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(54) Gas burner.

(57) A gas burner has means to supply gaseous fuel and combustion air to a combustion chamber adjacent a fluid chamber which receives heat therefrom. Heated fluid is removed from and cooler fluid supplied to the fluid chamber. A burner motor controls both the amount of combustion air and gaseous fuel in response to signals from temperature sensing means.

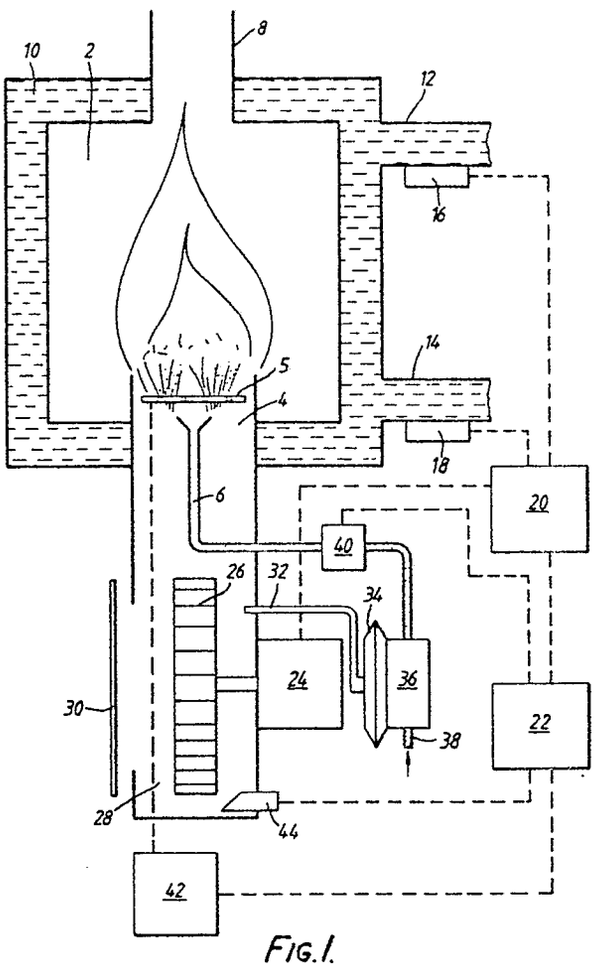

FIG. 1.

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GAS BURNER

This invention relates to burners operated by gaseous fuels, usually natural gas.

The use of gas-fired burners for heating systems is well known. Such burners can be used for large scale industrial applications or on a small scale, for example, in domestic central heating installations. In the modern energy conscious and environment conscious world, there is a natural desire to optimise fuel consumption wherever possible, thus ensuring that fuel is not wasted and that the combustion products are as clean as possible. Such an ideal situation is not easy to achieve, especially with comparatively low output burners intended, for example, for domestic use, as the load on such boilers changes constantly due to changing outside temperature conditions and/or the switching on and off of individual radiators.

U.K. Patent No. 2075718 describes a gas burner which has temperature sensors for sensing "temperature out" and "temperature in" of the water in the boiler tubes. Signals from the sensors go to a control circuit which controls the speed of a combustion air fan. The quantity of gas supplied to the burner is regulated by a valve which is actuated by an air flow sensor located in the fan housing.

The present invention seeks to provide an improved gas burner which is of comparatively simple construction but which will operate efficiently and adapt speedily to varying requirements over its output range. The simplicity of the gas burner construction is achieved in part by the provision of a motor which directly controls both the amount of air and the amount of fuel supplied to the combustion chamber, without the necessity for several control circuits.

According to this invention we provide a gas burner comprising a combustion chamber provided with means for the supply of gaseous fuel and means for the supply of combustion air, a fluid chamber adjacent the combustion chamber and arranged to receive heat therefrom, means for removing heated fluid from the fluid chamber and introducing cooler fluid thereto, means for measuring the temperature of fluid entering and/or leaving the fluid chamber to produce signals indicative of the measured temperature of temperature difference and a burner motor the speed of which is controlled by said signals and which motor controls both the amount of air and the amount of fuel supplied to the combustion chamber.

Preferably the fluid which is heated is water, the gas burner being in the form of a water boiler although the heated fluid may alternatively be air.

The burner motor preferably controls both the amount of air and the amount of gaseous fuel by the provision of a fan driven by the motor to supply air, means for sensing the pressure of the air supply and means for employing said sensed pressure to control the gaseous fuel supply. Suitable means comprise a diaphragm which is actuated by the sensed air pressure.

The gaseous fuel is suitably natural gas provided from a conventional gas main. However synthetically produced "town gas" or other gaseous fuels may be employed.

One form of the invention will now be described with reference to the accompanying drawing (Figure 1), which is a diagrammatic representation of a gas burner intended for comparatively low output use.

Referring to Figure 1, the burner comprises a combustion chamber 2 having at the bottom an aperture 4, fitted with a flame ring 5, for entry of gaseous fuel from a supply line 6, and at the top a flue 8. Around combustion chamber 2 is a low capacity water boiler 10 having an outflow 12 for heated water and a return 14 for returned cooler water which has given out its heat, for example to domestic radiators.

Attached to out-flow 12 and return 14 of boiler 10 are temperature sensors 16 and 18 respectively. A motor speed controller 20, linked to electrical control box 22, receives signals from sensors 16 and 18 and drives a burner motor 24 dependent on the difference in temperature between the out-flow 12 and return 14. This difference is indicative of the quantity of heat removed from the water during use for heating. Controller 20 is arranged so that with increasing temperature differential, motor 24 is caused to speed up.

Burner motor 24 drives a fan 26 which operates in a chamber 28 communicating with aperture 4. Chamber 28 has adjustable air inlet means 30. Fan 26 thus provides the source of combustion air for the burner, the amount of air being controlled by the speed of burner motor 24 as a function of the signals received from motor speed controller 20 and electrical control box 22.

An air pressure sensor tube 32 opens into chamber 28 and is connected to one side of a diaphragm 34 which operates a gas regulator valve 36. Regulator valve 36, which may be of conventional design, is arranged to control the supply of gaseous fuel, e.g. natural gas from a main supply line 38, to line 6. Thus air pressure in line 32, which itself is dependent on the air flow produced dependent on the speed of motor 24, regulates valve 36 and thus the amount of gaseous fuel

reaching the combustion chamber 2. It will be seen therefore that burner motor 24 controls both air and gas supply and that the air-fuel ratio remains approximately constant throughout variations in the load on the boiler over its operating range.

Thus the burner as described above can operate over its range with substantially unchanged combustion characteristics and high efficiency at low load can be maintained. The accurate control of water temperature means that a lower water capacity boiler can be used than would otherwise be thought necessary. Furthermore the constancy of the air fuel ratio makes for optimum fuel consumption combined with minimum environmental pollution.

The apparatus may incorporate various desirable safety features of such burners. Thus a solenoid valve 40 is arranged in gas supply line 6, the valve 40 being connected to electrical control box 22. Valve 40 remains closed until the initial required air purge for start-up of the burner is complete. The electrical control box 22 may control not only motor speed controller 20 and burner motor 24, but also transformer 42 connected to ignition means (not shown) and photocell 44 for detecting the presence of a flame within the combustion chamber 2.

Various modifications to the appratus may be made so that it is suitable for high output use. An additional advantage of the present invention lies in its providing means to enable modification of an existing boiler to give improved efficiency. This modification can be effected by introducing the necessary temperature sensors and electrical controls.

Claims

1. A gas burner comprising a combustion chamber provided with means for the supply of gaseous fuel and means for the supply of combustion air, a fluid chamber adjacent the combustion chamber and arranged to receive heat therefrom, means fo removing heated fluid from the fluid chamber and introducing cooler fluid thereto, means for measuring the temperature of fluid entering and/or leaving the fluid chamber to produce signals indicative of the measured temperature of temperature difference and a burner motor the speed of which is controlled by said signals, which motor controls both the amount of combustion air and the amount of gaseous fuel supplied to the combustion chamber.

2. A gas burner as claimed in claim 1 wherein the burner motor drives a fan to supply the combustion air.

3. A gas burner as claimed in claim 1 or claim 2 wherein first means are provided for sensing the pressure of the combustion air supply and second means are provided for employing said sensed pressure to control the gaseous fuel supply.

4. A gas burner as claimed in claim 3 wherein the second means comprises a diaphragm which is actuated by the sensed air pressure.

5. A gas burner as claimed in claim 3 wherein the diaphragm operates a gas regulator valve which is arranged to control the supply of gaseous fuel.

6. A gas burner as claimed in any one of claims 1 to 5 wherein the gaseous fuel is natural gas.

7. As gas burner as claimed in any one of claims 1 to 6 wherein the fluid which is heated is water.

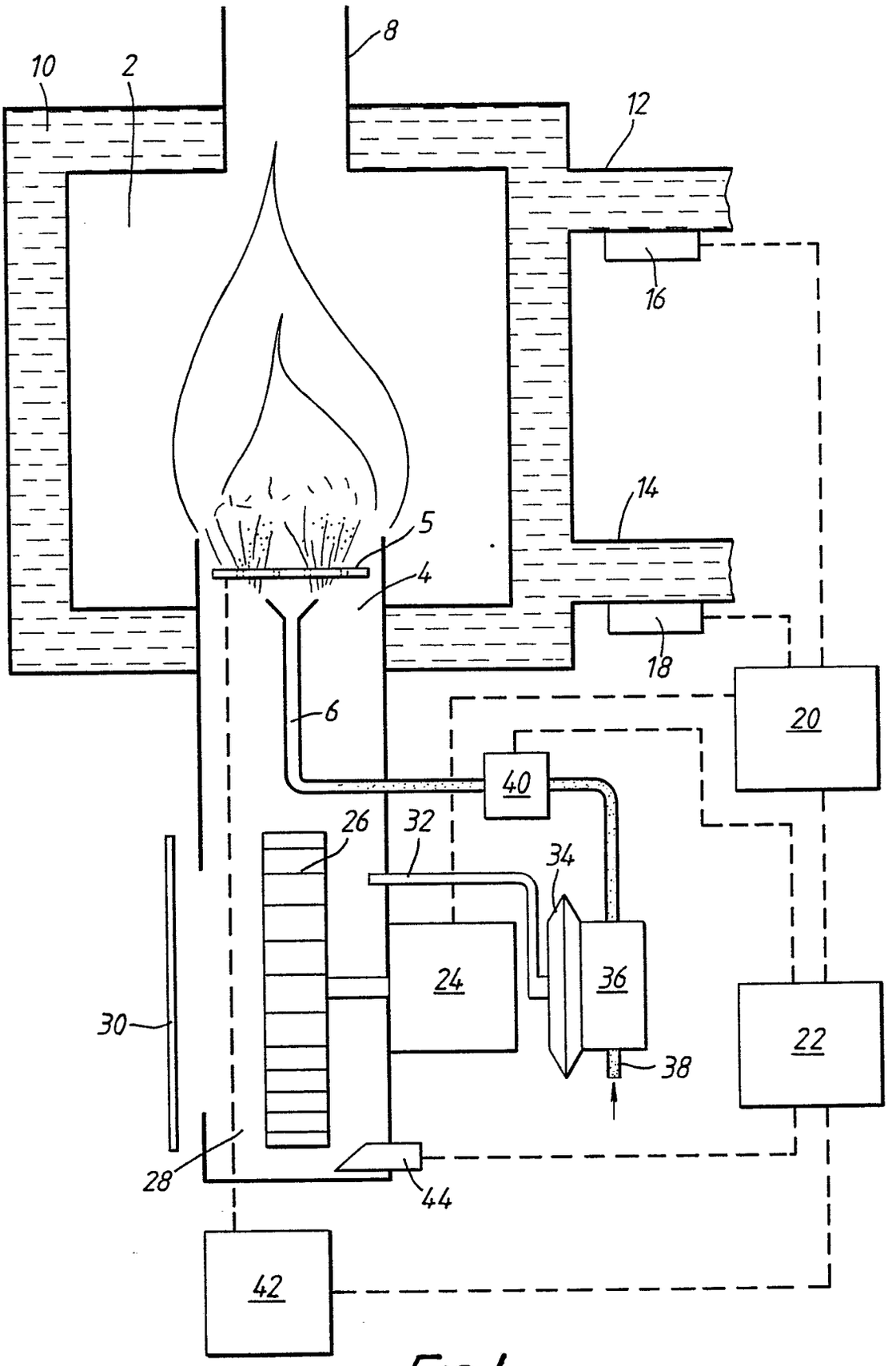

FIG. 1.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 31 0601

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,X	GB-A-2 075 718 (HITACHI LTD) * Figures 1,2; abstract *	1,2	F 23 N 1/10 F 23 N 1/02
X	FR-A-2 287 655 (SAUNIER-DUVAL) * Figures 1,2; claim 1 *	1-5,7	
X	FR-A-2 398 966 (CHEETHAM) * Figure 8; page 5, lines 4-29 *	1-5	
A	DE-A-3 517 471 (JOH. VAILLANT GmbH)		
A	DE-A-3 333 606 (JOH. VAILLANT GmbH)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 23 N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-02-1989	THIBO F.

CATEGORY OF CITED DOCUMENTS

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