(No Model.) 2 Sheets—Sheet 1.

H. M. PIERSON.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 297,444. Patented Apr. 22, 1884.

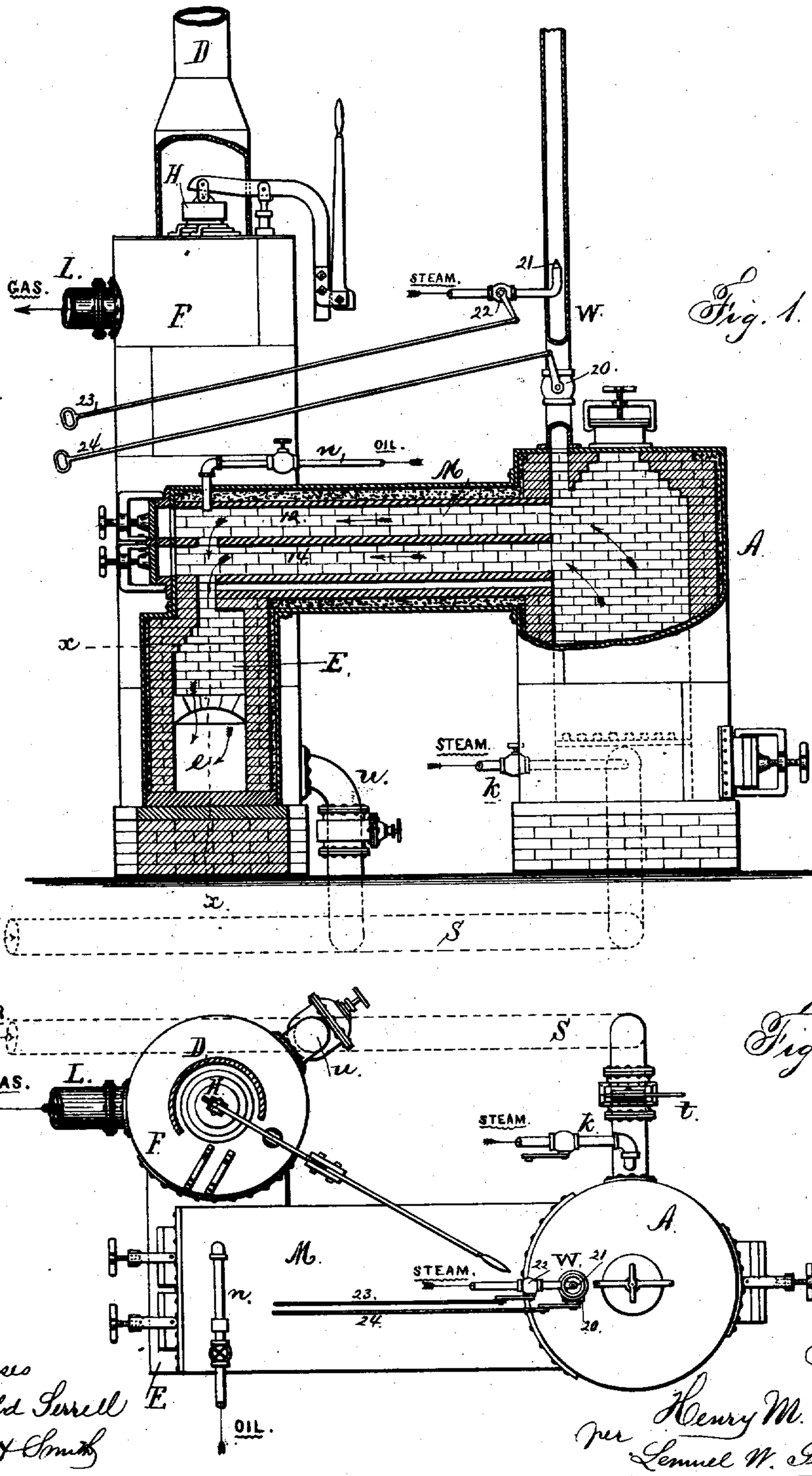

Fig. 1.

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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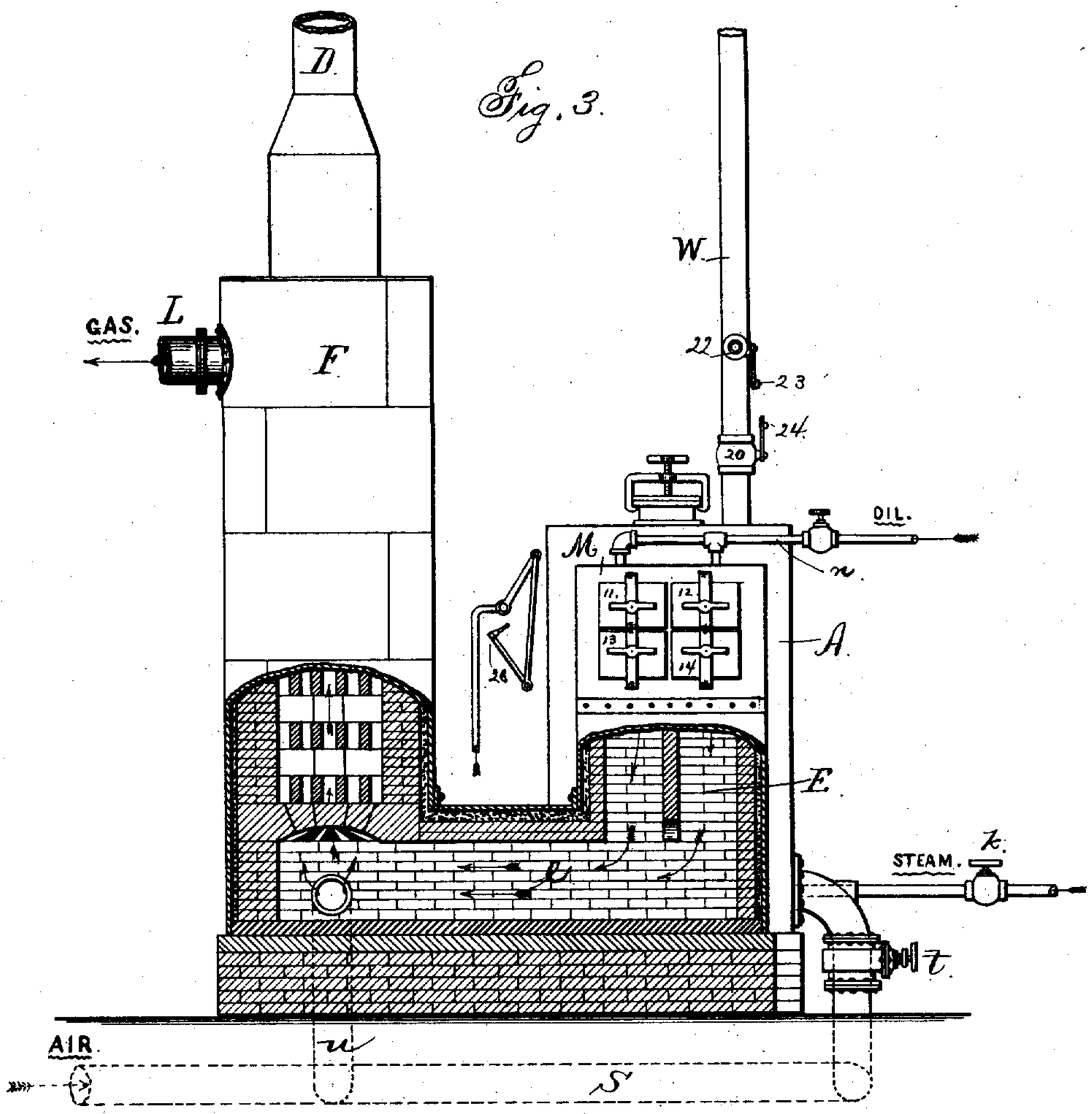
Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY M. PIERSON, OF BROOKLYN, NEW YORK.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 297,444, dated April 22, 1884.

Application filed November 5, 1883. (No model.)

To all whom it may concern:

Be it known that I, HENRY M. PIERSON, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Apparatus for the Manufacture of Gas, of which the following is a specification.

In Letters Patent No. 279,010, granted to me June 5, 1883, I have described an apparatus especially adapted to the use of soft coal in the manufacture of gas, wherein the soft coal is coked in a set of retorts, and is passed from the retorts successively into the generator, wherein the coke forms a bed of incandescent fuel, through which the superheated steam and the gases from the coke-retort pass and are fixed. In the said Letters Patent mention is made of the fact that this improvement may be employed with such retorts as are used in the Low, Frost, and Strong apparatus, in which the direction of the steam and gases through the chambers will vary.

My present invention relates to the especial apparatus designed for more perfectly carrying out and putting into operation the manufacture of gas, in a method corresponding generally to that known as the "Low process," in which the steam passes up through the bed of incandescent fuel, and the gases traverse through the fixing-chamber.

In the drawings, Figure 1 is an elevation partially in section. Fig. 2 is a plan; and Fig. 3 is an elevation, partially in section, at the line X X.

The generator A is connected at its upper end with a set of cokers, M, and I have numbered these cokers 11, 12, 13, and 14, as in my aforesaid patent. These cokers are to be charged with soft coal in a manner similar to the charging of ordinary gas-retorts, the covers of such cokers being removed periodically and in succession, and the coke remaining in each retort is pushed back into the generator A, so as to fall upon the bed of incandescent fuel, and then such coker is charged with fresh soft coal or similar material. These operations, having been fully described in my aforesaid patent, do not need to be repeated in my present specification.

Beneath one end of the group of cokers M is a descending flue, E, and a cross-flue, *e*, leading to the vertical fixing-chamber F, at the upper end of which is a chimney or escape, and flue D with a movable valve, H, and a lever to operate the same. This fixing-chamber F is filled with loosely laid up fire-brick or similar material, and is similar to that shown in my aforesaid patent. Instead of introducing the steam into the fixing-chamber F, I introduce the same by a pipe, *k*, beneath the grate-bars in the generator A, so that the said steam passes up through the bed of incandescent fuel, thence along through the cokers M, down through the flue E, and by the horizontal flue *e* to the fixing-chamber F, through which the steam and gases ascend, and by the internal heat of such chamber F the gases are fixed or combined in such a manner as to become permanent, and adapted to illuminating or heating purposes, such gases passing away by a pipe, L, to a suitable holder. In heating up this apparatus, the atmosphere is supplied by a pipe, *s*, and damper *t*, so as to pass in beneath the grate-bars in the generator A, thence up through the fire, along through the cokers M, and down through the flue E and horizontal flue *e* to the base of the fixing-chamber F. At this point a supply of air is admitted by the pipe and cock *u*, so that the carbonic oxide and other gases are ignited and burned with an intense heat as they pass up through the fixing-chamber F, and in contact with the loosely laid up fire-brick therein. By this means the fixing-chamber F becomes very highly heated, and is adapted to combining or fixing the gases that pass through it during the gas-making operation.

It is to be understood that the gas-making operation is suspended during the time that soft coal or fuel is introduced into one of the cokers, and that the atmosphere is supplied to pass through the incandescent fuel and the cokers for heating up the apparatus immediately thereafter, and that so soon as the apparatus attains the proper temperature the valve H at the top of the fixing-chamber F is closed and the supply of atmosphere is stopped. The steam is then admitted by the pipe and cock *k*, and the gas-making operation is resumed. In this gas-making operation the steam is decomposed as it passes up

through the fire. At the same time it becomes highly heated and the carbonic oxide, carbonic acid, and hydrogen pass from the fire through the cokers M and flues E *e* to the fixing-chamber F, and as such gases pass through said fixing-chamber F they are subjected to the high temperature thereof, which causes the olefiant or carbonacous vapors passing off from the soft coal in the cokers to combine with the carbonic acid, so that the resultant product is a gas well adapted to either illuminating or heating purposes, according to the quantity of steam that may be supplied and the character of the coal introduced into the cokers M. Furthermore, when it is desired to make a gas especially adapted to illumination, I introduce petroleum or any other suitable liquid hydrocarbon by the pipe *n* in a regulated quantity. The heat of the flue E vaporizes the same; but this flue E is not sufficiently hot to cause the development of lamp-black in the fixing-chamber, or the production of tarry liquid materials.

In the manufacture of gas, when a cover is removed from the retort, the gases escape and the atmosphere rushes in, causing an explosion that is very annoying and sometimes injurious to the workmen who remove the coke and supply the fresh fuel. One portion of my present improvement relates to devices for overcoming this difficulty. Above the generator A is provided an escape-pipe, W, with the cock 20, and the steam-jet 21 controlled by the cock 22 and the rod 23. As soon as the gas-making operation is suspended by shutting off the supply of steam through the pipe *k*, the attendant opens the cock 20 by the rod 24 and turns on the steam at the jet 21 by the rod 23. The jet of steam acting in the pipe W draws out from the generator A and the cokers M sufficient of the gaseous materials therein to reduce the pressure down to that of the atmosphere. The attendant removes whichever retort-cover is to be removed, and the atmosphere passes into the retort, and the gases therein being simultaneously ignited by a gas-jet they do not explode, and the combustion proceeds toward the back end of the retort as the contents of such retort are drawn out by the action of the pipe W; hence the attendant is able to press the coke in said retort back and cause it to fall upon the bed of incandescent fuel in the generator A, and then he introduces the soft coal or similar material in the chute and delivers it upon the bottom of the retort and closes the retort-cover, and the valve 20 and the apparatus is ready for the admission of air in heating up the same as before.

It is usually preferable to provide a gas-jet at 26, the same being upon a jointed pipe, so that the attendant can bring this jet into contact with the gas that may issue around either cover when the clamping-screw thereof is first released, so that the gas will be ignited and in a burning condition as the cover of the retort is removed. This prevents the atmosphere from mixing with the gases previous to the ignition of the same and producing explosion.

I claim as my invention as follows:

1. The combination, with a generator adapted to contain a bed of incandescent fuel, of a fixing-chamber, and cokers between the generator and fixing-chamber and forming the sole passages for the gases, the loosely-laid fire-brick or similar material in the fixing-chamber, pipes for supplying the air at the base of the fixing-chamber and at the base of the generator, and a pipe for supplying steam at the base of the generator, substantially as set forth.

2. The combination, in a gas-making apparatus, of a set of cokers adapted to the reception of soft coal or similar material, and forming also the passage for the gases, a generator connected with one end of such cokers for the reception of the coke from such cokers, a fixing-chamber, F, connected with the other end of such cokers, and the pipe for supplying steam beneath the incandescent bed of fuel in the generator, substantially as set forth.

3. The combination, with the generator adapted to contain a bed of incandescent fuel, of a pipe for supplying steam into such generator, one or more cokers connected with the opening into such generator and adapted to receive soft coal or similar fuel, a fixing-chamber and the flue connected from the said cokers to the said chamber, and means of supplying hydrocarbon into such flue, substantially as and for the purposes set forth.

4. The combination, in a gas-making apparatus, of one or more cokers for receiving the soft coal or similar material, the movable cover or covers of such retorts, an escape-pipe connected with the back end of such retort, a jet-pipe for steam or other material under pressure to induce a current in such escape-pipe, and the cock for closing the said pipe, substantially as and for the purposes set forth.

Signed by me this 3d day of November, A. D. 1883.

H. M. PIERSON.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.