(No Model.) 2 Sheets—Sheet 1.

A. M. MACE.

GAS RETORT AND FURNACE.

No. 345,437. Patented July 13, 1886.

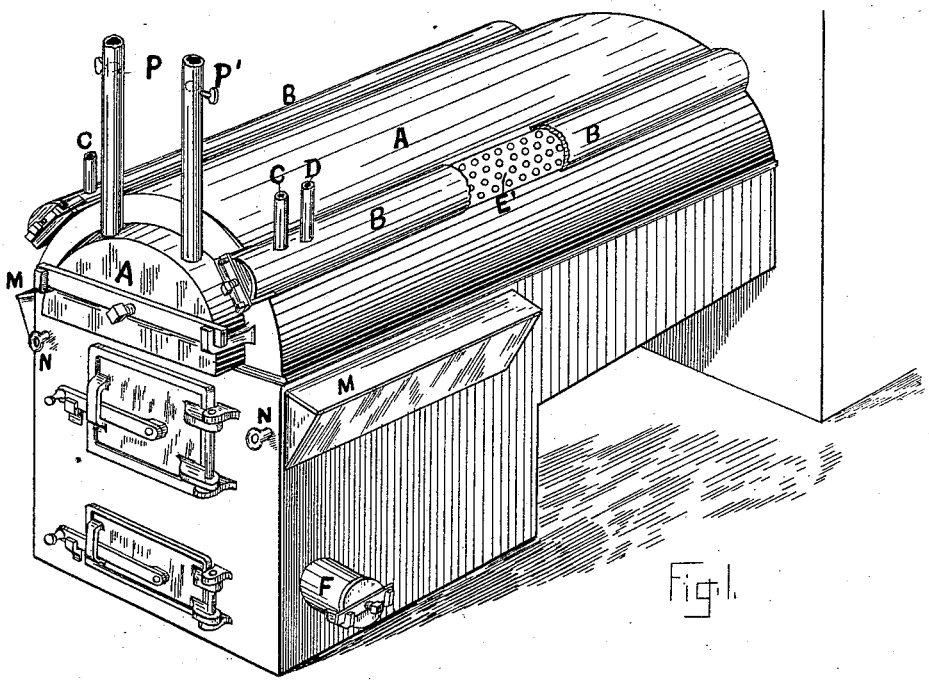

Fig. 1.

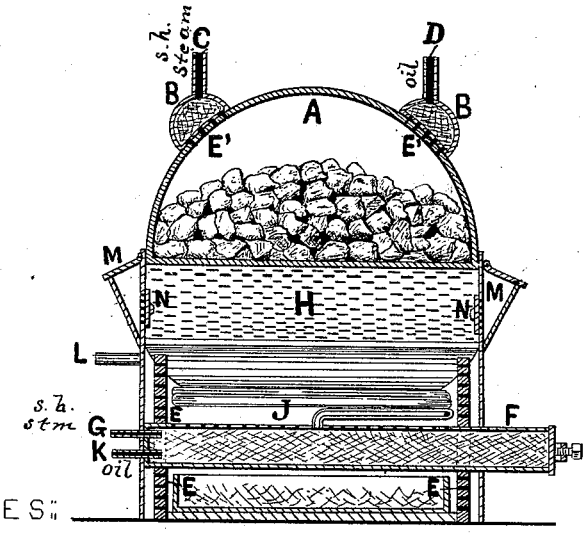

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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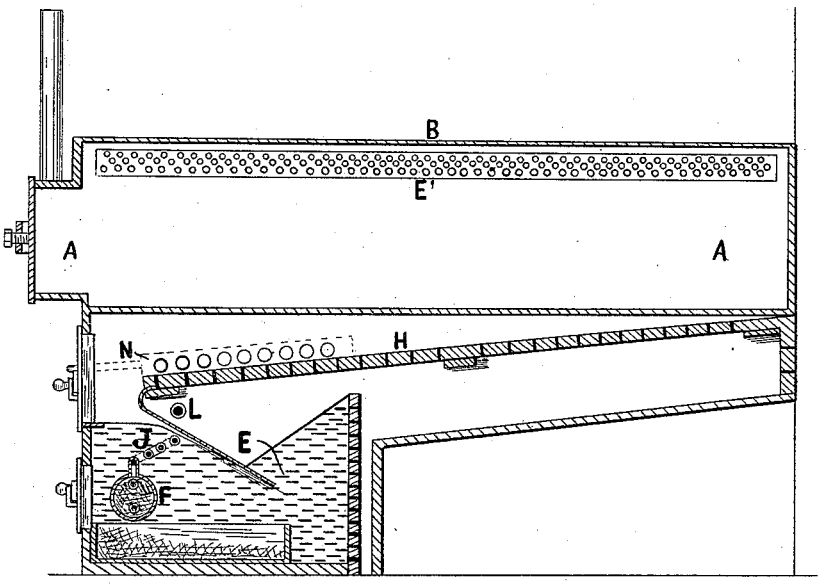

Fig. 3.

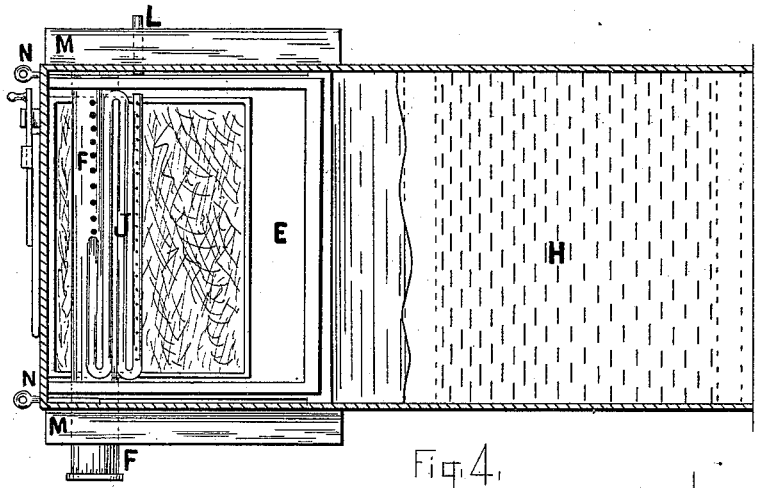

Fig. 4.

WITNESSES:
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UNITED STATES PATENT OFFICE.

ALONZO M. MACE, OF NEEDHAM, MASSACHUSETTS.

GAS RETORT AND FURNACE.

SPECIFICATION forming part of Letters Patent No. 345,437, dated July 13, 1886.

Application filed March 15, 1884. Serial No. 124,390. (No model.)

To all whom it may concern:

Be it known that I, ALONZO M. MACE, of Needham, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Gas Retorts and Furnaces, of which the following is a specification.

The object of my invention is to provide certain cheap, simple, and convenient devices for manufacturing hydrogen and carbonic-oxide gas; and it consists in the construction, combination, and arrangement with a gas-retort of the devices hereinafter more fully described, and particularly specified and pointed out in the claims hereto annexed.

Figure 1 represents a perspective view of a gas-retort having my invention embodied therein or connected therewith. Fig. 2 represents a vertical cross-section of the same. Fig. 3 represents a vertical longitudinal section of the same. Fig. 4 represents a horizontal sectional plan of the same.

In carrying out my invention, I provide a common gas-retort, A, and construct upon the upper portion thereof one or more supplementary retorts, B, made of fire-clay, asbestus, or other non-oxidizable material, and connecting with the main retort through a finely-perforated wall or partition, E′, through which may be forced or ejected superheated steam, discharged into the said supplementary retorts B through a suitable steam-pipe, C, from any suitable boiler or apparatus adapted for the purpose. A hydrocarbon oil-supply pipe, D, connects with one of the auxiliary retorts, B, just back of the steam-pipe C. The auxiliary retorts are provided with removable lids at their front ends, so that access may be had for cleaning them of soot or carbon, if required. Two gas-discharge pipes, P and P′, having valves, connect with the front end of the retort, and each may connect with a different holder, one for illuminating-gas and the other for heating-gas. The charge of bituminous coal is to be distilled for several hours in the retort, as usual, till the carbureted hydrogen is driven off, and at any desired stage of the distillation either steam or oil, or both, may be admitted into the retort in contact with the hot coal, and be decomposed and converted into gas, which is mingled with the coal-gas. In this case the oil is admitted by pipe D to retort B, in front of the jet of superheated steam from pipe C, and is forced and diffused by such steam through retort B, where the oil is heated, and is then passed through the perforated diaphragm in a fine spray with the superheated steam. The two vapors are brought into contact with the incandescent coal or coke in retort A, resulting in the decomposition of steam to form hydrogen and carbonic oxide, and of the oil to form rich carbureted hydrogen. The gases thus produced are to be purified and conducted to the holder for illuminating-gas. At the end of a distillation of a charge of coal, and while the residual coke is incandescent, superheated steam may be forced through the fine perforations in partition E′ of the supplementary retorts, B, into contact with the incandescent coke and hard carbon in retort A, by which it is decomposed, resulting in the production of a large volume of hydrogen and carbonic oxide, which may be conducted to and stored in a separate gas-holder, to be used for heating purposes. After the carbureted hydrogen is driven off from the coal both steam and hydrocarbon oil may be admitted to the retort A, as above described, and decomposed in contact with the incandescent coke, and a fixed illuminating-gas be thus produced.

In further carrying out my invention there may be constructed a double-wall fire-pot, E, or combustion-chamber formed of perforated fire-clay or asbestus, and have extending through the same a primary vaporizer, F, filled with any non-combustible material, like asbestus, having connected therewith the pipe G, through which superheated steam or air may be forced, and pass upward therefrom through the perforated top into the combustion-chamber, where it mingles with the gases of combustion and intensifies the heat generated therein, and passes backward beneath the perforated incline bridge-wall H, and through the perforations thereof upward.

To the top of vaporizer F may be connected the vaporizing perforated coil of pipe J, through which the superheated steam or air may also pass from the same into the combustion-chamber, and, when desired, any suitable hydrocarbon liquid may be injected into the

said vaporizer F through the pipe K, and be converted into gas, as above described, in relation to the supplementary retorts B. Both superheated steam and oil may be admitted by pipes G and K into vaporizer F, where they are mixed and highly heated, and the oil-vapor and superheated steam are further heated together in coil J. The mixed gas or vapor finally passes through the perforations of the vaporizer and coil into the front part of the fire-box, where primary combustion takes place, and the resulting partially-consumed gaseous products pass below bridge H, where additional jets of air, entering through the perforated walls of the fire-box, cause complete combustion, resulting in highly heating the retort without smoke or waste of fuel. Air is admitted by pipe L into the space between the outer wall of the furnace and the perforated walls of the fire box for supporting combustion, as above described.

I have also arranged at opposite sides of the combustion-chamber receptacles or hoppers M, into which may be placed coal-dust or fine waste coal, which may be admitted into the combustion-chamber, or fed therein through suitable openings, as required, by means of the horizontal slide or gate N, as shown.

By means of the above-described apparatus I am enabled to utilize a very great amount of the waste gases which heretofore have passed off, through imperfect combustion of the same, in smoke and other forms, causing a very disagreeable odor and smoky atmosphere to surround the gas-works, which is destructive to all near surrounding objects in a greater or less degree. It will be seen and understood that the gas produced may pass upward from the main retort A through vertical pipes P P′ to the mains, as heretofore employed in all gas-works.

Having thus described my invention, what I claim is—

1. In combination with the coal-distilling retort A, the supplementary retort B, applied to the exterior thereof and connected therewith by means of a perforated partition extending between them, and a steam-supply pipe connecting with retort B, whereby coal may be distilled, and then steam decomposed in contact with the residual hot coke, as described.

2. In combination with the coal-distilling retort A, the auxiliary superheating-retort B, applied to the exterior thereof and connected therewith by means of a perforated partition extending between them, a steam-supply pipe, C, and oil-supply pipe D, connecting with retort B, whereby oil may be heated and forced in fine streams, together with superheated steam, into contact with hot coal or coke in retort A, and be converted into a large volume of illuminating-gas, and the heat of the coke thus utilized, as described.

3. In combination with the gas retort and furnace, the perforated bridge-wall extending through the furnace below the retort, the perforated fire-box, and the air-supply pipe L, connecting below the bridge, for the purpose described.

4. In combination with the gas retort and furnace, the perforated inclined bridge-wall H, the fine-coal receptacles M, having perforations and slides, a perforated fire-pot, and means for supplying air for causing complete combustion of the gaseous products.

5. The gas-retort furnace having an inclined perforated partition and a perforated fire-box, in combination with a perforated vaporizer and coil, and steam and oil supply pipes connecting with the vaporizer, for the purpose described.

ALONZO M. MACE.

Witnesses:
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