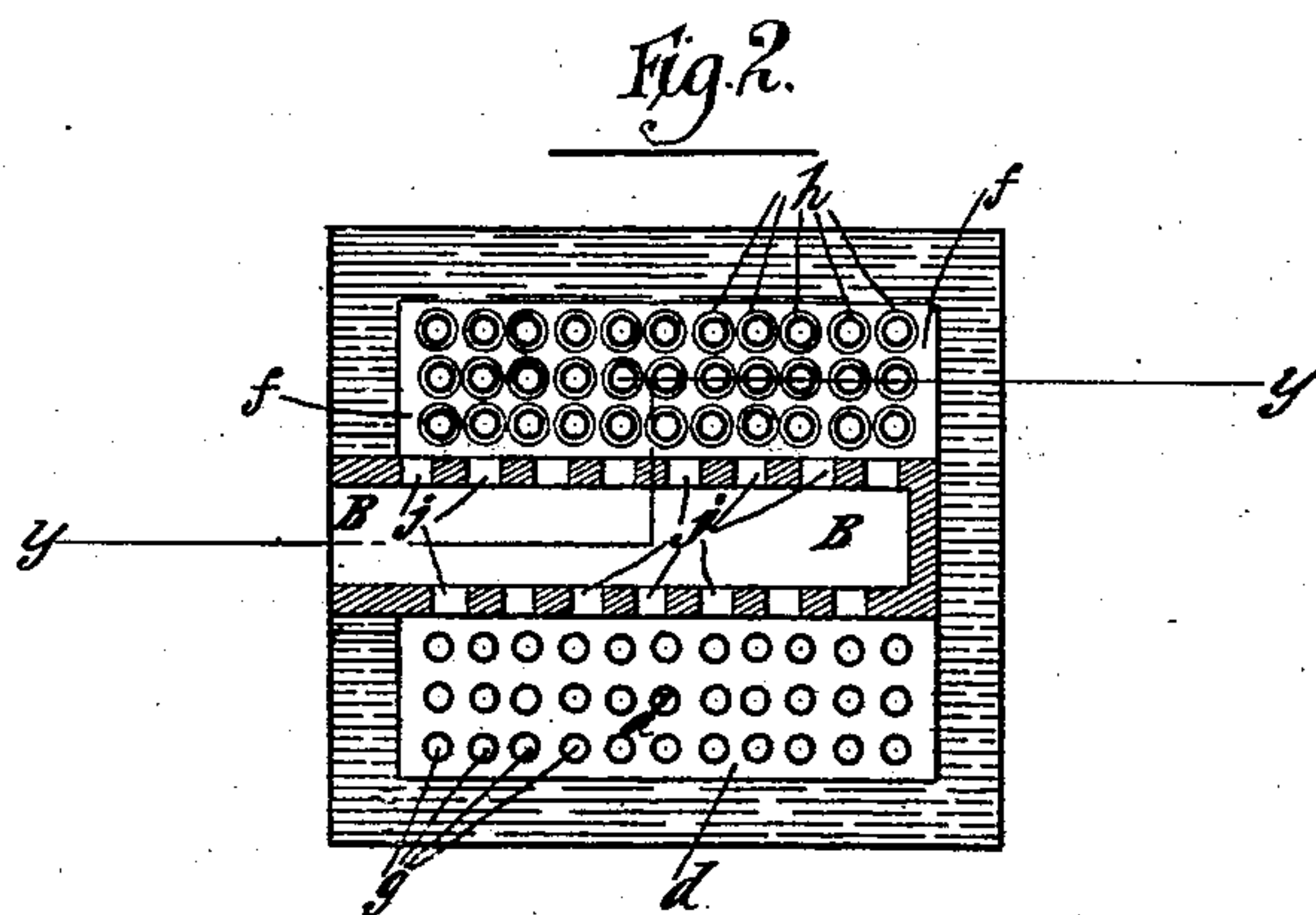
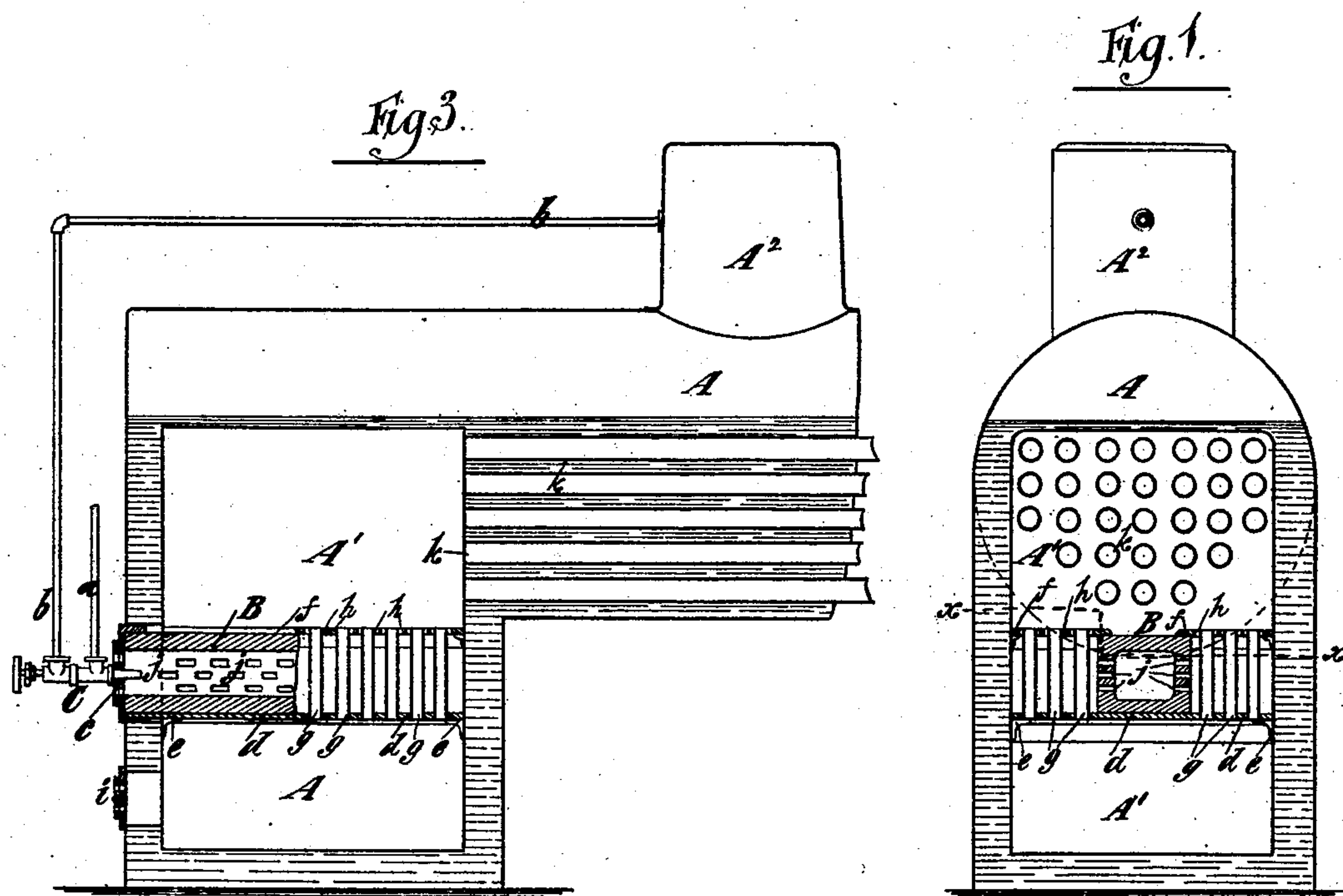


(No Model.)

W. W. THOMAS.
Furnace for Burning Hydrocarbons.

No. 243,472.

Patented June 28, 1881.



Witnesses:-

Geo. H. Hays
Ac. Webb

Inventor.

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UNITED STATES PATENT OFFICE.

WILLIAM W. THOMAS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO SAMUEL T. THOMAS, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE FOR BURNING HYDROCARBONS.

SPECIFICATION forming part of Letters Patent No. 243,472, dated June 28, 1881.

Application filed March 22, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. THOMAS, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain
5 new and useful Improvements for Burning Hydrocarbon Liquids in Furnaces, of which the following is a specification.

My invention relates to furnaces in which are arranged perforated retorts in which com-
10 bustible gases are generated from steam and hydrocarbon liquid—such as tar—injected thereinto, and in which the said gases are ignited, so that they issue therefrom in an ignited condition into the furnace, wherein they
15 meet with a further supply of air and are subjected to more or less combustion. In such furnaces it is found that the tendency of the gas issuing from the perforations of the retort is to pass immediately to the furnace-exit or to
20 the flues of a boiler if the furnace be a boiler-furnace, and hence it has been difficult to effect so perfect a mixture of the gases and air in the furnace as to effect perfect combustion.

The object of my invention is to retain the
25 gas in and spread it throughout the furnace, and also to heat the air which enters the furnace to support combustion, and to insure the thorough commingling of the heated air and gas, and consequently a more perfect combus-
30 tion and greater economy.

To these ends the invention consists in the combination, with a furnace, a perforated re-
tort arranged therein, and means for introduc-
35 ing steam and hydrocarbon liquid into said retort, of partition-plates above and below said retort, between which gas may escape from said retort, and the upper one of which is constructed with apertures and tubes projecting
40 upward from the lower partition-plate, through which air may pass upward to combine with the gas in the portion of the furnace above, such tubes being also heated by the gas to heat the air preparatory to its mixture with gas from the retort.

45 In the accompanying drawings, Figure 1 represents a transverse vertical section through the furnace or fire-box of a boiler of the locomotive type embodying my invention. Fig. 2 represents a horizontal section on the irregu-
50 lar dotted line *xx*, Fig. 1, and Fig. 3 repre-

sents a longitudinal section upon the dotted line *yy*, Fig. 2.

Similar letters of reference designate corresponding parts in all the figures.

A designates the boiler, and A' the furnace 55 or fire-box thereof, which is of ordinary form. Within the furnace or fire-box is a horizontally-arranged retort, B, of fire-clay or other suitable refractory or other material, which is here represented as extending the entire length 60 of the furnace and projects through the front wall thereof.

C designates an atomizer or injector, which constitutes the means for introducing hydro-
carbon liquid—such as tar and steam—into the 65 retort. The supply of hydrocarbon liquid may be derived through a pipe, *a*, from an elevated tank or other source of supply, and is injected into the retort in the form of spray by steam, which is taken through a pipe, *b*, from the 70 steam-dome A² of the boiler. The air necessary to mingle with the hydrocarbon liquid and steam to support combustion in the retort may be supplied to the retort B by a damper, C, in the head thereof. 75

Below the retort B is represented a horizontal partition-plate, *d*, which is supported upon a flange, *e*, projecting from the interior wall of the furnace or fire-box A', and upon which the retort B rests, and above the retort and resting 80 thereon is a second plate, *f*, composed of two sections.

Projecting upward from the lower plate, *d*, and upon each side of the retort B, are tubes 85 *g*, which are screwed or otherwise secured in tube-holes in the lower plate, *d*, and project through apertures or holes *h* in the upper plate, *f*, which are, however, somewhat larger than the said tubes, as seen clearly in Fig. 2. In 90 lieu of the apertures or holes being concentric with the tubes *g*, they might be otherwise placed.

Below the lower plate, *d*, in the front of the furnace A', is a damper, *i*, through which air enters, and it will be seen that no air can pass 95 upward into the upper part of the furnace or fire-box above the retort and plate *f* without passing through the tubes *g*.

In the sides of the retort B are numerous perforations, *j*, through which gas may issue 100

from the retort, and it is obvious that gas so issuing between the plates *d* and *f* can escape into the space in the upper part of the furnace or fire-box only by passing through the apertures *h* in the upper plate, *f*.

5 In starting the apparatus, a vessel or pan containing inflammable liquid or other inflammable or combustible material may be placed in the retort and said material ignited. The
10 steam is then turned onto the atomizer or injector and the retort filled with spray of mingled hydrocarbon liquid and steam, which is ignited and burns freely. The retort is thereby so highly heated that the air, steam, and
15 hydrocarbon liquid admitted are decomposed and converted into a gas. The products of the combustion of gas in the retort and the unignited but highly-heated gas issue from the perforations *j*, and, coming in contact with the
20 tubes *g*, heat them and the air passing through them. The gas and the air issuing from the apertures *h* and tubes *g* into the upper part of the furnace or fire-box are there intimately commingled and a very complete combustion
25 of the gas produced. The heat is distributed quite evenly through the furnace, and the products of combustion pass through the tubes or flues *k* of the boiler, effectively heating the same.

By my invention the partially-consumed gas 30 is prevented from passing too rapidly to the rear of the furnace, and as it heats the air a very perfect combustion is produced and a consequent economy of fuel.

What I claim as my invention is—

35 1. The combination, with a furnace, a perforated retort arranged therein, and means for introducing steam and hydrocarbon liquid into said retort, of partition-plates above and below said retort, between which gas may escape 40 from said retort, and the upper one of which is constructed with apertures, and air-tubes projecting upward from the lower partition-plate, through which air may pass upward to combine with the gas, and which are heated 45 by the gas, substantially as and for the purpose specified.

2. The combination of the furnace A', the perforated retort B, the atomizer C, the plate *d*, the tubes *g*, projecting upward from said 50 plate, and the plate *f*, having apertures *h*, substantially as and for the purpose specified.

WILLIAM W. THOMAS.

Witnesses:

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