(No Model.) 2 Sheets—Sheet 1.

J. L. KITE.

Hydrocarbon Furnace.

No. 238,695. Patented March 8, 1881.

FIG. 1.

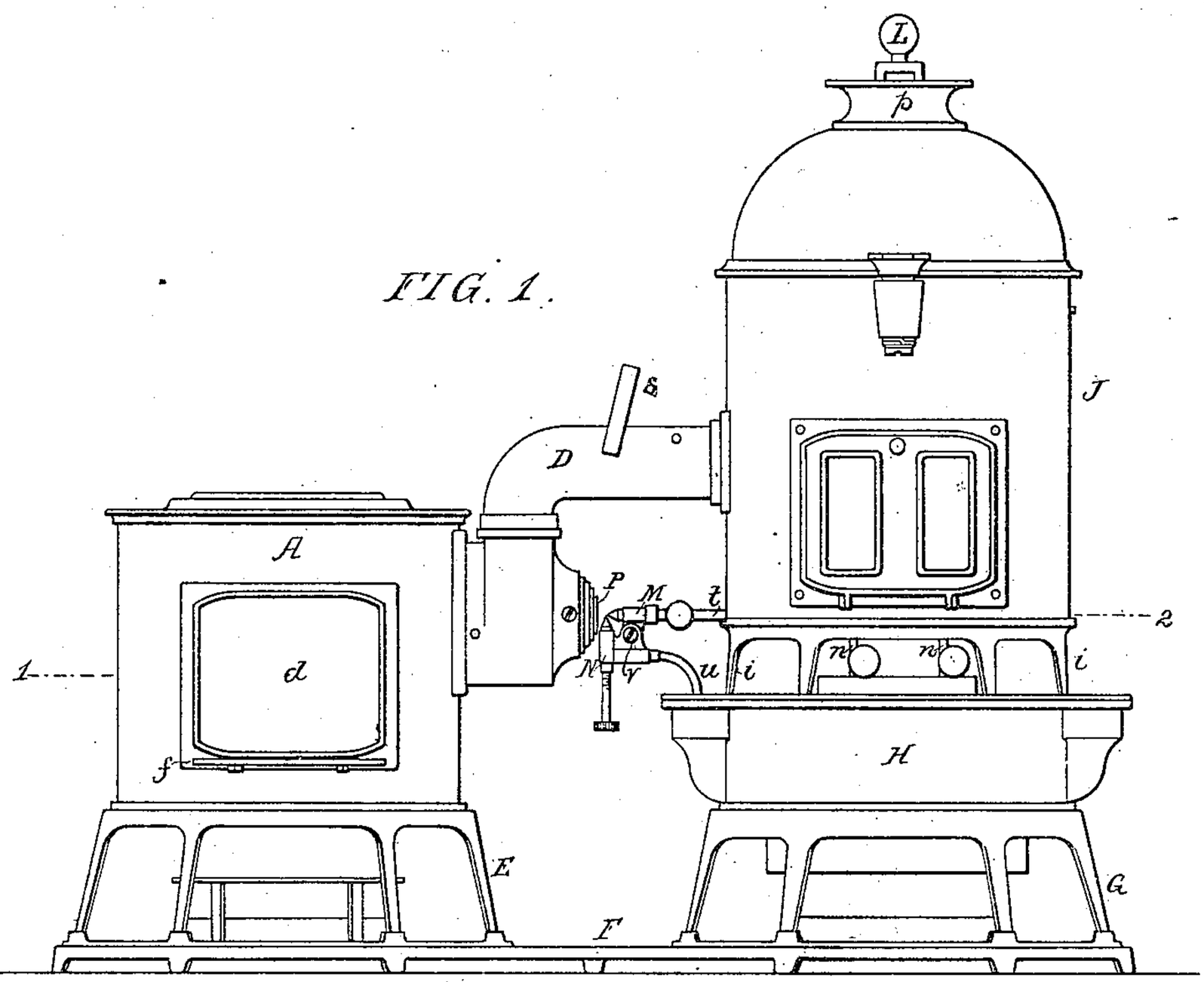
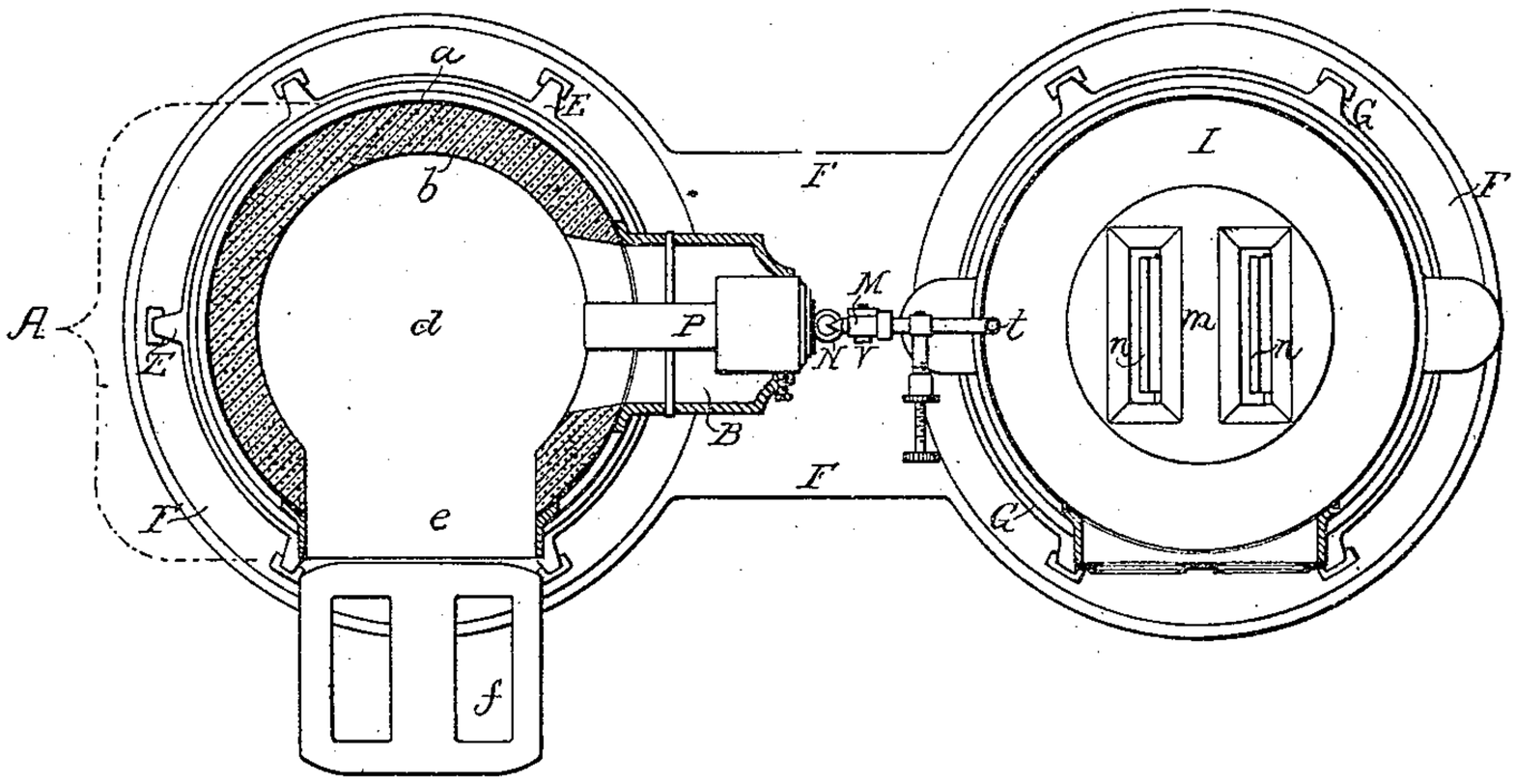


FIG. 2.



WITNESSES:
James F. Tobin.
Henry Howson Jr.

INVENTOR:
John L. Kite
by his attorneys.
Howson and Son

(No Model.) 2 Sheets—Sheet 2.

J. L. KITE.

Hydrocarbon Furnace.

No. 238,695. Patented March 8, 1881.

FIG. 3.

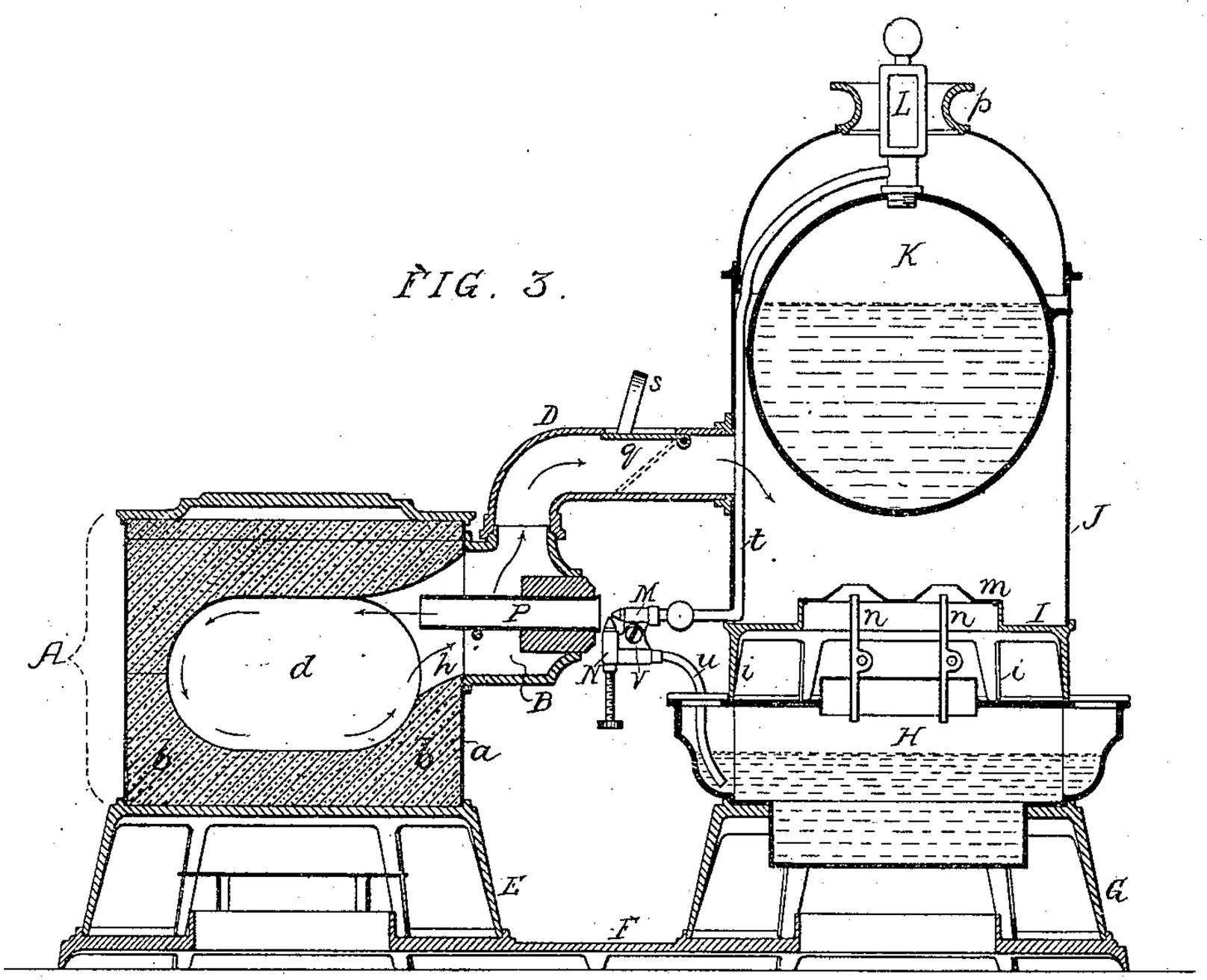


FIG. 4.

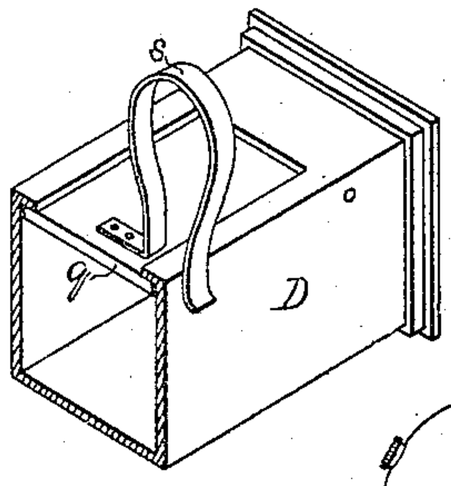


FIG. 5.

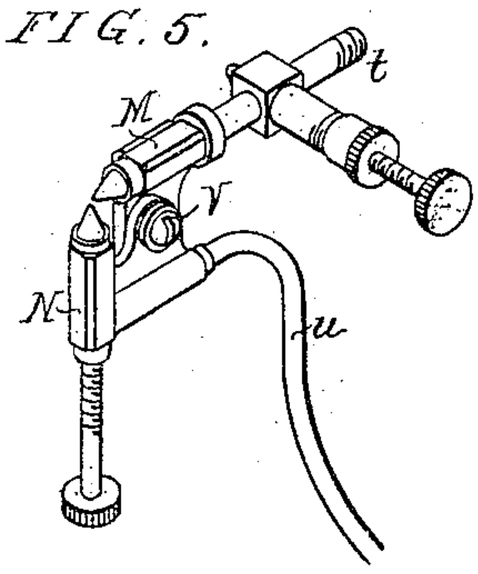
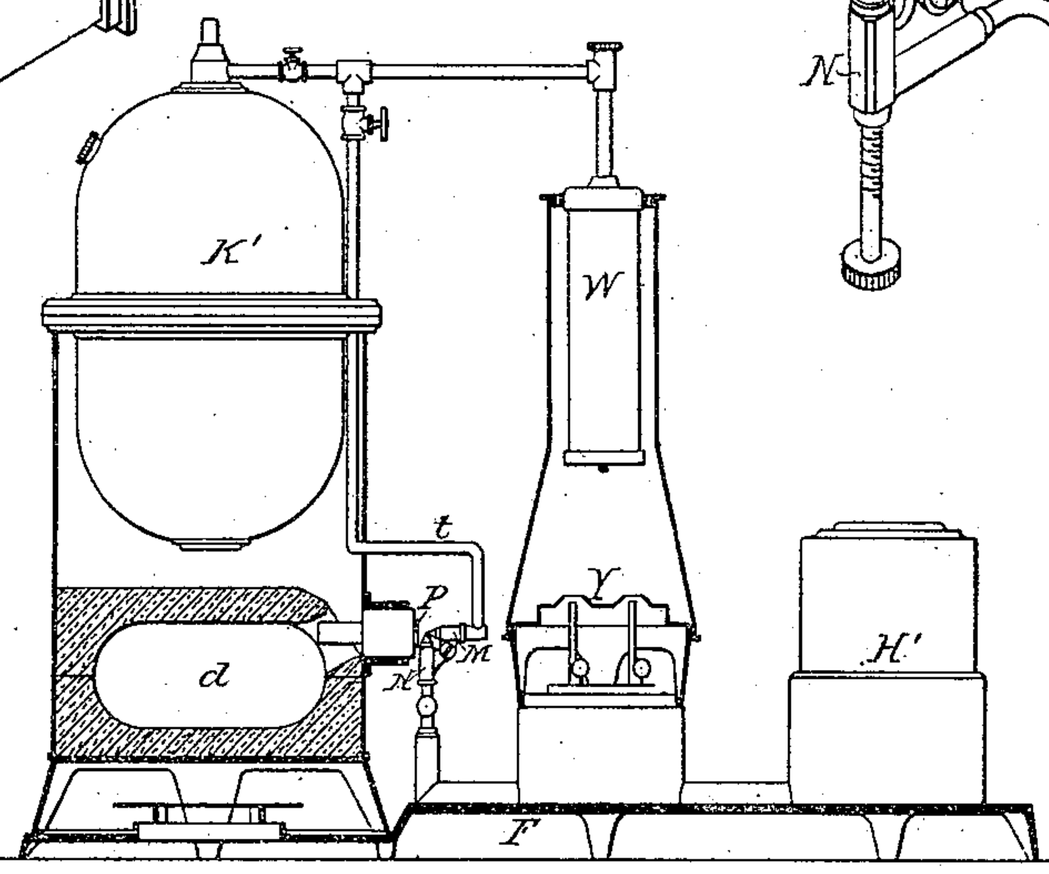


FIG. 6.



WITNESSES:

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INVENTOR:

John L. Kite.

by his Attorneys.

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UNITED STATES PATENT OFFICE.

JOHN L. KITE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO BENJAMIN GITHENS, OF SAME PLACE.

HYDROCARBON-FURNACE.

SPECIFICATION forming part of Letters Patent No. 238,695, dated March 8, 1881.

Application filed September 3, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. KITE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Furnaces Using Hydrocarbon as Fuel, of which the following is a specification.

My invention consists of certain improvements, fully described hereinafter, in that class of furnaces in which liquid hydrocarbons are used as a fuel by causing a jet of steam to atomize a jet of the said liquid, and to inject the spray or vapor, combined with steam, into the furnace.

In the accompanying drawings, Figure 1, Sheet 1, is a side view of my hydrocarbon furnace and apparatus connected therewith; Fig. 2, a sectional plan on the line 1 2, Fig. 1; Fig. 3, a vertical section; Figs. 4 and 5, detached perspective views of parts of my improvements, drawn to an enlarged scale; and Fig. 6, a side view, partly in section, drawn to a reduced scale, and illustrating a modification of my improvements.

In Figs. 1, 2, and 3, A is the furnace, consisting of a casing, *a*, and lining *b*, of fire-brick or other equivalent refractory material, inclosing a chamber, *d*, which is preferably of the circular form, as shown in Fig. 2, and rounded, as shown in Fig. 3. In other words, the interior of the furnace is, by preference, made in the form of a flattened sphere, a shape which I have found to be the best in practice.

The furnace is, in the present instance, adapted to the heating of soldering-irons, to admit which there is an opening, *e*, Fig. 2, in front of the furnace, and from the lower edge of this opening projects a tray, *f*, affording a rest for the stems of the said irons. It should be understood, however, that the furnace may be used for a variety of purposes, and that the character and location of the opening *e*, as well as any doors with which the opening or openings may be furnished, may be altered, as the different uses of the furnace may suggest.

There is an outlet, *h*, from the chamber *d* of the furnace, and this outlet communicates with the interior of a chest, B, secured to the casing, the products of combustion from the furnace being carried off from the chest through a pipe, D, and disposed of in the manner described hereinafter.

The furnace is supported on an appropriate stand, E, resting on and secured to a base-plate, F, to which is also secured a stand supporting a reservoir, H, containing liquid hydrocarbon.

On the top of the reservoir rest the legs *i* of the plate I, from the upper face of which projects the dome *m*, wick-tubes *n n* projecting upward from the reservoir H into this dome, in the top of which, above the tubes, are slots common to other coal-oil lamps.

The lower end of a casing, J, is secured to the plate I, and within this casing is suspended a small steam-boiler, K, preferably of spherical form, the boiler being furnished at the top with a safety-valve, L, which projects through the outlet *p* at the top of the casing. The products of combustion from the furnace can pass into the space within the casing J through the pipe D when the valve or damper *q* has been raised, this damper being hinged to one end of an oblong or square opening in the top of the pipe, and being provided with a spring, *s*, which, bearing against the exterior of the pipe, serves to maintain the damper in any position to which it may be adjusted. (See Fig. 4.)

A steam-pipe, *t*, extends from the lower portion of the safety-valve, or from any point in the upper portion of the steam-boiler, downward within the casing J, and through the same to a horizontal nozzle, M, the flow of steam through which is regulated by a suitable cock, and there is a vertical nozzle, N, communicating through a tube, *u*, with the interior of the reservoir H, the lower end of this tube being always immersed in the liquid contained in the reservoir. The nozzle N is also furnished with a suitable valve for regulating the flow of liquid from the same. The two nozzles are hinged together by a set-screw, *v*, as best observed in the enlarged perspective view, Fig. 5, so that the tips of the nozzles may be adjusted in respect to each other and in respect to a copper pipe, P, which extends through the chest B into the outlet *h* of the furnace-chamber, and nearly into the latter, the pipe, where it passes through

the chest, being surrounded by a cylinder of plaster-of-paris or other non-conducting refractory material, the said cylinder being fitted snugly in an opening in the chest. This cylinder prevents the communication of the heat to which the pipe P is subjected to the pipe D and casing J. Steam is, in the first instance, generated in the boiler K by the flame of the lamp while the damper *q* and the cocks of the nozzles are closed, and when the steam has reached the desired pressure the lamps are extinguished and the cocks of the nozzles and the valve *q* opened. Steam passes through the pipe *t* and escapes in a small forcible jet from the nozzle M, and this induces the liquid hydrocarbon to rise through the tube to the nozzle N, the liquid escaping from which is vaporized or atomized by the steam-jet, and the two together, intimately admixed with air, are projected through the pipe P into the furnace. The said pipe P being exposed to the products of combustion as they escape from the furnace to the pipe D, the vapor, composed of the three elements, must necessarily be highly heated. It is not ignited in the pipe, however, but escapes in the condition of a forcible and intensely hot flame from the said pipe, the heat of the flame being intensified by the preliminary heating of the vapor. This interposition between the chamber of the furnace and the nozzles of a pipe, P, open at its outer end for the admission of air and exposed to heat, is an important feature of my invention, as the most valuable results have been attained by this arrangement.

It will be observed that the pipe P is so arranged, in respect to the chamber *d* of the furnace, that the flame must pass in contact with the roof of the same, and must take the general course indicated by the arrows, Fig. 3, the flame being disseminated throughout the entire chamber, and the heated products of combustion passing in contact with the pipe P into the chamber within the casing J, where they serve to superheat the steam passing through the pipe *t*, and to impart the desired heat to the boiler K before they escape at the outlet *p*. The volume of the products of combustion permitted to enter the casing J, and consequently the degree of heat imparted to the boiler K, are regulated by the adjustment of the damper *q* in a manner which will be readily understood.

A nice adjustment of the nozzles, both in respect to each other and to the pipe P, is required, and this adjustment can be readily brought about after loosening the screw *v*, when the tips of either of the nozzles can be raised or lowered, the said screw being tightened after adjustment.

In the modification shown in Fig. 6, the furnace, the pipe P, and the nozzles are the same as in the apparatus above described; but the steam-boiler, instead of being separate from the furnace, is situated directly above the same, the lower portion of the boiler being contained in a continuation of the casing of the furnace. There is a small supplementary steam-boiler, W, in which steam is generated by a lamp, Y, in the first instance, and from which the steam is directed to the nozzle M until the furnace is hot enough to generate steam in the main boiler. In this case the oil-tank H′ is situated apart from the lamp instead of beneath the same.

I claim as my invention—

1. The combination of the furnace, the pipe P, exposed to the heated products of combustion from the said furnace and open at the outer end, and the steam and hydrocarbon nozzles M N, located adjacent to the open outer end of the pipe P, whereby steam, air, and hydrocarbon are caused to enter said pipe, and are mixed and heated in their passage through the same, as set forth.

2. The combination of the furnace and the vapor-supplying devices with the mixing-pipe P, located in the outlet-flue of the furnace, and directly exposed to the heated products of combustion in their passage from the furnace, as set forth.

3. The combination of the furnace, having a chamber, *d*, and outlet *h*, with the pipe P, arranged, in respect to the roof of the furnace, substantially as described.

4. The combination of the furnace and the chest B with the tube P, of metal, passing into the said chest, but isolated from the metal thereof by non-conducting material, substantially as set forth.

5. The combination of a furnace, a casing, J, a steam-boiler contained wholly or partly within the said casing, hydrocarbon-burning appliances, substantially as described, and a pipe or passage through which the products of combustion are directed from the furnace to the said casing, as specified.

6. The combination of the furnace, the casing J of the steam-boiler, the communicating pipe or passage D, and its damper *q*, as specified.

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

JOHN L. KITE.

Witnesses:
JAMES F. TOBIN,
HARRY SMITH.