

(No Model.)

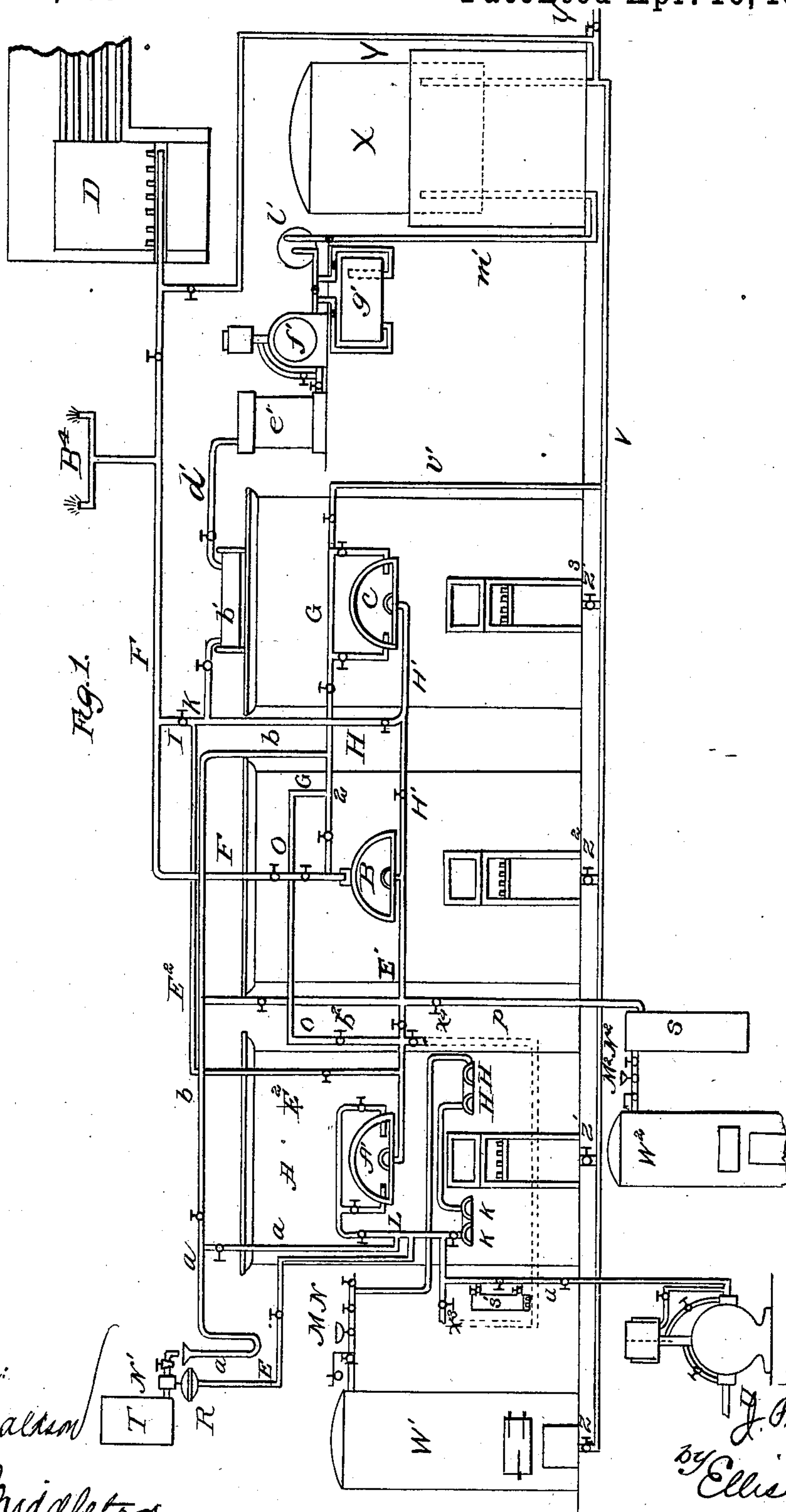
2 Sheets—Sheet 1.

J. P. GILL.

PROCESS OF AND APPARATUS FOR MANUFACTURING LIGHTING OR  
HEATING VAPORS.

No. 275,635.

Patented Apr. 10, 1883.



Attest:  
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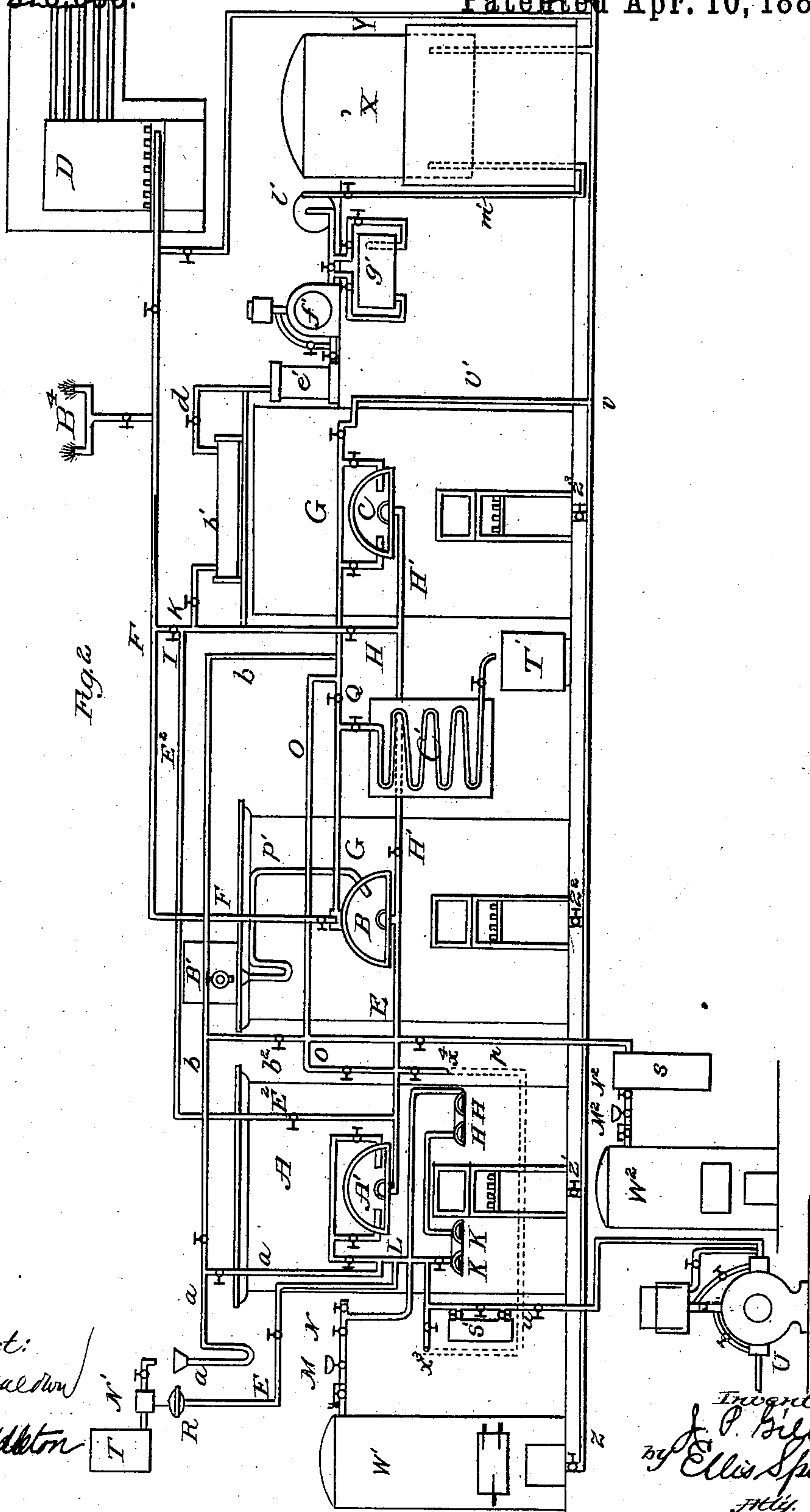
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No. 275,635.

Patented Apr. 10, 1883.



Attest:  
Walter Davidson  
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Inventor  
J. P. Gill  
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# UNITED STATES PATENT OFFICE.

JOSEPH P. GILL, OF NEW YORK, N. Y.

PROCESS OF AND APPARATUS FOR MANUFACTURING LIGHTING OR HEATING VAPORS.

SPECIFICATION forming part of Letters Patent No. 275,635, dated April 10, 1883.

Application filed March 21, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH PEARSON GILL, of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Processes of and Apparatus for Manufacturing Lighting or Heating Vapors; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention includes in part the apparatus described in applications filed by me February 25, 1881, and March 19, 1881, in the United States Patent Office, said applications bearing respectively serial numbers 26,951 and 28,665, which apparatus is modified, as hereinafter described, to adapt it to the methods set forth hereinafter.

The essential part of the invention consists in passing either a highly-heated air and the vapor of a hydrocarbon liquid or a non-illuminating gas or heated air alone through a retort containing bituminous coal or an equivalent solid or liquid hydrocarbon in a state of vaporization at a heat below that of destructive distillation, whereby a highly-rarefied and elastic heating-vapor is formed. To a certain extent the highly-heated air commingled with the vapor of a hydrocarbon liquid and non-illuminating gas, and the highly-heated air alone, are equivalents of each other—that is to say, they will take up the vapors rising from the distillation of the bituminous coal or from the other specific materials which may be substituted for the bituminous coal under the conditions named, and will produce by the process hereinafter described a highly-elastic rarefied heating-vapor; but these different agents, which are used to take up the hydrocarbon vapors in the retort to form the heating-vapor, are each adapted particularly for specific purposes, and in the apparatus which I have shown in the accompanying drawings and hereinafter described any one of these may be used; according to the particular purpose for which the heating-gas is required, so that while the general method is the same both the method and the apparatus are capable of variation by

the selection of any one or any combination of the absorbing and conveying gases or vapors, according to the particular purpose for which they are required.

In the accompanying drawings, Figure 1 shows a front elevation of one form of the apparatus in which the vaporizing-retort is adapted to receive a solid hydrocarbon. Fig. 2 shows a like elevation of the same form of apparatus with appliances in connection with the vaporizing-retort for supplying thereto the heavy liquid hydrocarbon, such as coal-tar and the like.

The apparatus shown in these figures is the same as that shown in the application hereinbefore referred to, entitled "Process and Apparatus for the Manufacture of Gas," which was filed in the United States Patent Office on the 19th day of May, 1881, with the addition of a number of pipes, which are hereinafter fully described.

In the process carried on by the apparatus shown herein the fixing of the gas for consumption in a furnace or burners is not contemplated. The first bench is provided with a retort, A', which is adapted to hold anthracite coal or any similar hydrocarbon, to make in connection with other substances hereinafter described a non-illuminating gas, or to heat whatever may be passed through it.

The apparatus is also provided with a boiler, W', for generating steam, which is connected by a pipe to the superheaters H H K K, said pipe being provided with automatic regulators M N, which regulators are of ordinary construction and need not be herein particularly described. The superheaters K K are directly connected to the retort A' by a pipe having two branches, which enter the retort A' on opposite sides. The retort A' is connected by a pipe, E', with the retort B, placed in the second bench. This retort B is adapted to hold bituminous coal or any similar hydrocarbon and to subject the same to vaporization.

The apparatus thus far described is capable of operation as follows: Anthracite coal or any similar carbonaceous material being placed in the retort A' and subjected to a high heat, steam from the boiler W' is admitted thereto through the superheaters, and these products are converted in said retort into a non-illuminating gas, which is passed through the pipe



E' into the retort B, where it takes up the hydrocarbon vapors, and thence is carried through the pipe F to the place of consumption; or it may pass through the pipes I K' and suitable intermediate apparatus to a storage-tank, X.

In case it be desirable from any reason to use some other substance instead of anthracite coal, I may supply the hydrocarbon from a liquid source. For this purpose I provide the tank T, which is connected by a pipe, *aa*, to the pipe L, which conducts the steam from the superheaters to the retort A', forming with the pipe a vaporizer, whereby the steam in a highly-heated state carries the vapor of the hydrocarbon into the retort A', where they become a fixed non-illuminating gas, in the manner heretofore described, and is carried onward, and is used in the same manner as the gas produced from the anthracite coal; but in case I desire to use steam directly for taking up the hydrocarbon vapors in the retort B, I may use the boiler W<sup>2</sup> and its superheater S, by means of which superheater steam may pass directly to and through the pipe E' to the retort B, and there act in connection with the hydrocarbon vapors, in the manner heretofore described. I do not propose, however, to use steam alone to take up the vapors resulting from distillation, for the reason that it is liable to variation, and thereby is not so well fitted to act as an absorbent and conveyer of the vapors; but it may be used directly in connection with the air or non-illuminating gas. To furnish the air I have provided an air-supplying device consisting of an air-pump, U, which is provided with automatic regulators, of a construction as shown in the application filed by me on the 25th day of February, 1881, entitled "Manufacture of Gases and Vapors." This air-supply is connected by a pipe, *u*, with the pipe L, leading to the retort A'. The branch pipes connected with the superheater S' are provided with stop-cocks, so that the superheater may be used or not, as may be required. The air in automatically-regulated quantities may pass through the pipes specified into the retort A', and there be highly heated, and thence be conveyed through the pipe E' to the retort B, where it commingles with the vapors arising from the bituminous coal, and, when saturated with such vapors, may pass, as before stated in respect to the non-illuminating gas, either to the points of consumption or through the condensing and purifying apparatus *c' f' g'* and meter *v'* to the holder X; but the heated air from the retort A' may, in its passage through the pipe E', meet with the hydrocarbon liquid passing from the tank T through the pipes *a b b'*, and the air and vaporized hydrocarbon pass into the retort B for conversion into a heating-vapor.

The air from the air-supplying apparatus may be passed around the retort A' instead of through it. For this purpose I use a pipe connecting the points *x*<sup>3</sup> and *x*<sup>4</sup>, (said pipes being shown by dotted lines in the drawings,) by which the air may be passed directly to the

pipe E'. In this case I use the superheater S' for the air.

I may also use the apparatus in another way, bringing into use at the same time the retort C, which, in another application I have described as a "fixing-retort," using it in this connection as a heating-retort. This is accomplished in this wise: I may take a non-illuminating gas prepared by any one of the methods heretofore described and stored in the holder X, and from said holder may pass this non-illuminating gas through the pipes V V' to the retort C, where it is heated, and thence I may take it through the pipe H H' to the retort B, in which it commingles with the vapors arising from the bituminous coal, with the result heretofore stated. These combined vapors may then be taken through the pipe F either to a furnace or to burners for lighting.

The apparatus in Sheet 2 is similar to that shown in Sheet 1, except that I provide a small tank, B', placed on the top of the furnace or in some other warm position, where it may be suitably heated. This tank I supply with coal-tar, heavy oils, or resinous or oleaginous substances, which may be melted and in a melted condition fed to the retort B, and used for vaporizing instead of the bituminous coal. This tank B' must be of a size sufficient to contain a quantity of the material required during a charge or run. The liquids are taken to the retort B through the pipe *p'* gradually and uniformly. When the vapor passing from the retort B is not otherwise required it may be allowed to pass through a condensing-coil, C', to a tank, T'.

Heated air from the superheater S' or retort A' and the superheated steam from superheater S may pass together through the pipe E' into the retort B in the manner described for each. Steam used with the air acts as a diluent, and may be employed when a thinner or poorer vapor is required.

I have provided a pipe, E<sup>2</sup>, extending from the pipe E' around the bench of the retort C and connecting with the pipe H, by means of which any of the products passing through the pipe E<sup>2</sup> may be conveyed to the pipe H and its connections without passing through the retort B, if it be so desired.

I do not herein claim the combination of an air-supply pipe and regulator and liquid hydrocarbon and steam-supplying devices provided with automatic regulators, a superheater, and vaporizer, said combination being claimed in application (Serial No. 28,425) filed March 16, 1881.

I am aware that it is not new to pass steam over carbonaceous material in process of distillation, that having been shown in the patent of Stevens, No. 3,338, of March 23, 1869, as well as elsewhere, and I do not broadly claim that process.

I have described the apparatus and process as adapted to produce a lighting and heating



vapor by the direct application of the heated air or gas to the distilling hydrocarbon; but for the best results I use the liquid hydrocarbon in this connection, for the reason that the solid hydrocarbon does not give off its vapors uniformly in distillation, but in decreasing quantities, and the variation may be corrected and the result made uniform by the use of the vapor of hydrocarbon liquid in the manner specified.

I do not broadly claim the use of steam to take up the vapors from the distilling solid hydrocarbons, nor the use of air for such purpose at ordinary temperatures.

Having thus described my invention, what I claim is—

1. The process of producing lighting or heating vapors, consisting in combining highly-heated air or non-illuminating gas (both with or without superheated steam) with the vapors arising in a heated retort from bituminous coal or other solid or melted hydrocarbons, coal-tar, or similar heavy liquids in the process of vaporization at a temperature kept below that of destructive distillation, the combination or mixture being effected by the introduction of the air or gas into the vapor above the distilling coal, substantially as set forth.

2. The process of producing lighting or heating vapors, consisting in combining highly-heated air or non-illuminating gas, both with or without superheated steam, in conjunction with the vapor of liquid hydrocarbon, with the vapors arising in a heated retort from bituminous coal or other solid or melted hydrocarbons, coal-tar, or similar heavy liquids in the process of vaporization at a temperature kept below that of destructive distillation, substantially as described.

3. The described apparatus, consisting of the retorts A', B, and C, the steam, air, and liquid-hydrocarbon supplying apparatus, the regulating devices, the connecting-pipes with suitable cocks, the tank X, and the pipes V V', all combined and operating substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH PEARSON GILL.

Witnesses:

B. F. JAMES,  
WM. H. GRENELLE.