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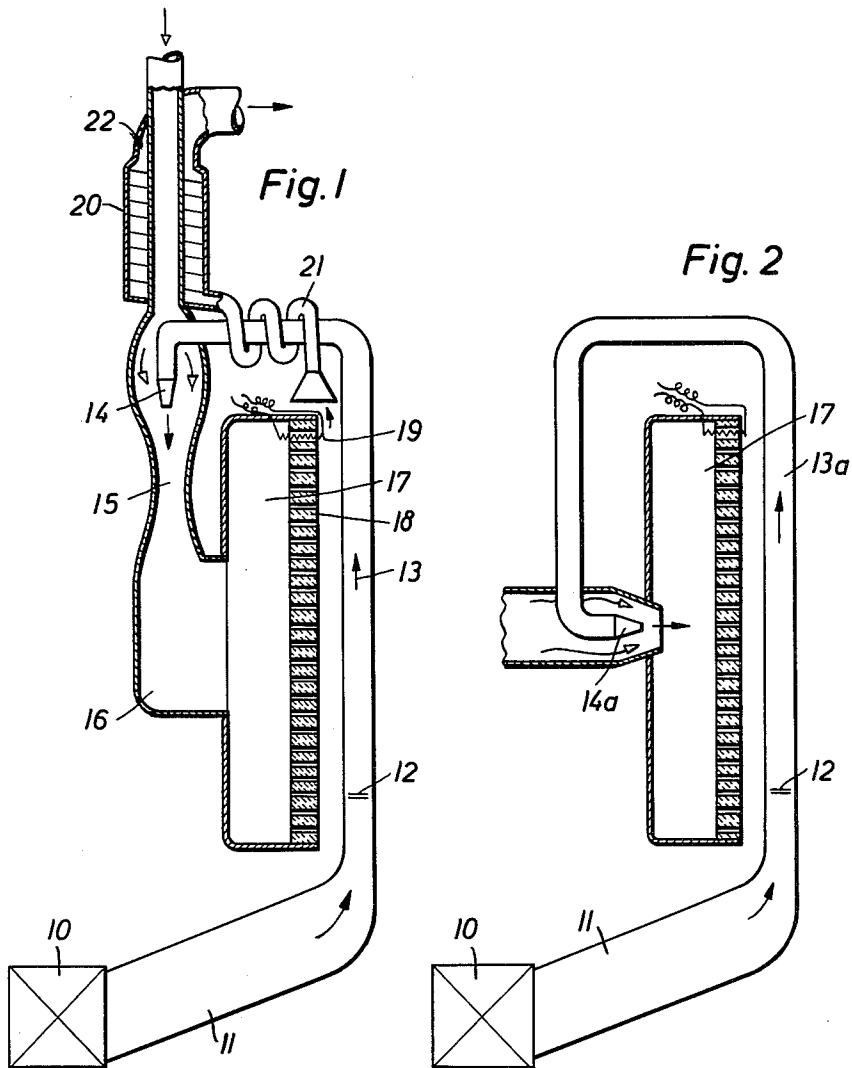
H. BAUMANNS ETAL

3,199,568

OIL HEATING APPLIANCE

Filed July 3, 1962

2 Sheets-Sheet 1



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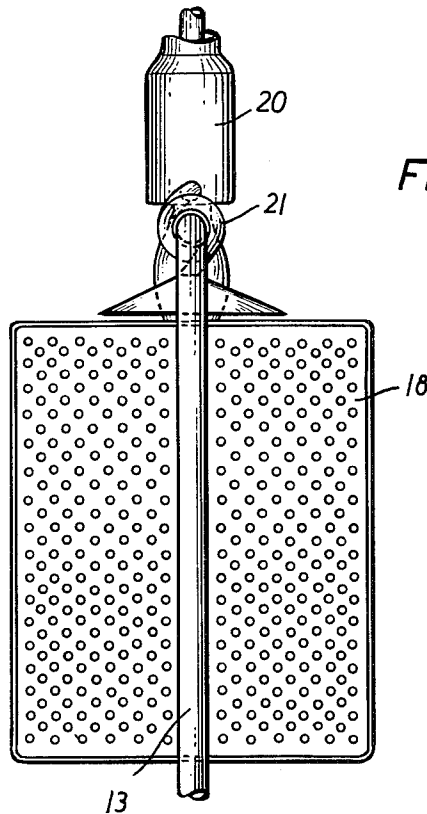


Fig. 3

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OIL HEATING APPLIANCE

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5 Claims. (Cl. 158—71)

The invention relates to an oil heating appliance with a burner having a burner plate or the like and at least one oil supply conduit leading to the burner.

Oil heating appliances are intrinsically known. They usually possess an oil tank from which oil is supplied by means of a supply line to a perforated burner plate where it is ignited. The burner housing may be perforated, so that the air for combustion is induced to flow in from there. Alternatively a fan supplies air to the burner plate. However, the use of fans is expensive, and they also produce an undesirably high noise level, and in addition an electrical connecting cable must be provided for them. Moreover, the fan and cable, etc., must be well shielded from heat from the burner housing and from the hot air. Such an arrangement is expensive and its operational reliability is imperfect. The principal disadvantage of the conventional oil heating appliances or of the oil burners, however, lies in the fact that they do not operate with sufficiently high efficiency, since the mixing of oil, oil vapour and air for combustion is not performed sufficiently thoroughly.

To obviate the aforesaid disadvantages, according to the invention an oil heating appliance comprises a burner having a burner plate or the like and at least one oil supply conduit leading to the burner, oil-pressurizing means connected to one end of said supply conduit and at least one oil vapour outlet means at the burner end of said supply conduit whereby fuel oil vapour in said conduit is maintained under pressure and a jet of oil vapour is blown or sprayed at said outlet means into an intake pipe connection leading to the burner plate.

By this means, the thermal efficiency of the heating appliance is substantially enhanced, since not only is oil supplied under pressure, but the jet of compressed oil vapour which emerges sucks in and vigorously whirls and mixes with an increased volume of air for combustion which is burned at the burner plate or the like with generation of a greater quantity of heat, or else, for a smaller consumption of oil, a quantity of heat is liberated which corresponds to the conventional oil heating appliances of equivalent type. Therefore, an increase in efficiency or an increase of temperature may be achieved selectively. Above all, more complete and soot-free combustion is achieved according to the invention.

In further elaboration of the invention, it is proposed that a nozzle or a Venturi tube whose outlet cross-section is many times smaller than that of the intake pipe connection be used, and that the cross-section of the intake pipe connection is reduced in the region of the nozzle output aperture. By this means, the arrangement according to the invention is improved inasmuch as the jet of oil vapour entrains the air for combustion more strongly and a greater quantity of air is induced to flow into the intake pipe connection. It is further proposed that at least one pressure oil tank or at least one pressure oil pump be used to generate the compressed fuel oil vapour. It is therefore possible to achieve a better heating effect by relatively simple means. An apertured, slotted or perforated burner plate is used, while the nozzle or nozzles out of which a jet of oil vapour is blown are arranged at a distance from the burner plate, so that combustion takes place at the latter at normal pressure.

The invention may be specifically varied by the use

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of a heat exchanger heated by the waste heating gases and/or by the radiation of the heating appliance, and through which or at which the combustion air conduit and/or the fuel oil vapour conduit is passed, so that the said conduit is or the said conduits are preheated. As compared with the supply of oil or of air for combustion, this additionally achieved either an increase in temperature and/or an increase in efficiency.

The invention will be further explained with reference to the accompanying drawings, which illustrate diagrammatically exemplary constructions, and in which:

FIG. 1 shows a side elevation of an oil heating appliance in accordance with the invention, FIG. 2 is a similar view of a modified construction and FIG. 3 is a front elevational view of the burner plate of FIG. 1.

Referring to FIG. 1, an oil-pressurizing means 10 is indicated diagrammatically. This means may be a gear pump or the like, and it is also possible to use a static pressure device, e.g., at least one pressure oil tank. A column of oil is forced up by the means 10 and passes first into the lower part of an oil supply conduit 11 so that an oil level, designated 12, develops in the latter. Obviously, the said oil level may also be substantially higher in the conduit. In the oil supply conduit the fuel oil is present as vapour above the level 12; if it is desired to obtain a greater volume of vapour and also to achieve a higher oil vapour temperature, the conduit 11 may be heated at one or a plurality of points. The oil supply conduit 11 leads into outlet means 14, which may be a nozzle or the like, whose outlet cross-section is so dimensioned that a relatively sharp jet of oil vapour, or a number of vapour jets, is blown or sprayed out and the oil vapour pressure in the conduit 11 is maintained roughly constant. The nozzle 14 therefore works firstly as a throttle device to prevent excessively rapid discharge of the oil vapour, and also to prevent a drop in the pressure in the conduit 11.

The jets of oil vapour leaving the nozzle 14 in the direction of the arrow are delivered to an intake pipe connection 16, whose cross-section is constricted at 15 so that strong entrainment of the requisite air for combustion is achieved. In many cases it is convenient to place the outlet aperture of the nozzle 14 roughly in the centre of the constriction 15. The mixture of oil vapour and of air for combustion passes via the intake pipe connection 16 to a burner plate 18 or the like, which is provided with a large number of slots, apertures, perforations or the like. Ignition takes place at the burner plate by means of a device, which may be for example an electrical incandescent spiral 19, and combustion takes place in a housing (not shown) in front of the burner plate 18, roughly at atmospheric pressure. The burner plate 18 may be a ceramic plate.

According to FIG. 2, the arrangement described may be varied so that at least one outlet nozzle 14a is located so that the oil vapour jet is blown in more directly in the direction of the burner plate. The upper part of the oil vapour supply conduit is designated 13a; this conduit may be taken behind the rear of the burner plate. As a rule, the vapour jet is then divided at the rear and is whirled in a chamber 17 of the oil heating appliance together with air for combustion which is drawn in.

It is further possible to produce an appliance which is provided with a heat exchanger 20 (see FIG. 1). The hot waste gases of combustion, for example, may be supplied to the said heat exchanger via a heating conduit 21. The heating conduit 21 may be disposed as a heating coil which surrounds the upper part 13 of the supply conduit for the fuel oil vapour, so that the oil vapour and the conduit 13 are heated. Higher efficiency of the combustion medium is thereby achieved since a smaller quantity of heat has to be withdrawn—e.g., from the

burner plate 18—in order to heat the oil to be burned to flame temperature. Or in other words, a higher heating temperature is achieved. However, heating of the conduit 13 may also be performed differently. It may be effected by passing the conduit 13 itself through the heat exchanger 20. The heat exchanger 20 may likewise serve for preheating the air for combustion by passing an air intake conduit through the heat exchanger 20. The said air intake conduit passes through as far as the nozzle 14, or the latter is introduced into the air intake conduit. The arrangement may also be that both the air intake conduit and the oil vapour conduit 13 are passed through the heat exchanger 20. Preheating of the air for combustion also serves to achieve greater efficiency, and the heatable surfaces are then subject additionally to an increase in temperature by the same quantity of heat which would have been necessary to warm the combustion air in other circumstances. Moreover, the waste gases may be used to heat the housing, a housing cover of the burner plate or the like, or may also be delivered directly to a flue pipe 22.

While it is true that it is not essential for complete efficiency to completely fill the conduit 11, it is sufficient that vaporized oil leaves the nozzle 14. Of course, it is desirable to start heating the conduit 13 as soon as possible in order to obtain the desired and/or sufficient vaporization. However, it should be apparent that one can obtain sufficient vaporization when the conduit 21 of the heat exchanger 20 is the sole heat source and the portion 13 of the conduit is not positioned in front of the burner plate. When the burner plate and conduit are in different planes, the coils of conduit 21 can be increased and extended into the vertical portion 13 or 13a of the conduit 11 and, if desired, to and beyond the level 12.

The appliance according to the invention is especially suited as an infra-red heating appliance. Such infra-red burners operate at a low temperature such that the maximum radiation takes place at the wavelength of infra-red waves, about 7600 Å. and above. Now, the waste heating gases in particular have a low temperature, which may be for example only a few hundred degrees, so that the quantity of heat which they contain tends to lower the temperature only slightly for the burner plate or the like of the infra-red burner, which is likewise relatively low. In other words, the quantity of heat delivered by the heating gases is still great enough, particularly in the case of infra-red burners, for the quantity of heat at the burner plate or the like to be considerably increased, which is equivalent to higher efficiency or to the delivery of a higher heating capacity to the exterior.

The invention may further be embodied to use the quantity of heat in the waste heating gases either to initiate or to enhance the vaporisation of the liquid fuel oil. The arrangement may be made so that a heating coil fed by the waste heating gases is wound about the conduit for the liquid fuel oil and/or about the conduit for the vaporised fuel. The vaporisation may further be initiated or enhanced by heat radiated by the burner itself, and finally, waste gas heating and heating by radiation may be used jointly to produce vaporisation. Furthermore, it may be convenient to use an auxiliary appliance, e.g., an electrical auxiliary heating appliance, which effects prevaporisation before the fuel in the form of vapour is ignited. The reliability of ignition is thereby enhanced, or the commencement of ignition is accelerated.

What is claimed is:

1. An oil-burning heating appliance comprising a burner plate at which the oil is burned in air, an oil supply conduit, oil pressurizing means connected to one end

of said supply conduit and adapted to supply oil thereto under pressure, an oil vapor outlet means connected to the other end of said supply conduit, an intake pipe connection leading from said vapor outlet means to said burner plate, the outlet means being a nozzle the outlet cross-section of which is many times smaller than that of the intake pipe connection, the cross-section of the intake pipe connection being reduced in the region of the nozzle outlet aperture whereby fuel oil vapor in said conduit is maintained under pressure and a jet of oil vapor is blown through said nozzle into the intake pipe, said intake pipe being open to the atmosphere so that the jet of oil vapor draws air into the intake pipe for mixing with the oil vapor, a heat exchanger heated by the waste heating gases resulting from the combustion of said oil vapor and air, said heat exchanger comprising a waste gas tube surrounding at least a portion of said intake pipe at a point where the air for combustion passes therethrough, and an exhaust gas intake member connected to said waste gas tube at one end thereof and positioned adjacent said burner plate, the other end of said exhaust gas tube being connected to the normal exhaust gas facilities for the appliance, said exhaust gases passing through said waste gas tube so that said conduit is heated.

2. The appliance according to claim 1, in which vaporisation of the liquid fuel is effected by radiated heat in addition to heat in the waste gases.

3. The appliance according to claim 1 in which the burner plate is an infra-red burner.

4. The appliance according to claim 2 in which the burner plate is an infra-red burner.

5. An oil-burning heating appliance comprising a burner plate at which the oil is burned in air, an oil supply conduit, oil pressurizing means connected to one end of said supply conduit and adapted to supply oil thereto under pressure, an oil vapor outlet means connected to the other end of said supply conduit, an air intake pipe connection leading from said vapor outlet means to said burner plate, said burner plate being an infra-red burner, a heat exchanger for preheating combustion air supplied to said burner, and a conduit for directing heat from said burner to said heat exchanger.

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