Jan. 23, 1940. F. WERNLI 2,188,212

VAPOR BURNER

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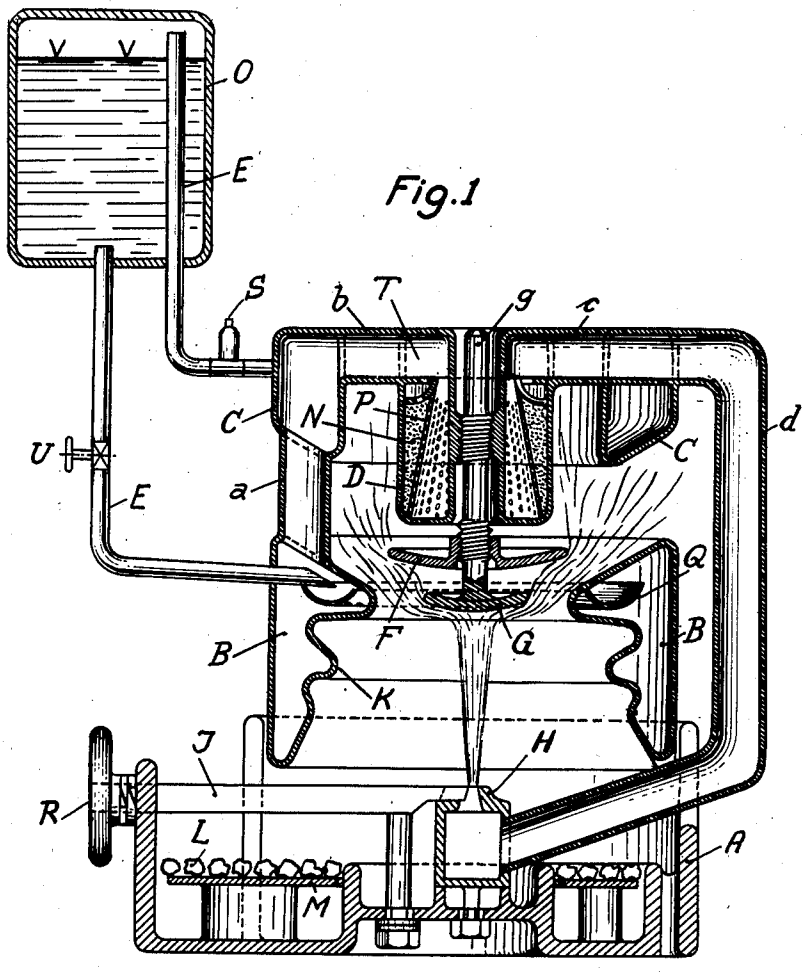
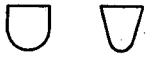


Fig.1

Fig.5 Fig.6



J Fig.2

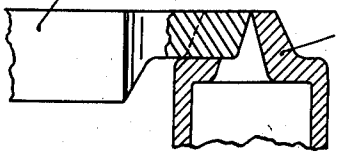


Fig.3

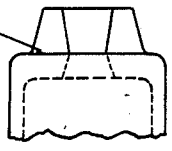
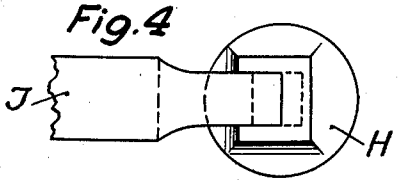


Fig.4



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VAPOR BURNER

Fritz Wernli, Oberrieden, near Zurich, Switzerland

Application December 28, 1936, Serial No. 117,981
In Switzerland October 6, 1936

6 Claims. (Cl. 158—54)

This invention relates in general to burners and more particularly has reference to apparatus for vaporizing oil and burning the same.

An object of this invention is to provide an improved vapor burner, including means for producing the vapor from a liquid fuel.

Another object of this invention is to provide a vapor burner comprising an annular vaporizing chamber, a superheating chamber above the vaporizing chamber, a burner positioned to project a flame axially of the vaporizing chamber, and means for varying the flow of the flame through said vaporizer.

A further object of this invention is to provide a vapor burner comprising an annular vaporizing chamber having a sinuous inner wall with a portion adjacent the upper portion projecting inwardly to simulate a Venturi tube, a burner for projecting a flame axially through said vaporizing chamber, a disc-like baffle positioned within the central portion of said vaporizing chamber, and means for axially adjusting the position of said baffle within said Venturi portion of the chamber to vary the flame projected therethrough.

With these and other important objects in view, which may be incident to my improvements, the invention resides in the parts and combinations to be hereinafter set forth and claimed; with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

One embodiment of the invention is shown by way of example in the accompanying drawing:

Fig. 1 shows a longitudinal section through the burner and fuel reservoir,

Fig. 2 shows an enlarged fragmentary section through the sliding valve burner nozzle,

Fig. 3 is a side view of the nozzle without the valve,

Fig. 4 is a plan view of the nozzle in the closed position of the valve,

Figs. 5 and 6 show configurations of the valve closing the nozzle.

The lower part A of the burner constitutes the heating bowl which is provided with the readily removable sliding valve burner nozzle H. The nozzle opening is formed by the sliding valve J which can be adjusted from the outside by means of the handwheel R. Moreover inserted in the heating bowl A is an apertured ring M which is covered with an absorbent and heat resisting material L which takes up oil from the space located beneath it. When it is desired to start the burner this oil is ignited until, due to the increasing heating in the vaporiser, the nozzle H is fed from the vaporiser whereupon the actual use of the burner for heating purposes commences.

Mounted on the lower part A of the burner is the vaporiser housing B constituting a part of the vaporiser aggregate. The inner chamber of the housing B communicates by way of one or more conduits *a* with a second housing C disposed above it and the housing C is connected with an inner housing portion D by conduits *b* and *c* which form the boundaries of the openings through which the heating flames pass. The fuel which has been subjected to a preliminary vaporisation in the housing B enters the inner housing D where the drops of oil which are still liquid collect in an apertured distributing ring T. These drops of oil then traverse the space between the wall of the housing D and an apertured inner wall P, which space is filled with an absorbent and heat resisting material N, so that under the influence of the heating flames the complete vaporisation of the oil occurs and the vapor is super-heated. The inner wall K of the vaporiser housing B is sinuous in order to offer as large a surface as possible which is subjected to the heat. The oil flows to the interior of the vaporiser housing B from a fuel reservoir O at a higher level by way of a conduit E controlled by a tap U. The conduit E leads to an apertured distributing ring Q from whence the oil is distributed over the sinuous wall K where it is subjected to preliminary vaporisation.

The burner plate G is mounted on an adjustable shaft *g* which also carries a flame distributor F. The shaft *g* passes through the super-heating chamber D. The burner plate G serves for the further regulation of the flames in addition to the regulation afforded by the outlet aperture of the sliding valve burner nozzle H.

From the housing C—D the super-heated vapor passes through the conduit *d* to the sliding valve burner nozzle H. At the same time this housing is connected with the fuel reservoir O by way of a pressure equalisation conduit E' with a safety valve S.

Valve S, which may be of any desired construction of the usual type of safety valve, is incorporated in the conduit connecting the superheater of the fuel tank and which is provided in accordance with official requirements. However, it is not necessary, as due to the complete

equalization of pressure inside the apparatus and the tank, there is no possibility of a local rise in pressure.

The fuel flowing to the vaporizer B is only slightly heated because the main flame formation does not occur until the burner plate G is reached. In this way, oil vapor is produced and namely oil vapor which is saturated with drops of oil. These wet oil vapors rise and separate out in the housing D where, under the action of the great heat, the vaporization and superheating of the gas is effected.

In accordance with the desired control of the burner, the sliding valve J is trapezoidal, triangular or semi-circular in end elevation (Figs. 5 and 6). The valve J which is actuated from the outside by means of the handwheel R is supported adjacent the nozzle H on an adjustable screw and is guided in the lateral walls of the nozzle H. In accordance with the burner aperture it is possible to adjust from flames of the finest jet to quite broad flames, and in conjunction with the configuration of the profile of the valve it is possible at the same time to widen or to narrow the flame.

Figs. 2 and 3 show the nozzle H in two directions at right angles. The nozzle tapers in the cross-sectional plane shown in Fig. 2, but diverges in the plane at right angles thereto as shown in Fig. 3. The result of this is that the cross-section of the upper portion of the nozzle is constant and thus the speed of flow of the vapor through the nozzle is also constant. The shape of the valve corresponds, of course, to the shape of the nozzle aperture, so that the valve shown in Figs. 2 and 4 would have a cross-section filling the aperture of the nozzle in Fig. 3. The particular shape of the valve and burner makes the apparatus more suitable for use in particular conditions and in practice it is found desirable to provide a different form of burner for different circumstances. The heat resisting material N has, however, a definite and useful function. The vapor passing into the superheater contains a certain proportion of oil drops and it is necessary for these drops to be retained in the superheater until they are completely evaporated so that only complete vapor passes to the nozzle H. The material N serves to hold the drops of oil until they evaporate completely. By providing the material N, the individual drops are kept substantially separate and thus evaporate much more readily than if they were allowed to accumulate and run together. It is also essential for the material N to be heat resistant because very considerable temperatures arise in the superheater. The temperature may, for example, be 600° or more.

I claim:

1. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding valve member controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a superheater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said super-heater housing, a chamber divided off from said super-heater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

2. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding member guided in the wall of the bowl portion and the lateral walls of the nozzle, means external to the bowl for adjusting the sliding member for controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a super-heater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said super-heater housing, a chamber divided off from said super-heater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

3. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding valve member of trapezoidal cross-section controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a superheater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said superheater housing, a chamber divided off from said superheater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

4. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding valve member of triangular cross-section controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion

and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a super-heater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said super-heater housing, a chamber divided off from said super-heater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

5. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding valve member of semi-circular cross-section controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a super-heater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said super-heater housing, a chamber divided off from said super-heater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

6. A vapor burning apparatus comprising a lower bowl portion, a nozzle with an opening widening towards its end mounted thereon, a sliding member of trapezoidal cross-section guided in the wall of the bowl portion and the lateral walls of the nozzle, means external to the bowl for adjusting the sliding member for controlling the nozzle opening, a lower vaporiser housing disposed above the lower bowl portion and having a sinuous inner wall, an apertured oil distributing trough within said lower vaporiser housing, a super-heater housing arranged centrally above the lower vaporiser housing in the direct path of the burner flame, conduits extending from the lower vaporiser housing to the super-heater housing and from the super-heater housing to the burner nozzle, an apertured distributing trough within said super-heater housing, a chamber divided off from said super-heater housing beneath said trough, a rod adjustably carried by and extending downwardly from the super-heater housing, a burner plate and a flame distributor both carried by said rod, a fuel reservoir disposed at a higher level than the remainder of the said apparatus, a conduit extending from the fuel reservoir to the lower vaporiser housing and discharging into the apertured distributing trough therein, and a pressure equalising conduit extending between the reservoir and the space occupied by the vaporised fuel.

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