No. 877,898. PATENTED FEB. 4, 1908.

S. W. BATES.

HYDROCARBON BURNER.

APPLICATION FILED APR. 11, 1903.

Fig. 1.

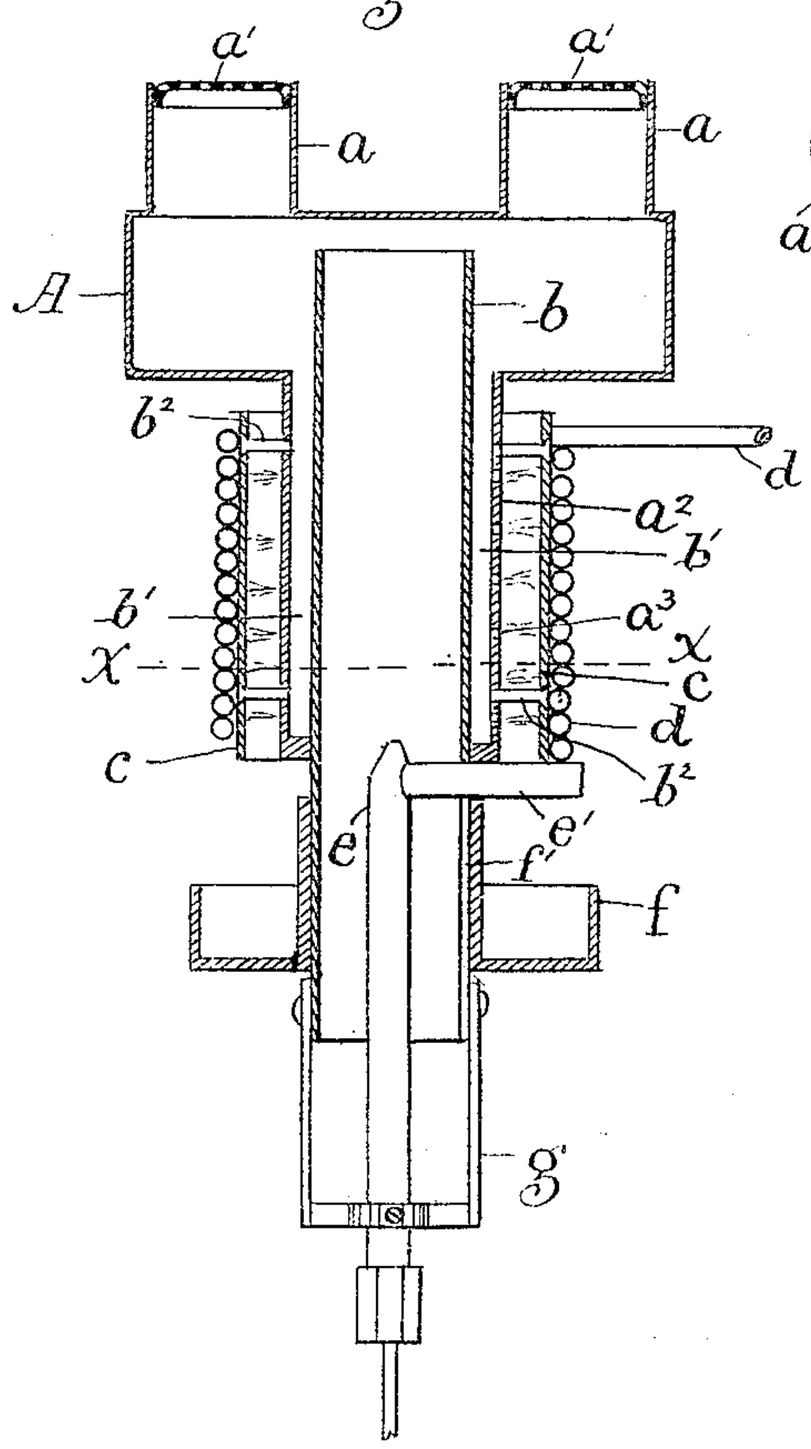


Fig. 2.

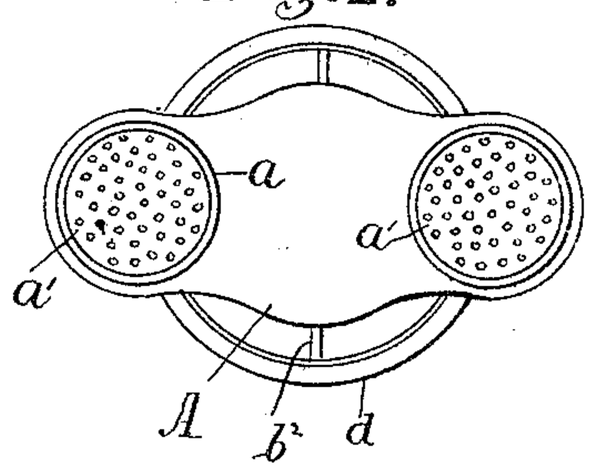


Fig. 3.

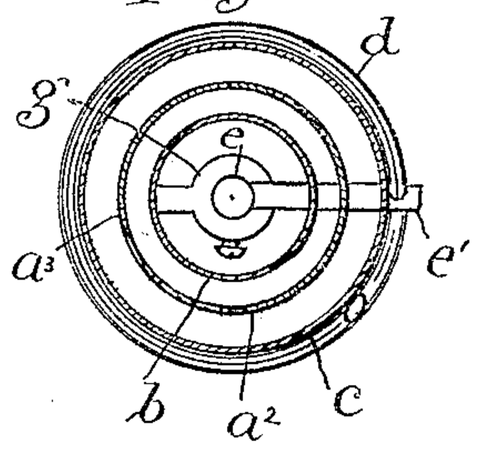
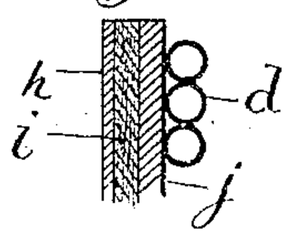


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

No. 877,898. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed April 11, 1903. Serial No. 152,128.

To all whom it may concern:

Be it known that I, SOLOMON W. BATES, a citizen of the United States of America, and a resident of Portland, Cumberland county, State of Maine, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

My invention relates to a hydro-carbon burner of that class wherein the oil is vaporized in a retort and discharged from a needle valve into a mixing tube and mixing chamber, then issuing from and burning above a perforated diaphragm.

Burners of this type are commonly used for producing light with incandescent mantles and my invention relates particularly to a burner of this class for lighting although it is equally well adapted for heating.

In this class of burners it has hitherto been difficult to regulate the heat to which the vaporizing retort is subjected. The retort has been heated in two ways, first by the heat of the main flame or flames which arose from the mantle and second by a "sub-flame" which was a small auxiliary flame formed from jets of flame from a downward extension of the mixing chamber into which air and vapor were forced by the internal pressure of the chamber.

My invention resides in a "sub-flame" burner so constructed that the amount of heat applied to the vaporizing chamber may be accurately gaged whereby carbonizing or overheating of the vapor may be avoided.

In my burner the oil is vaporized in a coil wound on an imperforate coil cylinder which is preferably formed in part of insulating material so as to let but a limited amount of heat through and the sub-flame acts against the inner surface of this cylinder burning in an annular flame space formed between the inner surface of the imperforate coil cylinder and the perforated walls of the mixing chamber or an extension thereof.

I illustrate my invention by means of the accompanying drawing in which is shown a mantle burner constructed according to my invention. Figure 1 is a central vertical section, Fig. 2 is a plan Fig. 3 is a section on $x\ x$ of Fig. 1 and Fig. 4 is a detail section through the coil cylinder.

A represents the mixing chamber and $a\ a$ are the burner tubes and $a'\ a'$ the perforated diaphragms above which the main flame burns. The mixing chamber is supplied with mixed vapor and air through the mixing tube b in the lower end of which is a vapor discharge nozzle here shown as a needle valve e having a horizontal branch or offset e' connecting with the vaporizing coil. The coil d is wound on the outside of an imperforate coil cylinder c which is preferably made up with insulation as shown in Fig. 4 where h and j are two concentric cylinders of brass or other metal with a layer of asbestos i between them. The imperforate coil cylinder surrounds some portion of the mixing chamber, the walls of which are perforated and project flame into the annular space within the imperforate coil cylinder. As here shown, a downward extension of the mixing chamber is formed by the tube a^2 which tube has perforations a^3 opening into the annular sub-flame space between the tube a^2 and the imperforate coil cylinder c. The mixing tube b passes through the tube a^2 forming an annular space b' communicating with the mixing chamber above and closed at the bottom. The imperforate coil cylinder is secured to the tube a^2 by screws b^2 or other suitable fastenings. A vertical slot f' is cut in the lower portion of the mixing tube to allow the offset e' to be slid up from the end and a bracket g is secured at the lower end of the tube to hold the needle valve. An annular alcohol cup f is provided for starting the burner.

From what has been said the operation of my burner will be evident. The oil passes from the pressure tank under pressure through the pipe d and is there vaporized, entering the offset e' and thence into the needle valve. The vapor mixed with air passes through the mixing tube into the mixing chamber thence the greater portion passes through the burners a' and burns under the mantles or otherwise if it is a heating burner. A portion of the mixed air and vapor is forced by the internal pressure down into the chamber b' and thence through the perforations a^3 where it burns as a sub-flame to heat the coil. The amount of heat in the sub-flame may be accurately regulated by the number of holes in the tube a^2 and the amount of heat reaching the coil may also be regulated by the insulation of the cylinder. The amount of vapor produced is also regulated by the amount of coil. It will be seen that in this way, the

temperature of the oil may be very accurately regulated since it is below the influence of the main flame and vapor for any number of mantles from one upward may be made by changing the amount of coil.

The main flame may be of any desired form according to the form of the perforated diaphragm and may be used to heat other things beside mantles.

I claim:—

1. In a hydro-carbon burner, the combination of a main mixing chamber having a perforated outlet for the main flame, a mixing tube leading to said mixing chamber, a vapor discharge nozzle opening into said mixing tube, an auxiliary mixing chamber connecting with said main mixing chamber and having perforations in the walls thereof, an imperforate cylinder surrounding said auxiliary chamber and forming an annular sub-flame space and a coil on said cylinder connecting with said nozzle.

2. In a hydrocarbon burner the combination of a main mixing chamber, having a perforated outlet for the main flame, a mixing tube leading to said mixing chamber, a vapor discharge nozzle opening into said mixing tube, an auxiliary mixing chamber below said main chamber and connected therewith and having perforations in the walls thereof, an imperforate cylinder surrounding said auxiliary chamber and forming an annular sub-flame space, and a coil on said cylinder connecting with said nozzle.

3. In a hydro-carbon burner, the combination of a main mixing chamber having a perforated outlet for the main flame, a mixing tube leading to said mixing chamber, a vapor discharge nozzle opening into said mixing tube, an annular extension to said mixing chamber surrounding said mixing tube having perforations in the walls thereof and connecting with said mixing chamber, a coil cylinder surrounding said extension forming an annular sub-flame space and a coil on said cylinder connected with said nozzle.

4. In a hydro-carbon burner, the combination of a mixing chamber having flame perforations therein, a mixing tube leading into said mixing chamber, a vapor discharge nozzle opening into said mixing tube, an imperforate coil cylinder surrounding a portion of said mixing chamber and forming an annular space into which said perforations discharge, and a vaporizing coil on said coil cylinder and connecting with said nozzle.

5. In a hydro-carbon burner, the combination of a mixing chamber having flame perforations therein, a mixing tube leading into said mixing chamber, a vapor discharge nozzle opening into said mixing tube, a coil cylinder composed of two concentrically arranged tubular metallic members having a non-metallic refractory substance between them surrounding some portion of said mixing chamber and forming an annular space into which said perforations discharge.

6. In a hydrocarbon burner, the combination of a mixing chamber, a mixing tube leading to said mixing chamber, a vapor discharge nozzle for discharging vapor into said mixing tube, an imperforate coil cylinder surrounding a portion of said mixing chamber and forming an annular recess between the two, a vaporizing coil around said cylinder, a main outlet to said mixing chamber having a perforated diaphragm, perforations being formed in said mixing chamber for discharging an auxiliary flame into said annular space to supply heat to said vaporizing coil.

7. In a hydrocarbon burner, the combination of a mixing chamber having a main flame outlet and a plurality of sub-flame apertures, an imperforate coil cylinder spaced from and surrounding a portion of the mixing chamber and a vaporizing coil arranged outside the coil cylinder.

Signed at Portland, Me., this 9th day of April, 1903.

SOLOMON W. BATES.

Witnesses:
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