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GAS OPERATED HEATERS

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FIG.1.

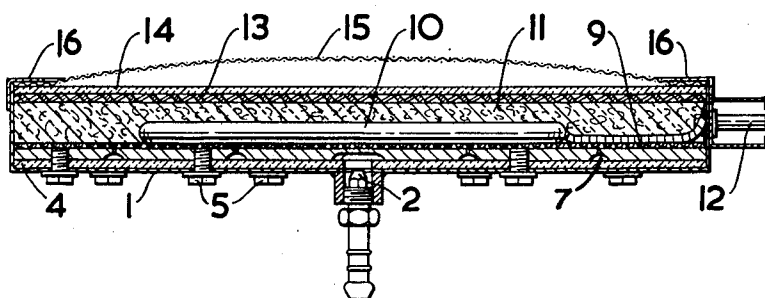
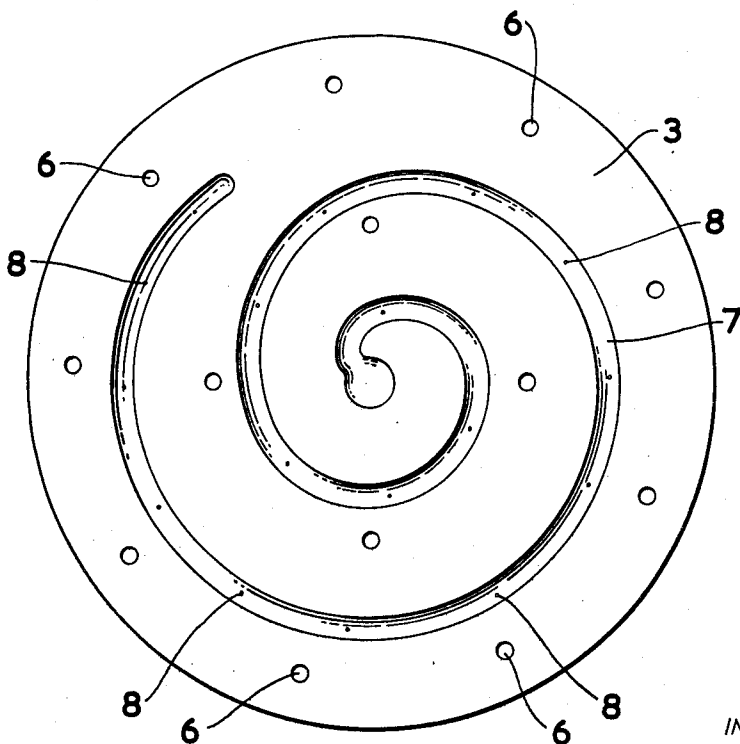


FIG.2.



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GAS OPERATED HEATERS

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7 Claims. (Cl. 158—114)

The invention relates to gas operated heaters and particularly to heaters in which the gas which may be town gas, propane, butane or the like is oxidised by a catalyst so that the heated air from the heater is without flame, smoke or smell and is free from carbon monoxide or unburned gas.

Such catalytic combustion heaters are of particular application for example in dwelling houses, offices, workshops, drying ovens or filling stations where there are inflammable gases or liquids, since the combustion of the heaters being without flame or incandescence, the safety factor is therefore very much higher than with ordinary heaters.

According to the invention a gas operated heater is provided having diffusing means through which the gas is passed to and through a catalytic oxidising layer before passing to atmosphere.

Advantageously the gas inlet of the heater is formed integral with the casing of the heater as by welding, brazing or soldering to the casing and threaded to be connected as by an armoured hose or by tubing to the source of gas supply. The gas inlet is drilled to provide a fixed orifice of pre-determined dimensions so that no inadvertent alteration of the supply can be made; incomplete or wasteful supply of gas is thereby avoided. Advantageously a coarse grained cartridge of Carborundum may be provided in the gas inlet to prevent overheating or blow-back.

The heater may be formed with a casing of frusto-conical, frusto-pyramidal, cylindrical or any other convenient shape and the diffusing means may comprise a ceramic, Carborundum or metallic plate member alone or in combination with other members as, for example, an asbestos backing or sealing plate and/or a fibrous mass as, for example, fibre glass so disposed as to ensure that all the gas supplied to the heater is passed through the diffusing means before being passed to and through the catalytic layer before passing to atmosphere.

According to the invention furthermore the diffuser plate member may comprise a metal plate, as for example an aluminium or sheet steel plate, the face of the plate nearer to the gas inlet, the rear face, being formed with a recessed portion, advantageously in the form of a scroll, to provide a path or guide to lead the gas outwardly from the central portion of the plate towards the peripheral area, spaced apertures being provided in the path to permit and direct the flow of gas towards the catalytic layer. Alternatively a star formation may be provided as raised portions on the rear face of the plate to provide a plurality of panels of sector form in which the gas is led to the peripheral area.

To prevent leakage of the gas rearwardly or around the periphery of the diffuser plate member, a sealing member may be provided, as, for example, an asbestos backing plate or sheet, held in close contact with the diffuser plate as, for example, by bolts or the like. Alternatively the diffuser plate member may be secured to an inner peripheral wall of the casing as, for example, by welding.

According to the invention furthermore the diffusing

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means may also comprise in front of the diffuser plate member, a perforated metal sheet member in which the perforations are formed as by stabbing or punching, to present a plurality of projections on which a fibrous mass of low thermal conductivity is impaled and held in position.

Because of the low conductivity of the fibrous mass loss of heat rearwardly is prevented and all the heat from the combusted gas is available at the front of the heater.

Any disadvantage which may result from the reduced rate of flow of heat forwardly from the pre-heater element because of the low conductivity of the adjacent fibrous mass is more than offset by the restrictive action of the mass on the passage of heat in the reverse direction.

According to the invention furthermore, means may be provided, advantageously in front of the perforated metal sheet member, for pre-heating the gas, the fibrous mass and the catalytic oxidising layer, such means advantageously comprising a shrouded electrical element and thermostatic control means may be provided whereby the pre-heater circuit is broken when a determined temperature is reached.

Any other convenient means of pre-heating the catalytic mass may be used; thus for example as an alternative to electrical pre-heating a by-pass from the gas supply may be provided to provide a direct undiffused supply of gas to be burnt prior to turning on the full gas supply and adapted to be automatically cut off as soon as the full gas supply is in operation. Alternatively the pre-heating to the required temperature may be effected by external heating means.

Pre-heating is effective to ensure an initial combustion temperature sufficient to start the action of the oxidising layer, the normal temperature of operation being effective to maintain the action once started.

The catalytic oxidising layer may comprise, for example, asbestos wool or an asbestos sheet, cloth, or the like, impregnated with a suitable catalyst, the sheet forming the front face of the heater and being held in position by a wire mesh or the like.

It will be appreciated that in a heater according to the invention there is no necessity to provide a primary air supply for the gas, combustion being effected wholly by means of a secondary air supply.

One construction of a heater according to the invention is illustrated, by way of example, in the accompanying diagrammatic drawings, in which:

FIGURE 1 is a sectional view of the heater, and

FIGURE 2 is a plan view of the rear face of the diffuser plate member.

In the construction illustrated in the drawings the heater comprises a cylindrical casing 1 with gas inlet nozzle 2 screw threaded in a boss formed integral with and externally is the rear wall of the casing.

A diffuser plate 3, formed as an aluminium plate bolted by bolts 5 to an asbestos backing and sealing sheet 4 is provided to be held in contact with the inner surface of the rear wall of the casing, the bolts 5 passing through screw threaded holes 6 in the plate and corresponding holes in the asbestos sealing sheet.

The rear face of the diffuser plate 3 is recessed in the form of a scroll 7 and holes 8, of determined dimensions, are bored within the recessed scroll portion 7 to permit and direct the flow of gas forwardly through the plate 3.

A perforated metal sheet 9 is positioned adjacent to the front face of the diffuser plate 3, the perforations being formed as by punching, or stabbing, to present projections on the front face of the sheet on which a fibrous mass 11 is impaled held in position.

The fibrous mass 11 may comprise fibre marketed under the registered trademark "Rocsil" and may be in loose

form or may be compacted or formatted to a prescribed density.

Secured to the perforated metal sheet 9 are pre-heating means indicated generally by 10 formed as an electrical element mounted within a shroud, and connected to plug and socket means 12.

Immediately in front of the fibrous mass 11, a wire mesh 13 is provided, and in front of the wire 13 a catalytic oxidising layer 14 of asbestos cloth or sheeting impregnated with a catalyst, the sheeting being advantageously of the composition described in British patent application No. 40,811/59.

The asbestos cloth or sheet forms the front face of the heater and is held in position by a wire mesh 15, formed with a rim 16, to engage around the casing 1 and to be held in position as by screw means (not shown in the drawings).

The operation of a heater according to the invention is illustrated in the following example.

In one construction the heater is 11" in diameter with a diffuser plate also 11" in diameter on which the scrolled path is $\frac{1}{8}$ " deep and $\frac{3}{8}$ " wide. The apertures through the diffuser plate are made with a number 70 drill. A 250 watt electric pre-heater is provided between the diffuser plate and the catalytic oxidising layer.

The electric pre-heater is used to raise the temperature of the catalytic layer to 160° F. Butane (Calor gas) at a pressure of 14" water gauge is supplied to the heater; 1 cubic foot per hour was consumed and 3200 B.t.u. per hour were produced.

What I claim is:

1. A gas operated heater comprising: a casing having an end wall with an inlet for supplying gas into the adjacent end of said casing; diffusing means substantially filling said casing, said diffusing means including a diffuser plate member adjacent to said end wall of said casing, a fibrous mass of low thermal conductivity extending from adjacent to said plate member to the other end of said casing, and a catalytic oxidizing layer substantially defining the other end of said casing, said catalytic oxidizing layer being impregnated with a catalyst, said plate member having a recess adjacent said end wall and defining with said end wall an elongated path communicating with said inlet; and means defining a plurality of apertures through said plate member and communicating with said path, said gas passing through said

apertures in said plate member and said fibrous mass without substantial oxidization and being oxidized as it passes through said catalytic oxidizing layer whereby the oxidation products are free to exit from said casing.

2. A gas operated heater according to claim 1 including an asbestos sealing member between said apertured diffuser plate member and said end wall of said casing, said sealing member having a central opening communicating with said inlet.

3. A gas operated heater according to claim 2 in which a perforated metal sheet is provided between the apertured plate member and the fibrous mass, the perforations in the metal sheet having a plurality of projections thereon on which the fibrous mass is impaled and held in position.

4. A gas operated heater according to claim 3 including pre-heating means comprising a shrouded electrical element disposed between the perforated metal sheet and the fibrous mass.

5. A gas operated heater according to claim 2 in which the recessed portion of the apertured plate member is formed as a scroll.

6. A gas operated heater according to claim 1 in which the catalytic oxidising layer comprises a sheet of asbestos impregnated with a catalyst.

7. A gas operated heater according to claim 1 including a shrouded electrical heating element disposed between said apertured plate member and said fibrous mass for preheating the gas before it reaches the catalytic oxidizing layer.

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