





(No Model.)

2 Sheets—Sheet 2.

L. STEVENS.  
APPARATUS FOR MANUFACTURING GAS.

No. 328,149.

Patented Oct. 13, 1885.

Fig. 4.

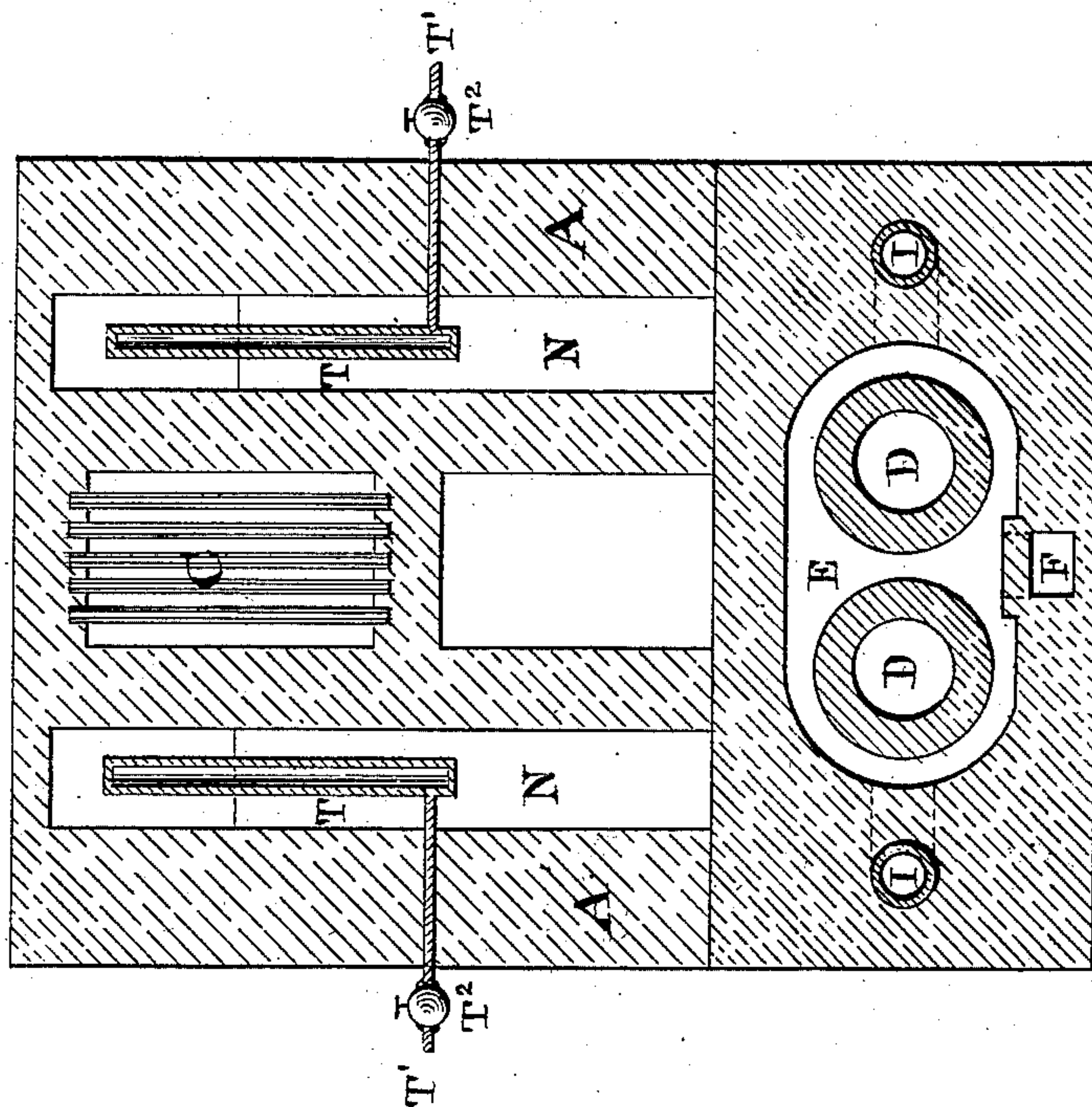
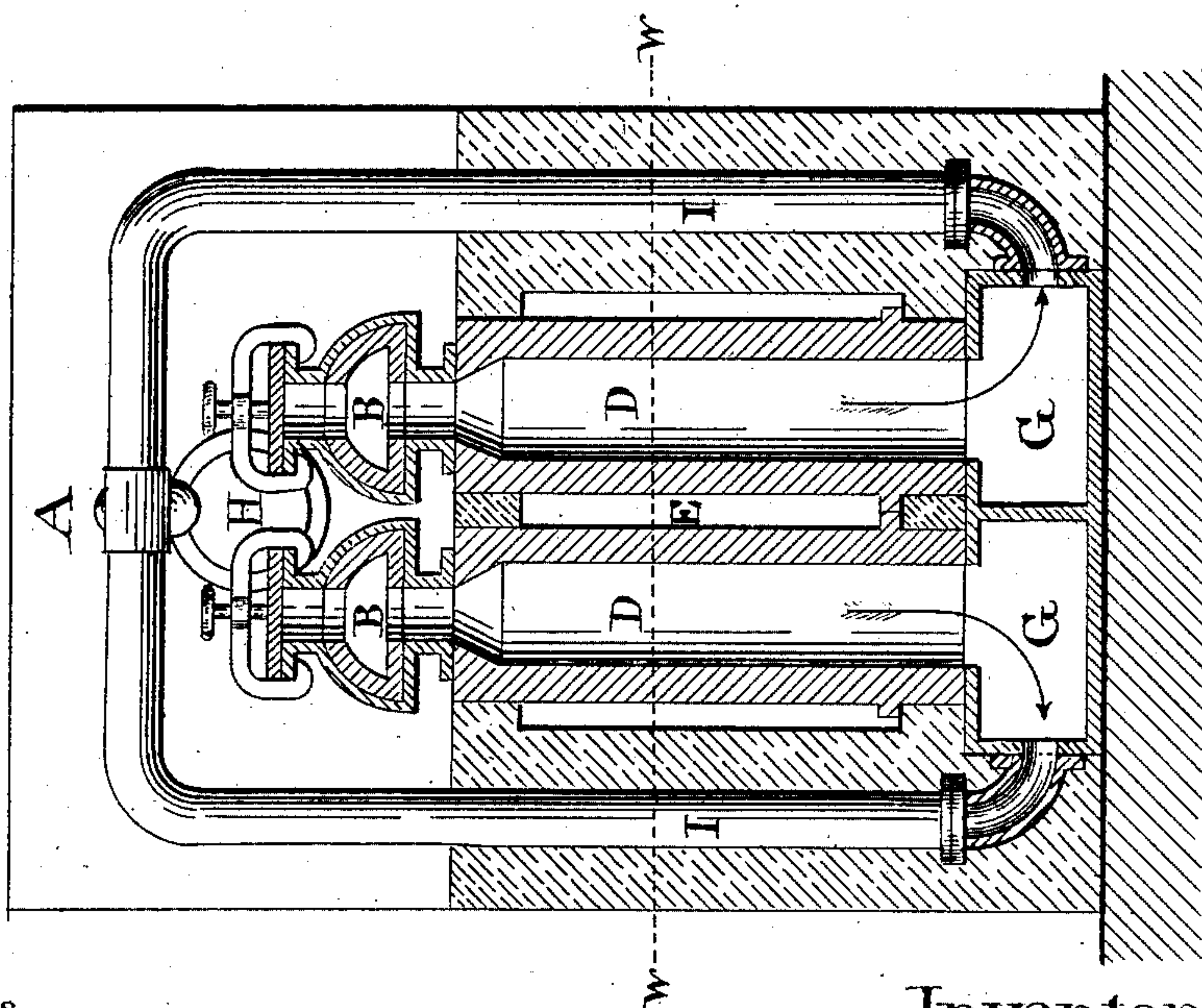


Fig. 3.



Witnesses.

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# UNITED STATES PATENT OFFICE.

LEVI STEVENS, OF WASHINGTON, DISTRICT OF COLUMBIA.

## APPARATUS FOR MANUFACTURING GAS.

SPECIFICATION forming part of Letters Patent No. 328,149, dated October 13, 1885.

Application filed June 6, 1884. Serial No. 134,015. (No model.)

*To all whom it may concern:*

Be it known that I, LEVI STEVENS, of Washington city, in the District of Columbia, have invented a new and useful Improvement in  
5 Apparatus for Manufacturing Gas; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a  
10 part of this specification.

This invention is an improvement upon the forms of apparatus heretofore described and claimed in my Letters Patent of the United States dated and numbered as follows: January 7, 1868, No. 73,057; April 14, 1868, No. 76,841; January 26, 1869, No. 86,187; February 23, 1869, No. 87,123; Reissue No. 3,338, March 23, 1869; and it consists in improvements in the apparatus, substantially as hereinafter described, whereby and wherein I am  
20 enabled to pass the combined gases obtained by distilling coal in the presence of steam heated to a high temperature (1500° to 1800° Fahrenheit) through a water-gas retort to a  
25 more highly heated fixing or finishing retort, wherein they are converted into a fixed gas and enriched for illuminating purposes by means of hydrocarbons volatilized and retorted in the presence of steam at a high temperature  
30 and under pressure.

To enable others skilled in the art to make and use my present invention, I will describe the same with reference to the drawings, in which—

35 Figure 1 is a longitudinal section, partly in elevation, of my improved apparatus, taken upon the irregular line *xx* in Fig. 2; Fig. 2, a transverse section on line *yy* of Fig. 1; Fig. 3, a transverse section, partly in elevation, on  
40 line *zz* of Fig. 1, and Fig. 4 a horizontal section on line *ww* of Figs. 1 and 3.

A represents a bench, in which two primary or distilling retorts, B B, Figs. 1 and 2, are mounted longitudinally in a suitable fire-chamber over a fire-box, C, Fig. 2, so as to be  
45 heated directly therefrom.

50 D D are two water-gas retorts, mounted vertically in a draft chamber or flue, E, at the rear of the bench, which communicates with the fire-chamber and through which the products of combustion are led from said chamber to the chimney F. (See Figs. 1 and 4.)

The upper end of each water-gas retort D is made to communicate freely with the inner end of one of the distilling-retorts B, so that  
55 the contents of the latter may be pushed forward into the former. The lower end of each water-gas retort opens into a chamber, G, Figs. 1 and 3, provided with a suitable door, (see Fig. 1,) through which the waste contents of  
60 the retort may be drawn out and removed.

H is a finishing or fixing retort, mounted longitudinally over the distilling-retorts B B in the upper part of the same heating-chamber C, (see Fig. 2,) so as to be exposed to the  
65 greatest heat from the fire. The inner end of this finishing-retort H communicates by means of pipes or flues I I (see Figs. 1 and 3) with the chambers G G at the lower end of the two water-gas retorts D D, and its outer end com-  
70 municates by means of the delivery-main O, Fig. 1, with the gas-receiver.

A hydrocarbon or enriching retort, R, is fitted centrally within the finishing-retort H, to extend longitudinally therein for nearly its  
75 entire length, and the inner end of this hydrocarbon-retort is closed by a valve, S, (see Fig. 1,) adapted to be opened inwardly by means of a rod, M, led therefrom to the outer end of the retort through which it extends, so as to  
80 admit of the opening of the valve from the outside of the apparatus. The outer ends of the hydrocarbon-retort R and of the distilling-retorts B B are made to project out from the bench A, which incloses the fire chamber, 85 and the distilling-retorts are closed by doors which admit of the ready introduction therein of the coal for distillation.

Lateral chambers or enlarged flues N N are formed on either side of the fire-box C, (see  
90 Figs. 1, 2, and 4,) through which the products of combustion from the furnace are carried to the flues E, encircling the water-gas retorts, and within these lateral chambers are placed steam-superheaters T, connected by pipes T' 95 T' with a steam-generator, from which a suitable supply of dry steam, at a temperature of from 1200° to 1800° Fahrenheit, is drawn.

The admission of steam is controlled directly by valves T<sup>2</sup> in said pipes T' T'. 100

The superheaters T T are of the description fully described in the Letters Patent heretofore issued to me on the 22d day of July, 1873, No. 141,179, and the steam decomposed



therein is carried by suitable pipes, Q Q, (see Fig. 1,) to the distilling-retorts B B, and also from one or both of them to the hydrocarbon-retort R.

- 5 The admission of superheated steam to the hydrocarbon-retort is made through an injector-nozzle, V, which is connected by a pipe, V', with a reservoir of petroleum or other hydrocarbon in liquid form.
- 10 The operation of my apparatus is substantially as follows: Fire is started in the fire-box C, and the bench heated to a temperature of 2200° Fahrenheit. Common gas-coal is charged into the retorts B B, and steam from any suitable generator is admitted into the superheaters T T in quantity and under a pressure controlled by the valves T<sup>2</sup> T<sup>2</sup>. The steam in passing through said superheaters becomes heated to a very high temperature, and in this
- 15 condition is admitted through the pipes Q Q into the primary or distilling retorts B B, where it combines with the gases from the coal which is distilling therein. The resultant mixed gases or vapors pass from the retorts B B into the water-gas retorts D D, and out at the base of said retorts, (see Fig. 3,) through the pipes I I, into the finishing-retort H, which is maintained at a high temperature by its exposure to the heat of the fire-chamber. Steam is
- 20 delivered meanwhile through the pipe Q, from the superheaters T T, or from an independent superheater, at a temperature of from 1200° to 1800° Fahrenheit, into the retort R, carrying with it, by means of the injector V, a proportion of the hydrocarbon oil delivered through the pipe V'. The valve S is so far closed as to maintain a high pressure within the retort R, and under the influence of the high pressure as well as high temperature of the steam the
- 25 hydrocarbon is volatilized, and in connection and combination with the decomposed steam is completely fixed, and in this condition is delivered in proper proportion into the finishing-retort H at its inner end, so as to become thoroughly combined with the gas from the retorts D D as it flows through the retort H into the delivery-pipe O. The gas thus produced and enriched then passes out of the retort H, through the pipe O, into the gas-main.
- 30 When the coal charged into the retorts B B has become carbonized, the front covering-plates or doors are opened and the coke is shoved into the retorts D D, and the retorts B B are thereupon recharged with fresh coal
- 35 and the proportion of steam increased sufficiently to convert any desired percentage of the carbon of the coke in the retorts D D into carbonic oxide.

The coke is removed from the water-gas retorts through the door in the lower chamber G, and serves as fuel for the furnace C.

I do not herein claim the process of making gas by means of the within-described apparatus, having made said process the subject of a separate application for Letters Patent, Serial No. 173,962.

I claim as my invention—

1. The combination, with a furnace, C, and with a horizontal distilling-retort, B, discharging into a vertical fixing-retort, D, of a finishing-retort, H, communicating with the lower end of the retort D and heated by the furnace, and through which the products of distillation in the retort B are led after passing through the retort D, substantially in the manner and for the purpose herein set forth.

2. The combination, with a furnace, C, distilling-retort B, fixing-retort D, and finishing-retort H, of one or more steam-superheaters, T, arranged to be heated by the furnace C and to deliver steam to the distilling-retort B, substantially in the manner and for the purpose herein set forth.

3. The combination, with one or more steam-superheaters, T, and with a coal-distilling retort, B, connected therewith, a fixing-retort, D, into which the commingled steam and products of distillation are led from the retort B, and a retort, H, into which the resultant gases pass from the retort D, of a hydrocarbon-retort, R, communicating with said retort H, and into which steam is injected from the superheater under pressure in connection with a volatile hydrocarbon oil, substantially in the manner and for the purpose herein set forth.

4. The combination, with the hydrocarbon-retort R, communicating with the fixing and enriching retort H, in an apparatus for the manufacture of illuminating-gas from carbonaceous material, and with a steam-injector, V, and an oil-supply pipe, V', for delivering superheated steam commingled with oil into said retort, of a valve, S, fitted to control the delivery-port between the retorts R and H, for the purpose of maintaining a high pressure within the retort R, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEVI STEVENS.

Witnesses:

DAVID A. BURR,  
GEORGE H. BOTTS.