

No. 641,776.

Patented Jan. 23, 1900.

A. T. INGALLS.
HYDROCARBON BURNER.

(Application filed Mar. 21, 1898.)

(No Model.)

FIG. 1.

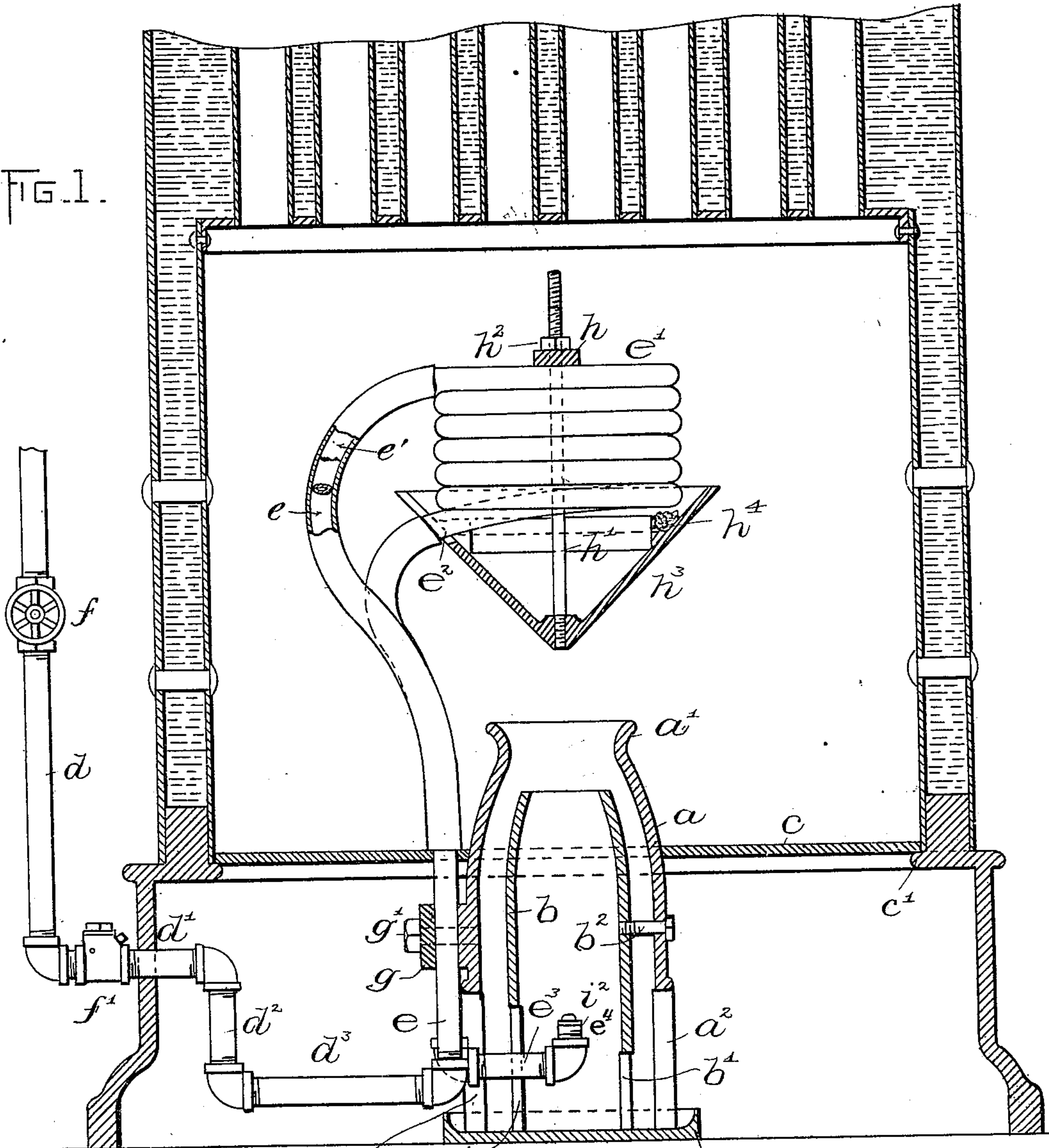


FIG. 3.

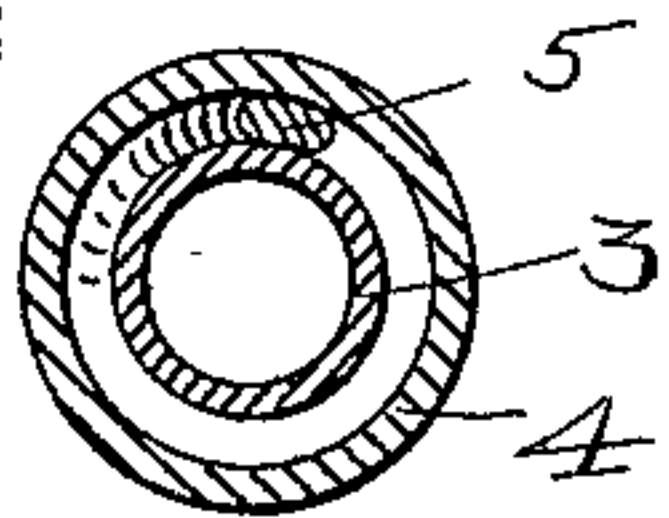


FIG. 2

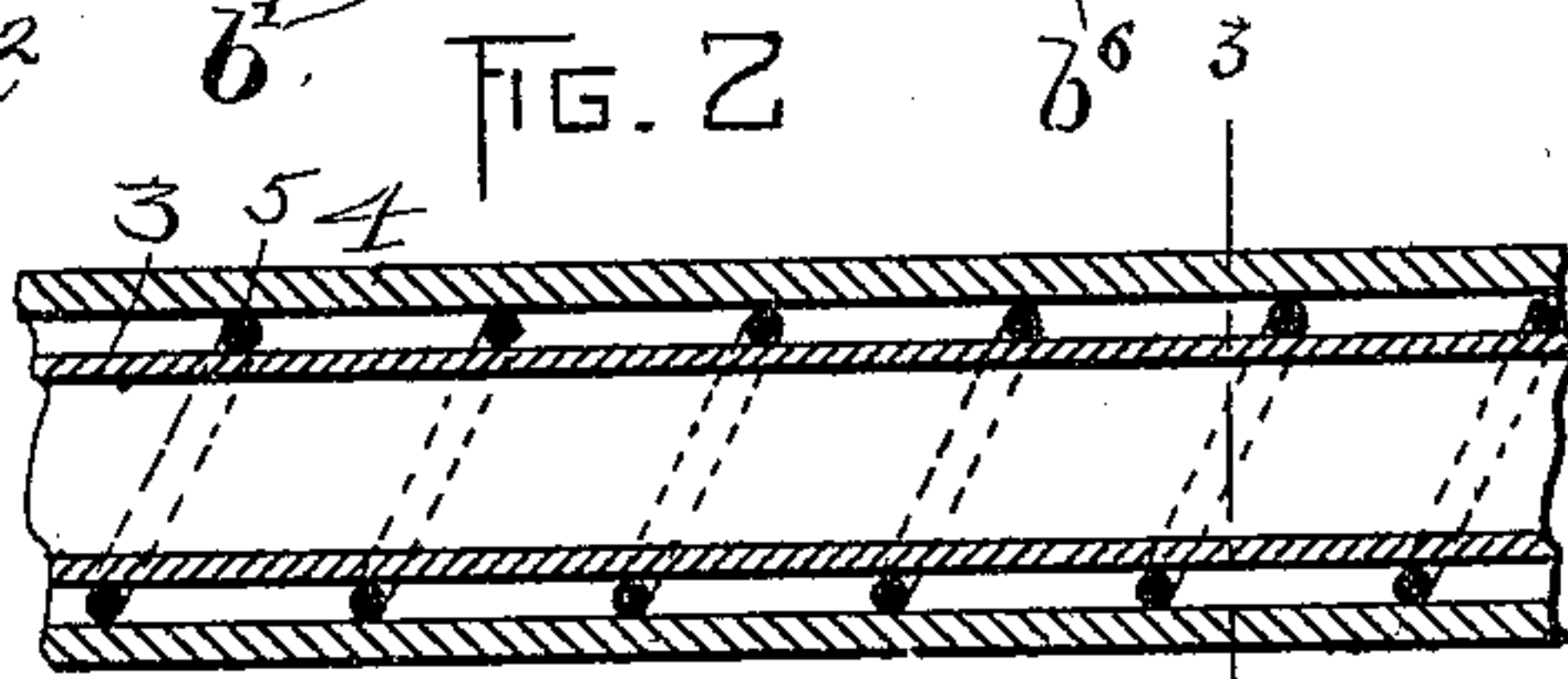
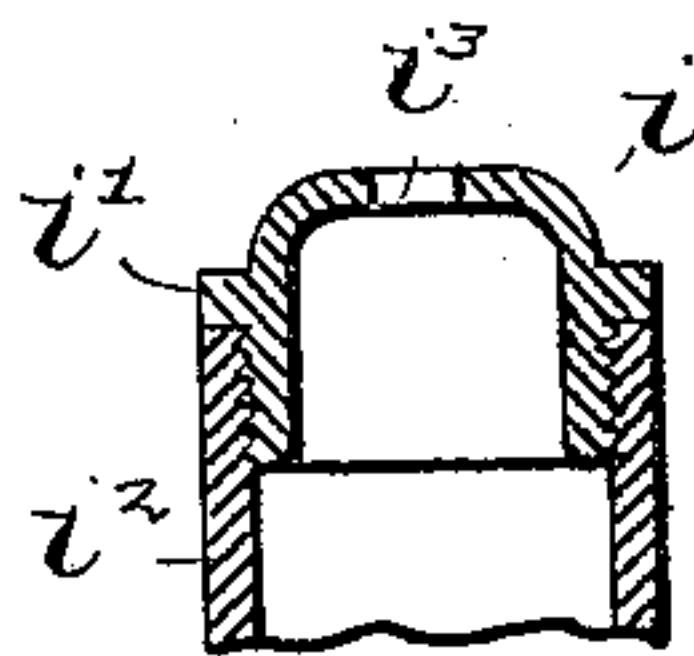


FIG. 4.



WITNESSES:

A. D. Harrison.

P. W. Pezzetti.

INVENTOR:

Almond T. Ingalls

by Wright, Brown & Quincy
Attys.

UNITED STATES PATENT OFFICE.

ALMOND T. INGALLS, OF MALDEN, MASSACHUSETTS.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 641,776, dated January 23, 1900.

Application filed March 21, 1898. Serial No. 674,559. (No model.)

To all whom it may concern:

Be it known that I, ALMOND T. INGALLS, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

This invention has relation to apparatus for vaporizing and burning fluid hydrocarbons. In devices for accomplishing this purpose as heretofore constructed great difficulty has been experienced from the accumulation and coking of a residuum in the pipes before the vapor issues from the nozzle of the burner and is ignited. Generally the fluid hydrocarbon is carried through a coil of pipe to the burner, the coil being heated so as to generate a vapor as the liquid passes through it; but by reason of the intense heat which is directed around or against the coil the hydrocarbon is coked in the pipes to such an extent as to seriously interfere with the proper distribution of the vapor to the burner. I have found by experience that unless the hydrocarbon of which the vapor is generated is exposed to a practically constant heat which is not more intense at one place than at another the flow of vapor is such as to cause the flame to increase or diminish at regular intervals, caused by the vapor being delivered from the burner in intermittent jets or puffs.

Therefore the object of this present invention is to provide a hydrocarbon-burner in which the flow of the vapor shall remain constant and the vapor be delivered at the same pressure; and to accomplish this I embody the invention in an apparatus possessing certain features of construction and relative arrangement of parts, which I have illustrated upon the drawings and shall now proceed to describe in detail and then point out in the claims.

Reference is to be had to the accompanying drawings and to the letters and figures marked thereon, the same letters and figures indicating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 represents in section a furnace in which is placed my improved apparatus. Fig. 2 represents a longitudinal section through a portion of the pipe of which the generator is formed. Fig. 3 represents a transverse section of the same on the line 3 3

of Fig. 2. Fig. 4 represents in section the burner.

My invention may be utilized in connection with furnaces and stoves of various kinds, but upon the drawings I have illustrated it as being employed in connection with an upright-boiler furnace, which I shall not describe.

The apparatus which embodies the present invention is illustrated as having an outer shell or casing a , the upper portion of which is contracted and then flared outwardly, as at a' . It is formed with enlarged openings or air-inlets a^2 to supply oxygen to the flame, there being two of them located diametrically opposite each other, though their number may be increased or decreased, as desired.

Within the casing a is an inner casing b , which forms a combustion-chamber and which is similar in shape to the casing a , except that it lacks the flaring end. It is reduced in cross-diameter, so as to leave an annular space between it and the outer casing, and it is somewhat shorter than the latter, ending in a plane below the contracted throat at the upper end thereof. The casing b is likewise provided with air-inlets b' , which are considerably less in area than the inlets a^2 .

The two casings are maintained in their relative positions by spacing-screws b^2 passed through the outer one and threaded into the inner one, and they rest in a catch-basin b^6 upon the grate-bars of the furnace fire-box or on the base of the ash-pit, as shown upon the drawings. In the latter event the grate-bars are removed and a plate c , having an aperture to receive the upper part of the casing a , is placed in the fire-box, with its edges resting upon the rib or projection c' , extending inward from the walls of the furnace.

The liquid hydrocarbon flows from a reservoir or receptacle (not shown) above the plane of the coil to be described downward through the vertical pipe d into the pipes d' d^2 d^3 , from whence it passes through the pipe e to the vaporizing-coil e' . From thence the vapor passes downwardly through pipe e^2 , outside the casing a , into the pipe e^3 , which passes through the air-inlets a^2 b' in the casings and on the end of which the burner e^4 is placed.

There is a regulating-valve f placed in the pipe d and a check-valve f' in the pipe d' , so that the flow of liquid can be regulated and

the back pressure caused by the vaporization of the liquid resisted.

The coil e' is supported by the vertical pipes e e^2 , and the latter are attached to the casing a by a clamp g , and a set-screw g' , passed through the latter into the casing, so that the pipes and the coil are maintained in position.

The vaporizing-coil is placed with its axis substantially coincident with the axes of the casings, as illustrated upon the drawings, whereby it is surrounded by the heat generated by the flame. Across the top convolution of the coil is placed a supporting-bar h , through which is loosely passed a rod h' , threaded at its upper end to receive a nut h^2 , which rests upon the bar h . The lower end of the rod is likewise threaded to extend into the apex of a conical flame-deflector h^3 , placed beneath the coil in an inverted position and having its edges extending beyond the coil. Within the deflector is placed a circular trough h^4 , in which is placed oakum or felt, which is saturated with naphtha or kerosene to initially generate vapor in the coil.

The pipes e and e^2 are covered with asbestos or other fireproof material, the covering extending from the vaporizing-coil to the plate c , the said covering being represented in Fig. 1 as having a portion thereof removed from near the upper portion of the pipe e , and thus showing a portion of said pipe as uncovered. The said pipes e e^2 , as well as the pipe forming the coil, are constructed as illustrated in Figs. 2 and 3—that is to say, the pipe has an outer shell 4 and an inner shell 3 concentric therewith, so that there is an annular air-space between them. To maintain the two shells of the pipe in the concentric relation during the use of the device, as well as during the bending of the pipes, a wire 5 of the proper cross-diameter is wrapped spirally around the inner tube or shell, and the outer tube or shell is slipped over them. Then the pipe can be coiled without disturbing the relation of the two shells, and said relation cannot be altered during the use of the device, as by any warping or distortion of the coils when subjected to intense heat.

The burner consists of a thimble or nipple i , having a radial flange i' and threaded, so as to be screwed into the tube i^2 . In the end of the thimble is a contracted opening i^3 , through which the vaporized hydrocarbon is emitted.

To light the apparatus, the hydrocarbon is allowed to flow into the coil, and a small amount of naphtha, kerosene, or other inflammable fluid is placed in the trough h^4 in the deflector and ignited. After a minute or two the vaporizing-coil becomes sufficiently heated to vaporize the liquid, and the vapor flows through the burner and is ignited with a match or torch. Combustion immediately takes place in the combustion-chamber and the

flame gushes upward through the contracted mouth or throat of the outer casing and is divided by the deflector, a sufficient quantity of oxygen being supplied to the combustion-chamber through the inlets b' b' and to the chamber in the fire-box through the inlets a^2 a^2 and the annular chamber surrounding the combustion-chamber. The heat generated by the flame is intense, and the hydrocarbon is vaporized immediately upon entering the coil e' ; but although the heat in the fire-box is intense, as said, the hydrocarbon is not coked in the pipes, since it is protected by the annular air-space between the two shells of the pipe, and consequently the flow of the vapor is constant and uniform and the pressure thereof is practically unvarying.

The deflector may be adjusted vertically to spread the flame more or less, according to the number of tubes in the boiler, by screwing the nut upon the pendent rod. The pan in the ash-pit catches the drop from the burner when the valve is first opened and before the vapor is generated, whereby the hydrocarbon is prevented from spreading over the floor of the ash-pit.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. A conduit for the vaporization of hydrocarbons, comprising in its construction inner and outer coiled tubes or shells having an air-space between them, and an interposed coil of wire for preserving the relative positions of the two shells.

2. An apparatus for burning hydrocarbons, comprising a burner, a combustion-chamber in which said burner is located, and a vaporizing-coil located above the burner, and formed of an inner shell or tube and an outer shell or tube separated by an air-space, and a wire wrapped spirally around the inner shell or tube to maintain the two shells or tubes in their relative positions.

3. An apparatus for burning hydrocarbons, comprising a burner, a vaporizing-coil, a bar resting on said coil, a rod passed through said bar and threaded at its upper end and having a nut resting on the bar, and a deflector secured to the lower end of the rod and arranged below the coil and above the burner and adapted to spread the flame more or less, said deflector having an internal annular trough containing absorbent material, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALMOND T. INGALLS.

Witnesses:

A. D. HARRISON,
C. F. BROWN.