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(54) Waste oil burner.

(57) A waste oil burner in which a positive fuel feed is ensured by providing a pump (4) for injecting the waste oil into a combustion chamber (8) where the oil is ignited. The heat thus generated is exchanged and used to heat a constant flow of air or other fluid. The burner is of particular use as a space heater.

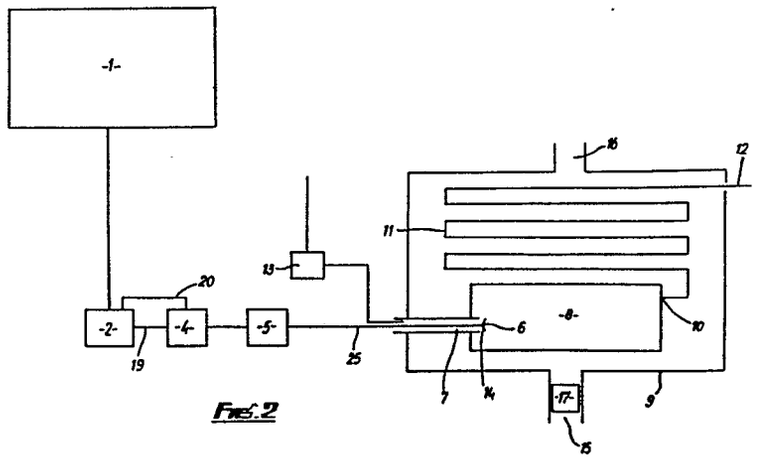

Fig. 2

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Waste Oil Burner

This invention relates to a waste oil burner.

Burners have previously been employed for space heating in factories and workshops, such burners using diesel oil as fuel; the diesel oil is non-viscous and easily burnt, but suffers from the considerable disadvantage that it is expensive. Recently there has been introduced a burner which, instead of diesel oil, runs on waste oil such as used engine oil from road vehicles. The waste oil costs very little and the burner is therefore cheap to operate, but has suffered from ignition problems making it rather unreliable. Further, it does not readily lend itself to alteration of heat output as its fuel is fed by gravity to the combustion chamber, and its atomisation of the fuel is effected by a blast of compressed air.

According to the present invention there is provided a waste oil burner having a housing which has an inlet and an outlet for fluid to be heated, a combustion chamber in the housing having inlet means for admission of waste oil and air and outlet means for egress of combustion products, and a pump for supplying waste oil to the chamber inlet means.

The burner is preferably provided with a preheater for raising the temperature of the oil prior to introduction into the combustion chamber, most preferably to a temperature of from

130°F to 150°F, in order to decrease its viscocity and make it ignite easily. The inlet means for admitting the waste oil into the combustion chamber is preferably in the form of a nozzle adapted to cause atomisation of the oil emerging from it; a diffuser may be provided around the nozzle to control the flame.

Electrodes are preferably provided downstream of the nozzle to cause a spark for igniting the oil.

The air is most effectively introduced into the combustion chamber through an annular passageway surrounding and coaxial with the nozzle so that on atomisation of the oil a good mixture of oil and air is obtained for combustion.

The oil may initially be gravity fed and thereafter pumped to the combustion chamber, and the pump may be electrically driven and is preferably variable in speed. The pump provides positive and variable control over the flow of oil to the combustion chamber.

A safety valve is preferably provided in the fuel line to prevent flow of oil to the combustion chamber until the conditions therein are correct for safe combustion. Thus the valve may prevent flow on starting the burner until the chamber has been purged with air, or in the event that the flame becomes extinguished; a photocell may be provided to detect this. The valve is most effectively solenoid-operated.

Further according to the present invention there is provided a method of heating a fluid, comprising supplying waste oil by pump to a combustion chamber, mixing the waste oil with air, burning the waste oil in the air in the combustion chamber, and providing a flow of fluid to be heated past the combustion chamber to effect heat exchange between the chamber contents and the fluid.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a schematic view showing the general installation of a waste oil burner in a building;
Fig. 2 is a schematic flow diagram showing the operation of a burner of this invention;
Fig. 3 is a perspective view of the preheater and burner unit;
Fig. 4 is a perspective view, partly cut away, of the nozzle and diffuser of the burner unit;
Fig. 5 is a plan view of an inner assembly of the burner unit; and
Fig. 6 is a circuit diagram of the electrical system of the burner.

Waste engine oil is gravity fed from a storage tank 1 to the burner A having a preheater 2 (Fig. 3), in which is an electric element 3 of 750 watts for heating the oil to about 140°F. The preheater 2 communicates with an electric pump 4, a solenoid-operated valve 5 and a burner unit having a "1½ gallon" nozzle 6. This nozzle allows 1½ gallons of oil to pass through it per hour at a pressure of 100 psi. The nozzle 6 extends co-axially within a 4 inch diameter air duct 7 into a combustion chamber 8 which in turn is disposed within a housing 9. The combustion chamber 8 is a cylindrical stainless steel vessel 3 feet long and 2 feet in diameter having an outlet 10 communicating with a series of mild steel heat exchange tubes 11 and thence to a flue 12 which opens to the atmosphere.

The duct 7 has within it a fan 13 for forcing a flow of air into the chamber 8 around the nozzle 6, and a diffuser 14 is provided at the nozzle 6 for disturbing the linear flow of the emanating air and oil. Electrodes 24 are provided

at the upstream side of the diffuser 14, with a gap of 3/16 inch between them for providing continuous sparking to ignite the air and oil mixture.

The housing 9 has an inlet 15 and an outlet 16 for air, a fan 17 being provided at the inlet 15 to provide a flow of about 3000 cubic feet per minute. The outlet 16 has a number of rotatable discharge heads 26 (Fig. 1) for directing the outflow of heated air in desired directions.

The valve 5 is arranged so as to prevent throughflow of oil for about 30 seconds on starting the burner to ensure that the chamber 8 has been thoroughly purged with air, and a photocell 24 (Fig. 3) projects into the chamber 8 and is connected to the valve 5 so as to shut off oil flow should the flame in the chamber be extinguished.

A changeover thermostat 18 (Fig. 3) is provided in the preheater 2 connected to a switch, the thermostat 18 and switch combining to prevent oil flow to the burner unit until the desired preheat temperature has been attained. To this end the pump 4 is connected to the preheater 2 by means of a feed pipe 19 and a return pipe 20, and until the desired preheat temperature is reached the switch operates to circulate oil through both these pipes 19, 20 between the pump 4 and the preheater 2. When the desired temperature is reached, the thermostat actuates the switch to close off the return pipe 20 and allow oil to flow to the nozzle 6 through a pipe 25.

The preheat temperature of 140°F is set by adjusting a main thermostat 21 located in the preheater 2, and a high-limit safety thermostat 22 is provided connected to a switch which cuts off the oil supply if the temperature rises to 180°F. A vent pipe 23 is provided on the preheater 2.

The oil is gravity fed from the tank to the preheater 2, is

heated to 140°F thus decreasing its viscosity, and is thence pumped by the pump 4 to the nozzle 5 along the pipe 25. As it emerges from the nozzle 5 it is atomised by the diffuser 14, and the spark between the electrodes 24 causes it to burn in the flow of air from the duct 6, thus heating the combustion chamber 7 and heat exchange tubes 10. The flow of air through the housing 8 passes over the outside of the chamber 7 and tubes 10 and becomes heated, thus providing space heating on issuing from the outlet 15.

The output of the burner is 250,000 to 300,000 Btu although this can easily be altered by setting the pump 3 to provide a flow of oil at a rate to give a predetermined output. The use of waste engine oil or the like provides a cheap method of fuelling the burner and at the same time provides a method of disposing of waste oil, which is completely converted during combustion into gaseous products.

The heat output of the burner can be varied by using a nozzle 6 of different dimensions and capacity, for example a "1-gallon" nozzle which will reduce the heat output, or by applying more than 100 psi to the oil to force it through the nozzle at a greater rate.

The burner of this embodiment of the invention can be used to heat water, or any other desired fluid, instead of air, and other modifications and improvements may be made without departing from the scope of the invention.

CLAIMS:

1. A waste oil burner having a housing which has an inlet and an outlet for fluid to be heated, a combustion chamber in the housing for connection to a supply of waste oil and having inlet means for admission of waste oil and air and outlet means for egress of combustion products, and a pump for supplying waste oil to the chamber inlet means.

2. A burner according to claim 1, wherein a preheater is provided for raising the temperature of the waste oil prior to introduction into the combustion chamber.

3. A burner according to claim 1 or 2, wherein the inlet means includes a nozzle opening into the combustion chamber for passage of waste oil, the nozzle having means for atomising oil emerging from it.

4. A burner according to claim 3, wherein the nozzle is disposed within an annular passageway for introduction of air into the chamber.

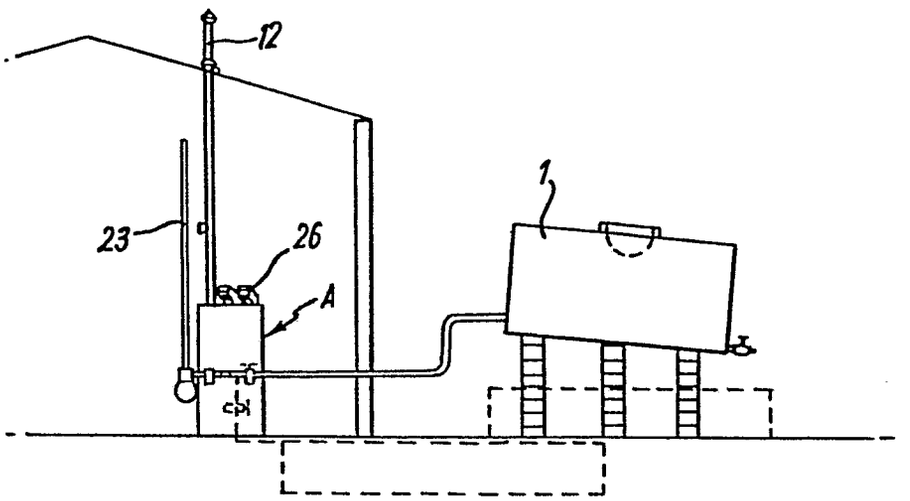
5. A burner according to claim 3 or 4, wherein the nozzle has a diffuser for controlling the flame in the chamber in use.

6. A method of heating a fluid, comprising supplying waste oil by pump to a combustion chamber, mixing the waste oil with air, burning the waste oil in the air in the combustion chamber, and providing a flow of fluid to be heated past the combustion chamber to effect heat exchange between the chamber contents and the fluid.

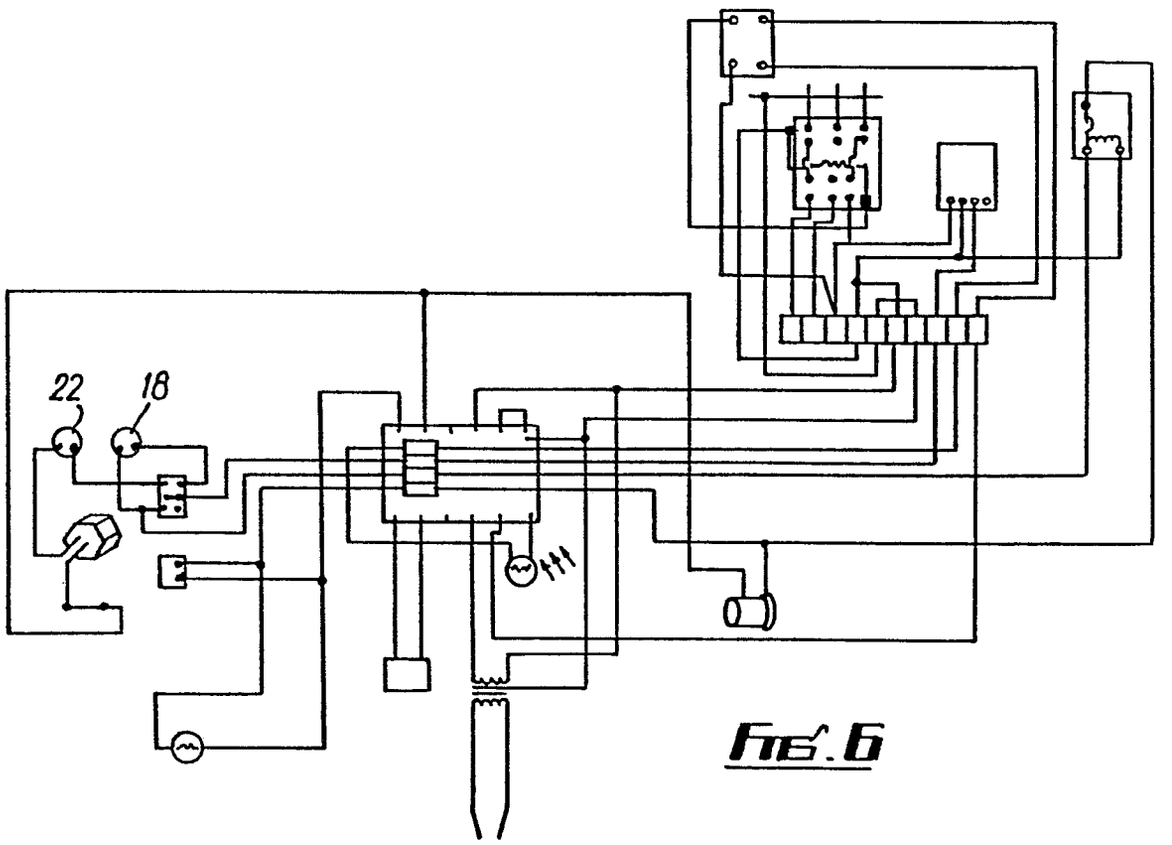
7. A method according to claim 6, wherein the waste oil is preheated prior to introduction into the combustion chamber.

8. A method according to claim 7, wherein the oil is preheated to a temperature of from 130°F to 150°F.

9. A method according to claim 6, 7 or 8, wherein the waste oil and air are mixed by atomising the oil in an air flow.



Фиг. 1



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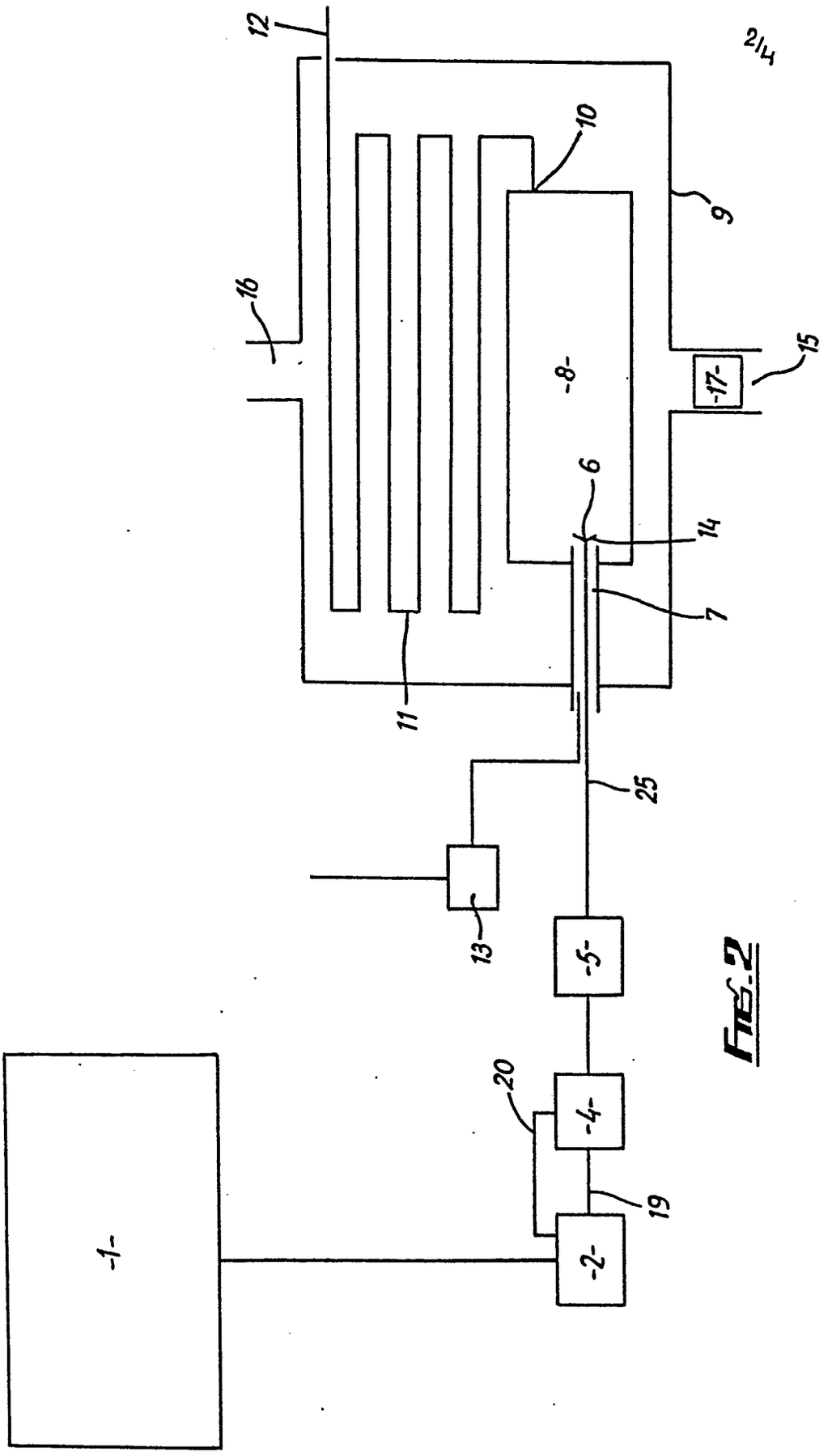
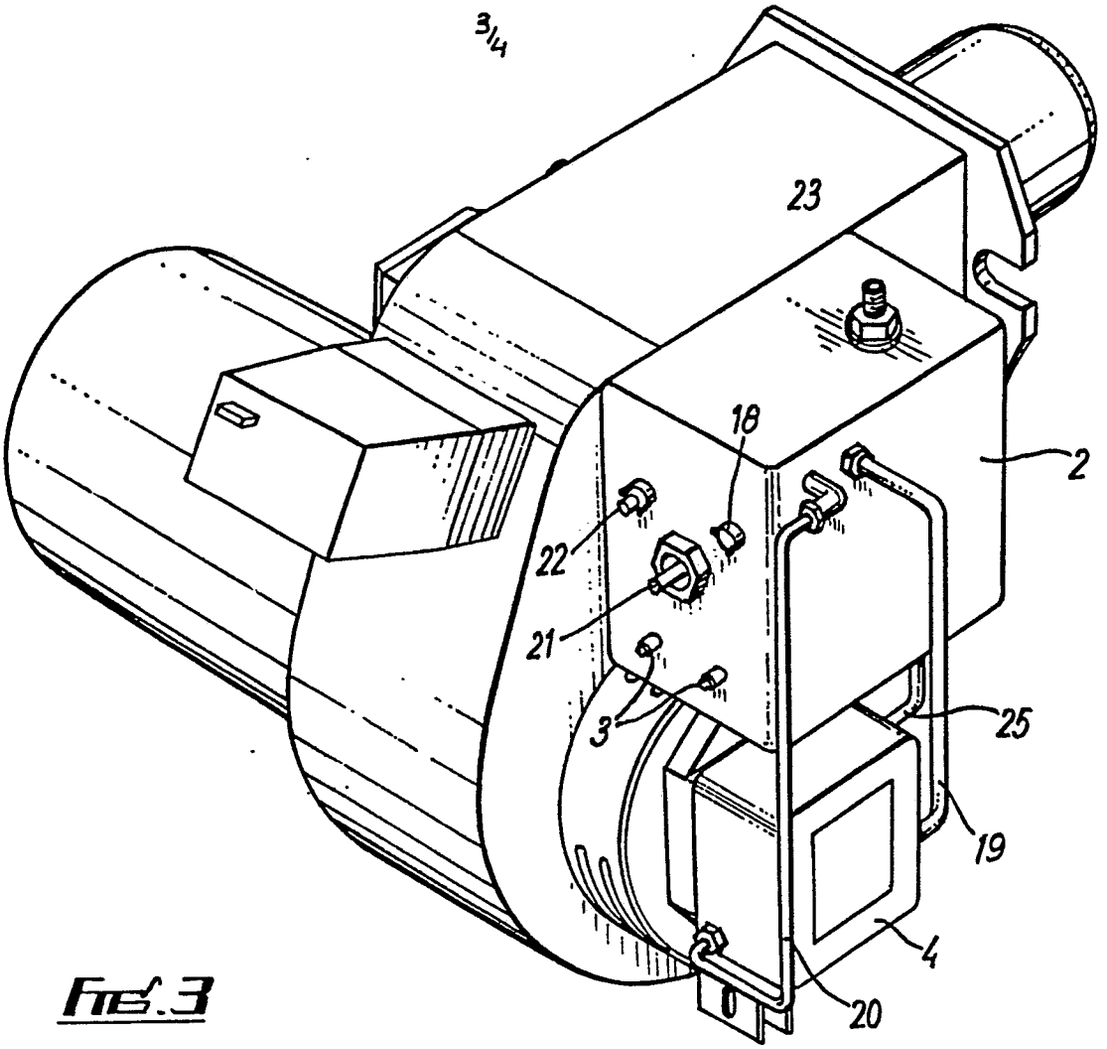
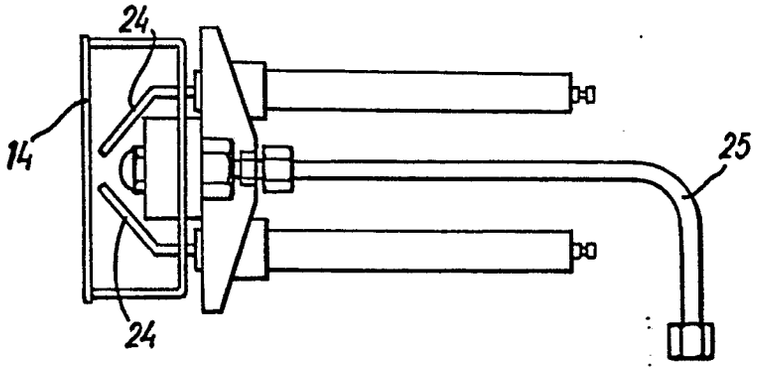


FIG.2



Фиг.3



Фиг.5

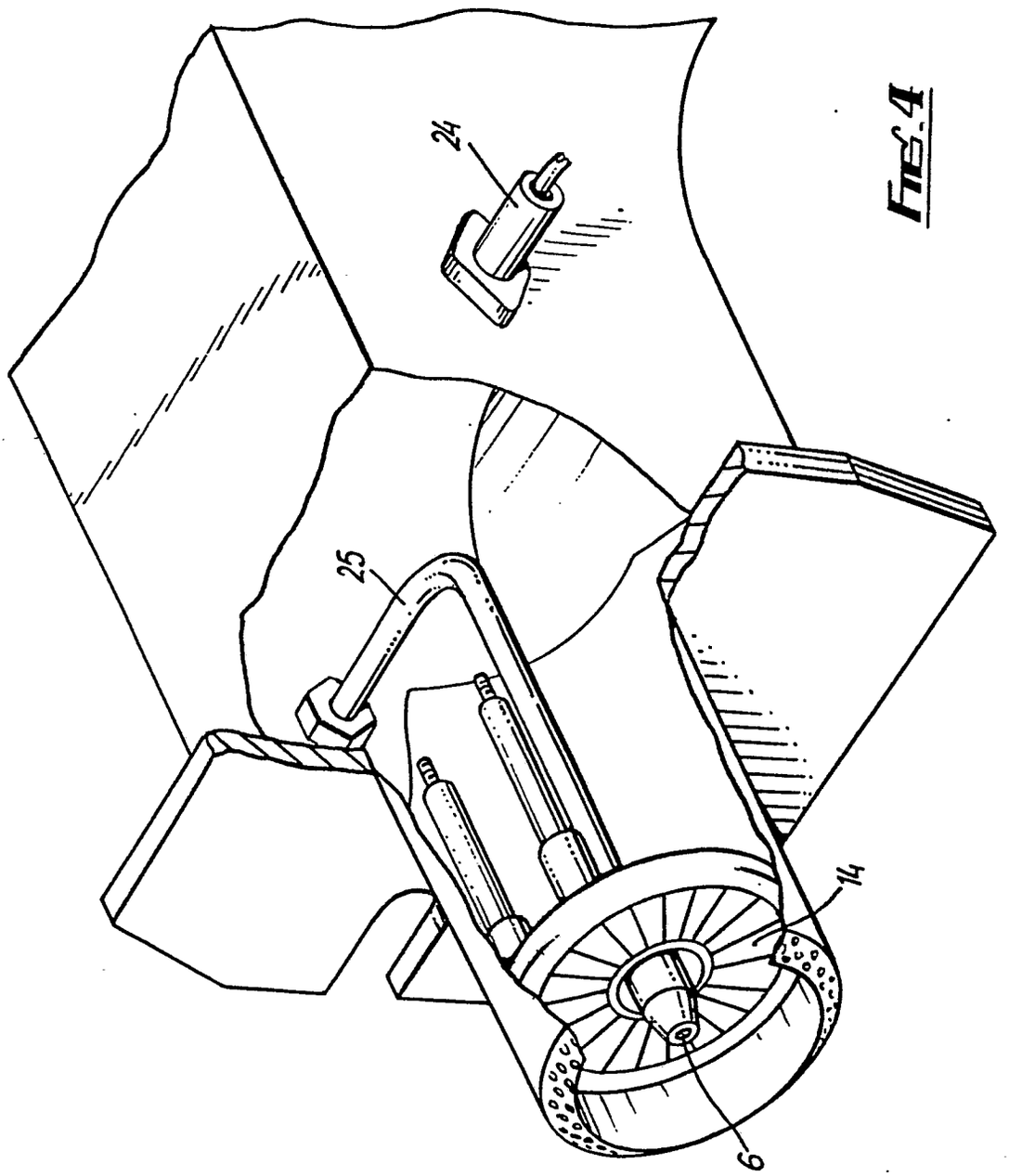


FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

0042891
Application number

EP 80302187.2

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	GB - A - 1 322 374 (MITSUI) + Page 2, lines 78-110; claim 3; fig. 1-3 + --	1-4,6, 7,9
	DE - A - 2 418 393 (ENVIROTECH CORPORATION) + Page 5, lines 23-30; claim 2 + --	1,2,7, 8
	DE - A - 2 311 470 (KABUSHIKI KAISHA) + Page 2, lines 11-15; description of fig. 3, pages 5-8 + --	1-3,6, 7
	CH - A - 287 811 (AG FÜR ÖL-FEUERUNGEN) + Totality + --	1-3,7
A	GB - A - 1 276 354 (PRENCO) + Totality + --	1
A	DE - B2 - 2 631 687 (CREUSOT-LOIRE) + Totality + -----	1

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

F 23 G 7/04

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

F 23 G 7/00
F 23 D 11/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	06-02-1981	TSCHÖLLITSCH

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