J. T. B. BENNETT.

Apparatus for the Manufacture of Coke and Illuminating-Gas.

No. 161,377. Patented March 30, 1875.

Fig. 1.

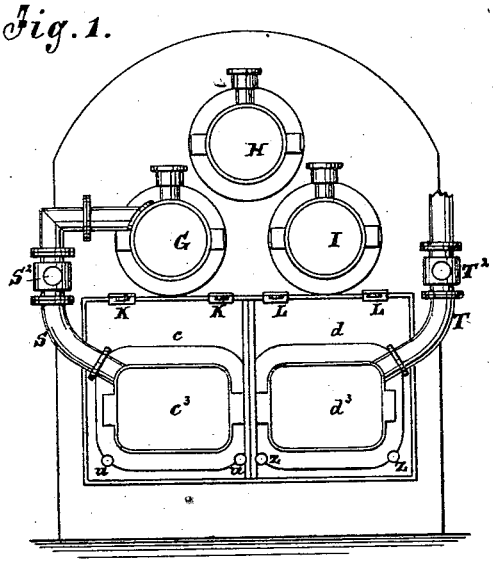


Fig. 2.

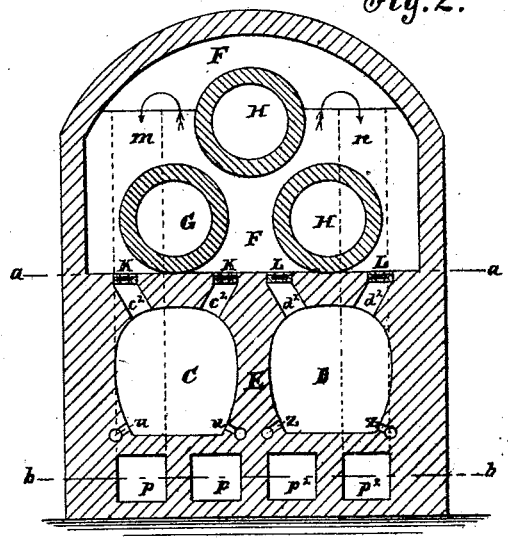


Fig. 4.

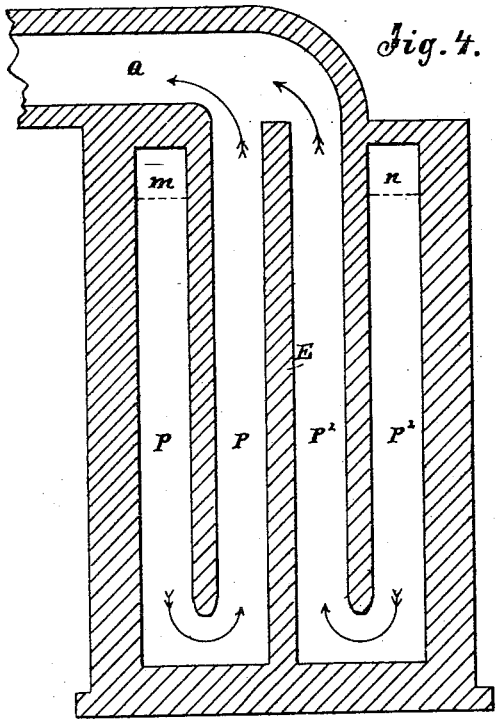


Fig. 3.

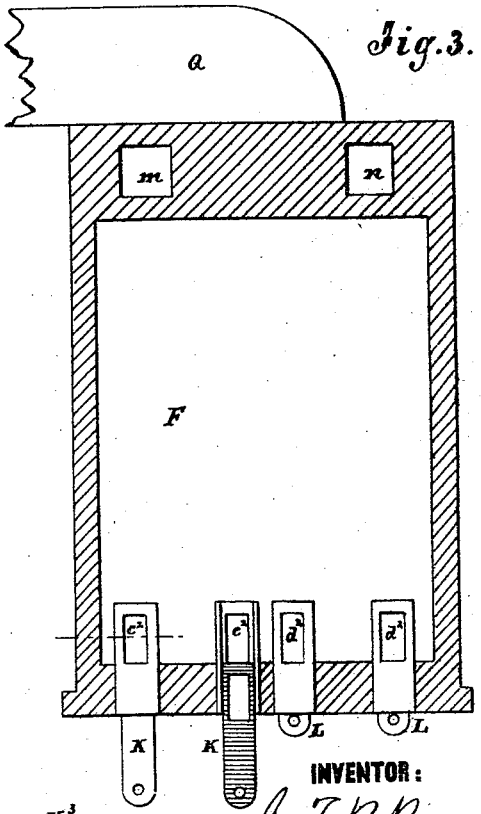
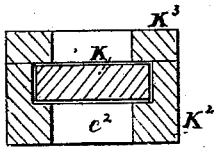


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN T. B. BENNETT, OF BIRMINGHAM, ENGLAND.

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE OF COKE AND ILLUMINATING-GAS.

Specification forming part of Letters Patent No. **161,377**, dated March 30, 1875; application filed September 19, 1874.

To all whom it may concern:

Be it known that I, JOHN T. B. BENNETT, of Birmingham, England, have invented new and useful Improvements in the Apparatus for the Manufacture of Coke and Illuminating-Gas, of which the following is a specification:

The invention will first be fully described, and then pointed out in the claims.

I will describe this invention as applied to the combined manufacture of coke and illuminating-gas.

I arrange the ovens in which the coking is to be effected in connection with gas-retorts, so that by means of stop-cocks and dampers or valves, communication between the said coke-ovens and gas-retorts may be opened and closed and controlled at pleasure. Around the gas-retorts is a channel or arch, through which the heated air and products of combustion from the coke-ovens may at pleasure be caused to circulate and heat the said gas-retorts, or the heated air and products of combustion may pass direct from the coke-ovens into the chamber containing the retorts.

In conducting the manufacture of coke and coal-gas we first charge the coke-ovens and ignite the contents. By the regulated admission of air the combustion of the fuel in the coke-ovens is determined for a length of time required to heat the said ovens sufficiently to continue the coking process after access of air has been cut off from the said ovens, and the combustion of their contents arrested.

During this, which we will call the first stage of the coking process, the heated air and products of combustion from the coke-ovens are made to circulate around the exterior of and heat the gas-retorts. When, by the combustion in the coke-ovens, the said ovens and their contents, as well as the gas-retorts, are sufficiently heated, air is shut off from the said coke-ovens, and the second stage of the coking process commences. During this second stage the heat of the coke-ovens and their contents causes the coking process to be continued, the volatile matters given off now being unburned in consequence of the exclusion of air. These volatile matters consist of permanent illuminating-gas, together with volatile hydrocarbons not permanently gaseous, and in order to convert and utilize these volatilized matters they are made to pass through the heated gas-retorts, which are charged with gas-producing material when the retorts have been sufficiently heated, and when the second stage of the coking process is about to commence. The volatile matters from the coke-ovens passing through the gas-retorts are resolved wholly or mainly into permanent illuminating-gas, which mixes and passes off with the illuminating-gas produced from the materials in the said gas-retorts. Where the coke-ovens are heated sufficiently to give off permanent illuminating-gas the said gas, instead of being passed through the gas-retorts, may be conducted direct into the hydraulic main. The gas so obtained is purified and otherwise treated and stored in the ordinary manner.

I will now proceed to describe, with reference to the accompanying drawing, the manner in which I conduct the combined manufacture of coke and illuminating-gas, and the apparatus which I prefer to employ for that purpose.

Figure 1 represents in front elevation a double coke-oven combined with a series of gas-retorts according to my invention; and Fig. 2 is a transverse vertical section of the same. Figs. 3 and 4 are horizontal sections of the same, the section Fig. 3 being taken on the dotted line *a a* of Fig. 2, and the section Fig. 4 being taken on the dotted line *b b* of Fig. 2. Fig. 5 represents one of the dampers of the apparatus and parts connected with the said damper.

Similar letters of reference indicate corresponding parts.

C D are two independent coke-ovens, separated by the wall E. C^3 D^3 are the doors of the coke-ovens. The top or roof of the double coke-ovens C D constitutes the bed of the retort-chamber F, containing the gas-retorts G H I. Communication between the coke-ovens C D and the retort-chamber F is effected by the passages C^2 D^2 in the top and near the front end of the said ovens. These passages may be opened and closed, so as to open and shut off communication between the said ovens and retort-chamber, by dampers K L. Each of the said dampers slides in a recess in the

bed-plate or slab K^2, (represented drawn to a large scale in Fig. 5,) the said damper being covered by a tile, K^3. The heated air and products of combustion from the coke-ovens C D enter the retort-chamber F by the passages C^2 D^2, and, after circulating about and heating the retorts G H I, they descend the vertical flues *m n* at the back of the retort-chamber into the horizontal flues P P P^2 P^2 under the floor of the coke-ovens, from whence they escape to the main flue Q. (See Fig. 4.) By the circulation of the heated air along the flues P P P^2 P^2 the floor of the coke-ovens and the bottom layers of coal therein are heated.

For convenience of illustration I have represented in Fig. 1 the oven C connected by the pipes with the retort G, and the oven D connected by the pipe T with the hydraulic main; but it must be understood that either arrangement of pipes may be used in connection with the combined gas and coke making apparatus. In the pipe S is a valve, at S^2, by which communication between the oven and gas retort or retorts is made and cut off, and in the pipe T is a valve, T^2, by which the oven D may be put into communication with or cut off from the hydraulic main. In the front of the ovens C D are air-passages *u u* Z Z opening into the said ovens for admitting a limited quantity of air to the coke-ovens for the partial combustion of the coal therein. These passages may be closed by plugs when it is desired to cut off the supply of air to the ovens. We use the coke-ovens C D alternately to heat the retorts and to utilize the volatile unburned matters given off substantially in the following manner—that is to say, the coke-ovens C D having been sufficiently heated by the combustion of the coal in the said ovens, the oven C is charged with coal. The passages C^2 are closed by the dampers K, and the air-passages *u u* are also closed, the valves S^2 in the pipe S passing to the retort being opened. By the heat of the oven C volatile unburned matters are driven off from the coal in the said oven C, and are conducted by the pipe S to the retort G. While the oven C has been giving off permanent illuminating-gas, the coal which has been charged into the oven D has been undergoing partial combustion, air being admitted thereto by the passages Z Z, and the products of combustion pass to and heat the retorts in the chamber F by the open passages d^2. When the coal in the oven C ceases to give off illuminating gas of the proper quality, the dampers K are opened, the valve S^2 is closed, and the plugs are withdrawn from the air-passages *u u*, so as to admit a regulated quantity of air to the oven C, for the partial combustion of the coke in the said oven C, the heated air and products of combustion passing to the retort-chamber F, so as to heat the retorts therein. While this partial combustion is taking place in the oven C the coke is withdrawn from the oven D, and the said oven is charged with coal, and the passages Z and d^2 of the oven D are closed, and the valve T^2 is opened, and the gaseous unburned matters from the coal in the said ovens are conducted by the pipe T to the retort or to the hydraulic main. The oven C having been again sufficiently heated by the combustion of the coal and coke therein, the coke is withdrawn and the oven is charged with coal, air is cut off from it, the dampers K K are closed, and the valve S^2 is opened, when volatile unburned matters again pass to the retort. Thus, while one oven is giving off volatile unburned products which are conveyed to the retorts or to the hydraulic main, the residual hydrocarbon gas and coke in the other oven is undergoing partial combustion for the purpose of heating the said last oven and the retort, the said oven being heated sufficiently to carry on the coking process, and to drive off volatile unburned matters when air is excluded from it. By this arrangement the ovens acquire a sufficiently high temperature to resolve the volatile unburned matters wholly or mainly into permanent illuminating-gas, which either passes to the retorts and mixes and passes off with the illuminating-gas produced from the materials in the said retorts, or passes direct to the hydraulic main to be treated in the ordinary way.

I do not limit myself to the details of the apparatus represented, as the arrangement may be varied according to circumstances.

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

1. An apparatus consisting of ovens C D and chamber F, connected by dampered passages c^2 d^2, and having the retorts G H I, as and for the purpose specified.

2. Sliding dampers K, recessed slab K^1, and covering-tile K^3, combined as and for the purpose set forth.

JOHN TYLER BARNSLEY BENNETT.

Witnesses:
J. B. GOULD,
J. BRAINE.