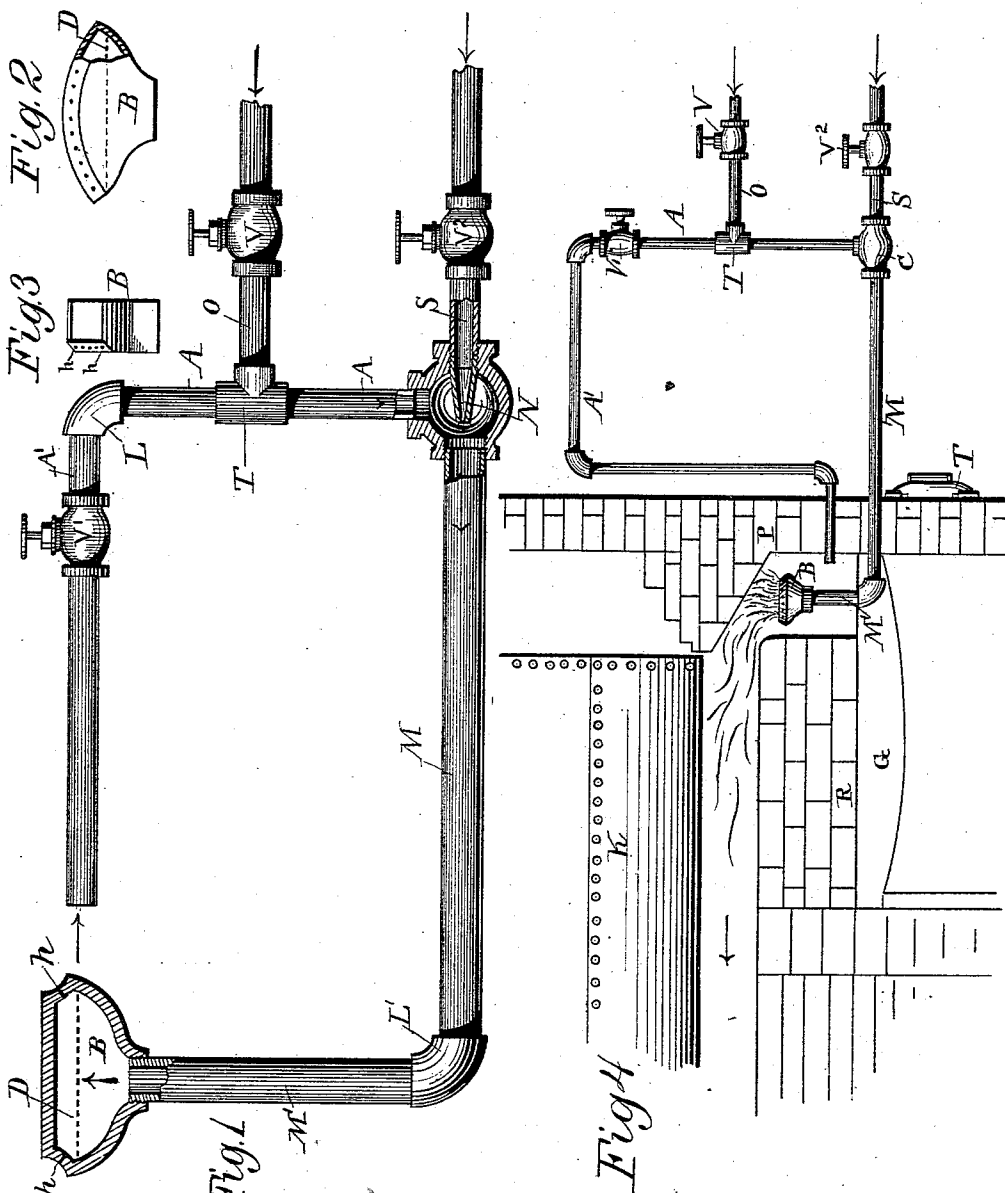


(No Model.)

J. F. SEERY.
HYDROCARBON BURNER.

No. 379,291.

Patented Mar. 13, 1888.



Witnesses:
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JAMES F. SEERY, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE EMPIRE
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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 379,291, dated March 13, 1888.

Application filed April 5, 1886. Serial No. 197,817. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. SEERY, a citizen of the United States, and a resident of the city of Brooklyn, Kings county, State of New York, have invented a new and useful Improvement in Hydrocarbon-Burners, of which the following is a specification.

My improvement relates to that class of hydrocarbon-burners which are adapted to be used in glory-holes, furnaces, annealing-ovens, leers, &c.; and it consists in so arranging the parts that crude, fuel-dead, or gas oils can be vaporized and burned instead of kerosene, naphtha, or other explosive and comparatively expensive oils, and, furthermore, that a steady and intensely-hot flame is produced and maintained. How I accomplish this result is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation, partly in section, of the improved complete burner. Fig. 2 is a side elevation of a special burner-head, partly in section, to show its interior construction; and Fig. 3 is an end view of Fig. 2. Fig. 4 represents a side elevation of the complete burner applied to a furnace under a boiler.

Similar letters of reference refer to similar parts in the several views.

O is a horizontal oil-supply pipe, which is connected at its far end to a tank situated at some distance from the burner and elevated above the said pipe, so that a continuous hydrostatic pressure is exerted on the oil within it. A valve, V, is placed on this pipe, so that the flow of oil may be governed. This pipe connects at T with the vertical section of air-pipe A, which at its lower end screws into a fitting that forms the atomizing-chamber C, and which incases the steam-jet nozzle N. This nozzle is of the usual tapering form, and is secured in its place in one of the horizontal openings of the atomizing-chamber. Above the fitting T a long nipple is screwed into it. The other end of the nipple screws into an elbow, L, thereby continuing air-pipe A', in a horizontal position. A valve or cock, V', is interposed in this pipe to regulate the amount of air to be supplied to the atomizing-chamber.

The connection of pipes A and A' with an

elbow is made when hot air is to be used, as will be more fully explained. When cold air is used, the pipe A' may stand in an opposite direction—that is, over the oil-pipe—or it may be dispensed with and the valve V' be placed in the vertical section of pipe A.

The steam-supply pipe S is screwed into the atomizing-chamber to butt up against the inlet of the jet-nozzle N, as shown. A valve, V', is set in this pipe to regulate the force or supply of steam. At its far end the steam-pipe is connected to a steam-generator.

M is a horizontal mixing-chamber, which is a pipe screwed into the atomizing-chamber opposite to or parallel with the steam-pipe. This pipe should be one or two sizes larger than the steam-pipe, which latter should be the same size as the oil and air pipes. An elbow, L', at its other end turns pipe M' vertically. These two connected pipes M M' form a simple and effective mixing-chamber, as will be more fully described hereinafter.

Burner-head B is annular in form, having a circle of small holes, h h, drilled through its beveled or concaved upper edge, as shown.

D is an inner diaphragm perforated with small holes. This diaphragm heats the atoms of mixed vapor passing through the perforations; distributes it equally into the upper chamber of the burner-head, and causes an even and steady flame.

For leers or annealing-ovens I prefer to use the flat burner-head shown by Figs. 2 and 3. The crown is segmental in form, having one or both edges beveled and a series of holes, h h, drilled through diagonally. This burner-head has the same interior diaphragm as the round burner-head. Therefore the description will apply to it. This burner, when in use, makes a flat fan-shaped flame.

In Fig. 1, which shows an arrangement for glass-makers' glory-holes and furnaces, the opening of the air-pipe is shown near the eye or center of the furnace supplying hot air to the atomizing and mixing chambers. When this is not practical or convenient, the air-pipe may be turned or so arranged that hot air is taken from some other source, or cold air may be substituted. Hot air, however, is preferable, because it assists in diffusing and heating the oil, and does not chill or condense

the steam, but, on the contrary, superheats it if the incoming air is hot enough.

Such being the construction, the operation is as follows: The three valves are partly turned on, steam first. The pressure and velocity of the steam issuing from the nozzle N create a partial vacuum in the atomizing-chamber and induce air to be drawn in through pipe A. The hydrostatic pressure on the oil, its gravity, and position, as well as the suction created by the steam-jet, assist its passage into the atomizing-chamber, where it is vaporized and forced into the mixing-chamber, where it is thoroughly mixed and heated in its passage to the burner, first striking the elbow L, and then the diaphragm D, and finally issuing as a heated and well-mixed hydrocarbon vapor from the holes in the burner-head. This vapor is then lighted.

As will be observed, the length of the mixing-chamber, together with the angles which the air, steam, and vaporized oil are compelled to turn, affords a simple and effective device for mixing the vapors thoroughly, heating them to a high degree, thus making an intensely-hot and, by reason of the low grade of oils used, an economical and steady flame.

The valves are so regulated that a proportionate amount of steam, air, and oil passes into the mixing-chamber. Too much of any one of these component vapors may cause the burner to be inoperative; hence a careful adjustment of the valves is necessary. To be accessible the valves should be located outside of the furnace-wall, which is shown by the long dotted line across Fig. 1.

I am aware that hydrocarbon-burners have been made for burning hydrocarbons in which steam and oil have been mixed and vaporized and air drawn in at some point. I am not

aware, however, that a valve to regulate the supply of air has ever been used on this class of burners; neither am I aware of a method or do I know of an apparatus for vaporizing and burning hydrocarbons in which the air, either hot or cold, was first mixed with the oil and afterward vaporized by a jet of steam in the manner described by me. In the construction of these furnaces it makes a material difference which of the two vapors is mixed first. I find that when hot air and oil are first brought in contact with each other above the steam and then permitted to mix with the steam, and these mixed vapors carried through a mixing-chamber with one or more bends, the result is a steady intensely-hot flame, suitable for boilers, furnaces, glory-holes, and the like.

I do not broadly claim a mode or method for vaporizing and burning hydrocarbons; but

What I claim as new, and desire to secure by Letters Patent, is—

In hydrocarbon-burners, a horizontal and vertical air-supply pipe having its inlet at or near the center of the furnace and provided with a valve, an oil-supply pipe connecting with said air-pipe above the atomizing-chamber at a convenient point, in combination with a steam-pipe, as S, and a mixing-chamber formed of horizontal and vertical pipes, as M and M', arranged at right angles with each other, the vertical one being surmounted at its end with a suitable burner, substantially as described and set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two witnesses.

JAMES F. SEERY.

Witnesses:

HENRY L. CORNELL,

WILLIAM L. TREADWELL.