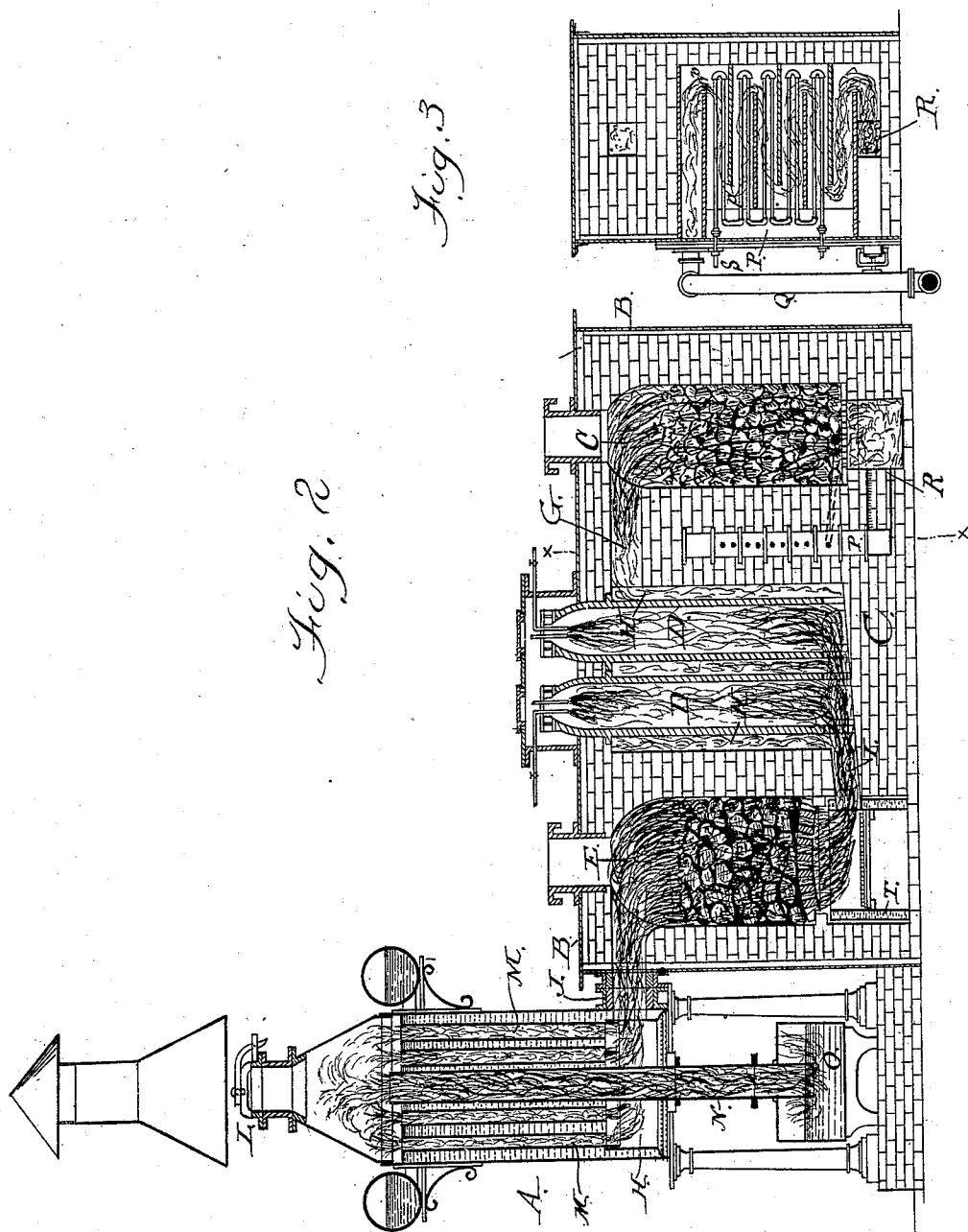
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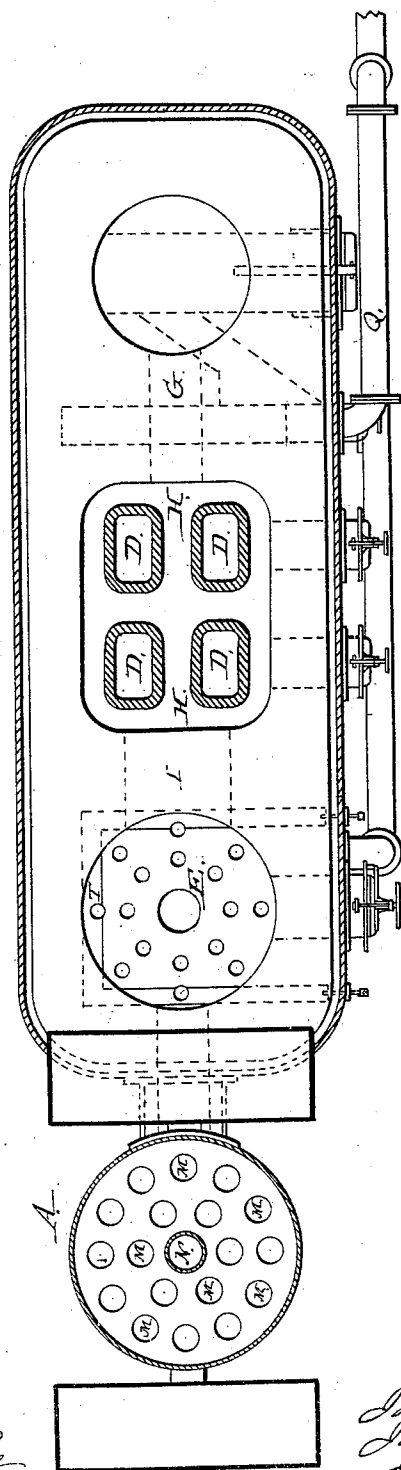
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Fig. 4.



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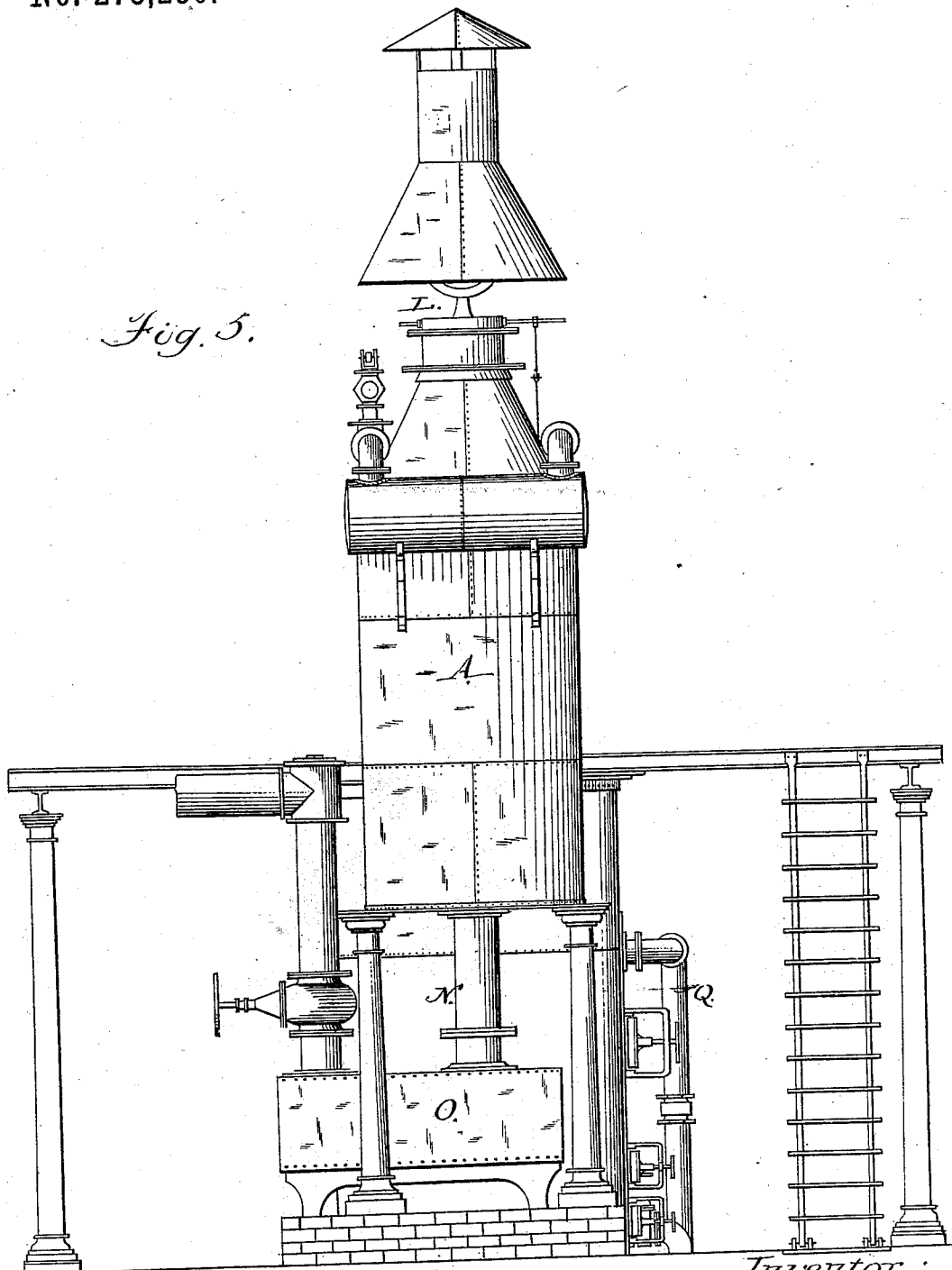
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Fig. 5.



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UNITED STATES PATENT OFFICE.

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PROCESS OF AND APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 273,230, dated February 27, 1883.

Application filed December 22, 1882. (No model.)

To all whom it may concern:

Be it known that we, JOHN HANLON, of New York, N. Y., JAMES E. LEADLEY, of Camden, New Jersey, and SILAS GIBBS, of Warren County, New Jersey, have invented certain new and useful Improvements in the Processes of and Apparatus for Manufacturing Gas, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a front elevation of a gas apparatus with our improvements attached. Fig. 2 is a vertical section through the same. Fig. 3 is a transverse section through *xx*. Fig. 4 is a horizontal section. Fig. 5 is an end view of the apparatus.

Our invention relates primarily to the production of illuminating-gas, but it may be economically applied to the production of other gases; and it consists in certain processes and in certain combinations of devices, as herein-after explained and claimed.

To enable others skilled in the art to make and use our invention, we will proceed to describe the exact manner in which we have carried it out.

In the drawings, A represents a boiler; B, the casing, inclosing the generator C, the retorts D, and the purifier E, as shown in Fig. 2. F is the ordinary pump connected with the apparatus.

The casing B is provided with the necessary openings or doors for conveniently reaching all parts of the apparatus.

Below the generator C is the necessary fire-box for heating the generator, which is charged with coke or other suitable material, and to which a blast is applied in any of the well-known ways. From the upper portion of the generator a passage, G, leads to the chamber H, surrounding the retorts D, and wherein the retorts are heated by the heat and gases passing from the generator. The retorts D receive through their top supply-pipes for the hydrocarbons which are vaporized in their descent and are taken up at the bottom by the passing hydrogen or water gas, and after commingling the gases are carried forward through the passage I to the purifier E, this passage entering the purifier at or near its bottom.

We are aware of the use of hydrate of lime as a purifying medium, both independently of the generating of gas and in connection therewith by the utilization of the waste heats from a gas-generator, to burn out from the hydrate of lime the impurities gathered by it from the gas. An essential feature in our new process and apparatus is to produce within the apparatus itself the lime by means only of the waste heat by charging the purifier with limestone or oyster-shells, and reducing the same to quicklime, thereby not only making the purifier in a manner automatic, but creating a novel limekiln for the continuous production of lime for general purposes.

It is evident from this description of our invention that the waste heat and gases constantly passing from the generator will convert the purifier into a valuable kiln for the production of lime, and at the same time the gas will be superheated, fixed, and purified by its passage through the lime thus produced.

From the top of the purifier a passage, J, leads to the vertical boiler A, through which the gases and the escaping products of combustion pass. A cap, L, fits on the top of the boiler, and when this cap is raised, as shown in Fig. 5, the heat and escaping products of combustion pass up through the flues M and out into the air; but when the cap of the boiler is closed, as shown in Fig. 2, there is no escape from the top of the boiler, and all the heat and heated gases are forced downward through the central flue, N, to the water-seal O, situated below the boiler, and thence to suitable holding-tanks.

It is evident from this description of the apparatus and boiler that the boiler is heated up by the passage of the waste gases and the escaping products of combustion up through the flues M and out into the air during the application of the blast for heating the generator, and when the blast is temporarily or periodically discontinued. While the gas is being generated, and the cap J of the boiler closed, the heat will be kept up by the hot gases passing up through the flues M of the boiler and down through the central flue, N, to the water-seal O below, thereby securing a constant supply of heat to the boiler.

We make no claim herein for the construc-

tion of this boiler, as it will be the subject of a separate application.

It has been customary heretofore in gas apparatus designed for the manufacture of carbureted-hydrogen gas to introduce the hydrocarbons directly into the generator; but this plan or method is objectionable, as a large amount of the carbon is destroyed by the heat, and lamp-black and other impurities result therefrom. One purpose of our present invention is to overcome these objections, and to that end we introduce the hydrocarbons at the top of the independent retorts D. These retorts become properly heated during the blast for heating up the generator, and the passage of the hot hydrogen gas keeps the retorts at a proper temperature for vaporizing the hydrocarbon as it descends through the retorts to the bottoms, to be taken up by the hydrogen gas and carried forward to the purifier. The purifier not only takes up any sulphur or other impurities left in the gas when it leaves the generator C, but it also acts most efficiently as a superheater to decompose any particles of the hydrocarbons or steam which may have escaped decomposition in the generator and retorts.

In the operation of our apparatus the blast is alternately applied and shut off. It is applied to heat up, and it is shut off when the gas is being manufactured. In practice, the blast is usually applied for fifteen or twenty minutes, or more, and then, being shut off, the steam is admitted into the generator and the hydrocarbons into the tops of the retorts by means of the usual pipes and stop-cocks. During this part of the operation the cap of the boiler is closed, and this is continued for about twenty minutes, when the blast is again applied to raise the heat and to burn out any sulphur or other impurities which may have been taken up by the lime in the purifier.

As occasion may justify it, a portion or all of the burned lime is withdrawn from the bottom of the purifier and replaced by limestone or oyster-shells supplied at the top.

In order to heat the air-blast and superheat the steam before their admission to the generator, we place a single heating-chamber, P, having shelves *p* with openings alternately at opposite ends and forming a zigzag flue in the body of the masonry and within the casing B. The steam-pipe S passes in a return-bend coil through chamber P, and is connected at the bottom with the base of the generator. The air-blast passes through pipe Q into this heating-chamber, where it is heated up before it passes to the generator through the passage R. When the air-blast is shut off from the heating-chamber P, by closing the pipe Q the steam-pipe S is opened and steam is admitted to the chamber P, where it is superheated and dried, preparatory to entering the generator and coming into contact with the fuel.

In order to furnish the boiler A with a constant supply of warm water, and to that extent facilitate the generation of steam, we pass the water-supply through a water-jacket, T, surrounding the fire-box beneath the purifier E, as shown in Figs. 1 and 2. This construction of our apparatus results in a great saving of fuel and facilitates the generation of steam.

Having thus described our invention, what we claim as new, and desire to protect by Letters Patent, is—

1. In the manufacture of gas, the method herein described of producing and utilizing within the apparatus the purifying medium, which consists in charging the purifying-chamber with carbonate of lime, and alternately burning it by the heat of the waste gases from the generator arising from the introduction of air and absorbing impurities from gas resulting from the decomposition of steam by passing such gas through the freshly-burned lime.

2. In an apparatus for the manufacture of gas, the generator, the chamber H, and connecting-flue G, in combination with the vertical retorts having hydrocarbon-supply pipes at the top and openings at the bottom into chamber H, whereby the retorts are heated by waste heat from the generator, and the hydrocarbon is vaporized by passing down through the retort and mingled with the gas from the generator.

3. In an apparatus for the manufacture of gas, the combination of a generator, the retorts, the purifier, the steam-boiler, and connecting-flues, as described, whereby the retorts, purifier, and boiler are heated by waste heat from the generator.

4. In an apparatus for the manufacture of gas, the vertical retorts having oil-inlet pipes at the top and outlet-openings at the bottom, in combination with the inclosing-chamber, the generator having connecting-flue at the top, and the purifier having a connecting-flue at the bottom, all arranged in one structure, for the purpose described.

5. In a gas-producing apparatus, the single superheater arranged in the wall thereof and provided with a zigzag flue, in combination with the steam-pipe passing through it, the connected air-inlet pipe, and the connections with the generator, whereby the blast is heated and the steam is superheated before they enter into the generator, for the purpose set forth.

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Witnesses to John Hanlon's signature:
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