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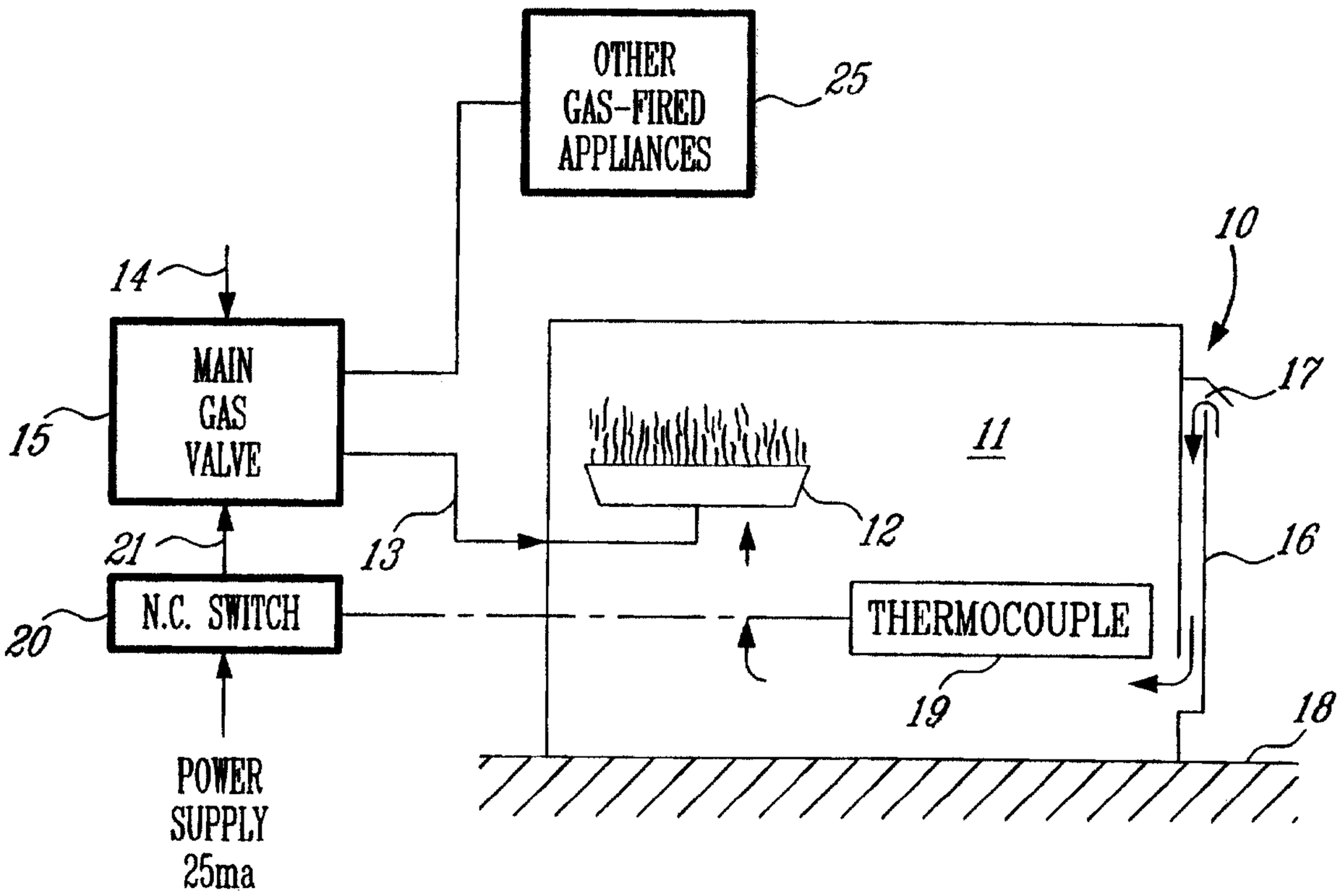
(54) Titre : SYSTEME DE DETECTION DE VAPEUR INFLAMMABLE POUR CHAUFFE-EAU
(54) Title: FLAMMABLE VAPOUR DETECTOR SYSTEM FOR HOT WATER HEATER



(57) Abrégé/Abstract:
A flammable vapour detector system is comprised of a thermocouple which is mounted in a combustion chamber of a hot water heater. A combustion air intake means supplies combustion air to the combustion chamber. A gas burner is provided in the combustion chamber. A gas supply line is secured to the gas burner. An external gas valve is provided in the supply line. A gas valve control circuit controls the ON/OFF state of the external gas valve. The gas valve control circuit is connected to the thermocouple. The thermocouple is exposed to the combustion chamber to sense the temperature therein and is set to cause the control circuit to shut off the external gas valve when the temperature in the combustion chamber reaches a set predetermined temperature value upon burning flammable vapours as they propagate in the combustion chamber through the combustion air intake means.

FLAMMABLE VAPOUR DETECTOR SYSTEM FOR HOT WATER HEATER

ABSTRACT

A flammable vapour detector system is comprised of a thermocouple which is mounted in a combustion chamber of a hot water heater. A combustion air intake means supplies combustion air to the combustion chamber. A gas burner is provided in the combustion chamber. A gas supply line is secured to the gas burner. An external gas valve is provided in the supply line. A gas valve control circuit controls the ON/OFF state of the external gas valve. The gas valve control circuit is connected to the thermocouple. The thermocouple is exposed to the combustion chamber to sense the temperature therein and is set to cause the control circuit to shut off the external gas valve when the temperature in the combustion chamber reaches a set predetermined temperature value upon burning flammable vapours as they propagate in the combustion chamber through the combustion air intake means.

FLAMMABLE VAPOUR DETECTOR SYSTEM FOR HOT WATER HEATER

TECHNICAL FIELD

[0001] The present invention relates to a flammable vapour detector system for shutting off the burner of a combustion chamber located in a hot water heater upon detection of flammable vapours within the burner chamber.

BACKGROUND ART

[0002] Various devices have been developed in recent years for detecting flammable gases in the area of a gas-fired hot water heater. Most systems use gas sensors which are located in proximity to the air intake for the combustion chamber and upon detection of same, the burners are shut down. These sensors are capable of sensing a variety of explosive gas, such as natural gas, methane, propane, butane, gasoline, solvents and paints. Also, the air intakes leading to the combustion chamber are usually elevated from the floor surface or else the entire hot water heater is supported on an elevated base whereby to elevate the air intake from the floor. Regulations are in place concerning the installation of gas-fired hot water heaters and it is recommended that they be mounted with their air intake at least 18" from the floor surface. Because natural gas is lighter than air, gas detectors must be installed adjacent a ceiling close to the hot water heater whereas detectors for heavier gases such as propane, gasoline vapours and kerosene, are located close to the floor as these gases are heavier than air. Accordingly, it is preferable to have two detectors associated with such water heaters.

[0003] A problem with using gas sensors is that many of these sensors do not operate effectively and often malfunction. Accordingly, they are not entirely reliable.

There is therefore a need to provide a more reliable way of detecting explosive flammable vapours.

SUMMARY OF INVENTION

[0004] It is a feature of the present invention to provide a flammable vapour detector system which overcomes the above-mentioned disadvantages of the prior art.

[0005] According to a broad aspect, the present invention provides a flammable vapour detector system which comprises a thermocouple mounted in the combustion chamber of a hot water heater. A combustion air intake means supplies combustion air to the combustion chamber. A gas burner is provided in the combustion chamber. A gas supply line is secured to the gas burner. An external gas valve is provided in the supply line. A gas valve control circuit controls the ON/OFF state of the external gas valve. The gas valve control circuit is connected to the thermocouple. The thermocouple is exposed to the combustion chamber to sense the temperature therein and is set to cause the control circuit to shut off the external gas valve when the temperature in the combustion chamber reaches a set predetermined temperature value upon burning flammable vapours as they propagate in the combustion chamber through the combustion air intake means.

BRIEF DESCRIPTION OF DRAWINGS

[0006] A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

[0007] FIGURE 1 is a schematic view of the flammable vapour detector system of the present invention utilized in conjunction with a combustion chamber of a hot water heater.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0008] Referring now to the drawing, there is shown the lower portion 10 of a hot water heater. The schematic

illustration does not show all of the component parts of the lower end of the hot water heater but the illustration is only schematic. Therefore, the inner casing of the hot water heater as well as the outer casing, pipes and controls are not illustrated.

[0009] At the lower end of the hot water heater, there is provided a combustion chamber 11 in which there is secured a gas burner 12. A gas line 13 supplies combustible gas, herein natural gas, to the gas burner 12. The gas line 13 is connected to the gas supply line 14 through a main gas valve 15. Combustible air is supplied to the combustion chamber 11 through air intake means, and as herein shown, via a snorkel 16 which is a channel provided with an elevated air intake port 17 whereby to admit air at a predetermined elevation from a support floor 18 on which rests the hot water heater 10. Accordingly, combustion air enters the inlet port and propagates down into the snorkel to enter the combustion chamber 11. The hot water heater could also be supported on an elevating base if the air intake is at the bottom of the heater whereby to elevate the air intake.

[00010] The present invention provides a thermocouple 19 which is mounted at a predetermined location within the combustion chamber 11 and which is connected to a high limit cut-off normally closed switch 20 and they constitute a control circuit. Power supply for the main gas valve is provided through the connection 21 from the normally closed switch 20. The thermocouple is exposed to the combustion chamber to sense the temperature therein and it has a set point whereby to cause the normally closed switch to open upon sensing the set predetermined temperature whereby to cause the main gas valve to shut down and stop the gas supply to the burner 12. By shutting the main gas valve, the gas supply to other appliances 25 is also shut-off to prevent explosion.

[00011] The system works as follows. As flammable vapours enter the snorkel 16 with the air supply, they are burned by the gas burner 12 and these additional flammable vapours burn and thereby raise the temperature in the combustion housing. The thermocouple 19 is set to open the switch 20 upon detection of a predetermined temperature value when flammable vapours are being burned in the combustion chamber. Accordingly, as the temperature in the combustion chamber rises due to infiltration of external flammable combustible products, the main gas valve shuts down the gas supply and the gas burner is extinguished to prevent an explosion. Other appliances are also shut down. The predetermined temperature value is set higher than the temperature generated by the burner from the combustible gas and air mixture without the flammable vapours mixed therewith.

[00012] The normally closed contact switch 20 supplies a 25 milli-amp current to the main gas valve through connection 21, to maintain that gas valve open to supply gas to the burner. When the current is cut off by opening the switch 20, then the main gas valve shuts down automatically.

[00013] The above flammable vapour detector system of the present invention is an economical, safe and efficient way of shutting down the burner in the combustion chamber of a gas fired hot water heater upon detection of flammable vapours and does not rely on gas sensors which often malfunction and which require separate power supplies.

[00014] It is within the ambit of the present invention to cover any obvious modifications of the preferred embodiment described herein, provided such modifications fall within the scope of the appended claims.

CLAIMS,

1. A flammable vapour detector system comprising a thermocouple mounted in a combustion chamber of a hot water heater, combustion air intake means to supply combustion air to said combustion chamber, a gas burner in said chamber, a gas supply line secured to said gas burner, an external gas valve in said supply line, a gas valve control circuit to control the ON/OFF state of said external gas valve, said gas valve control circuit being connected to said thermocouple, said thermocouple being exposed to said combustion chamber to sense the temperature therein and being set to cause the control circuit to shut off said external gas valve when said temperature in said combustion chamber reaches a predetermined set temperature value upon burning flammable vapours as they propagate in said combustion chamber through said combustion air intake means.

2. A flammable vapour detector system as claimed in claim 1 wherein said predetermined value is higher than the temperature generated by said burner from the combustible gas and air mixture without flammable vapours mixed therewith.

3. A flammable vapour detector system as claimed in claim 2 wherein said control circuit comprises a normally closed (N.C.) switch through which is supplied a current to maintain said gas valve open to supply gas to said burner.

4. A flammable vapour detector system as claimed in claim 3 wherein said thermocouple opens said N.C. switch upon sensing said predetermined set temperature value to cut off said current to cause said gas valve to close and shut off gas supply to said burner to extinguish same.

5. A flammable vapour detector system as claimed in claim 2 wherein said combustion air intake means is a snorkel having an elevated air intake port to admit ambient combustion air to said combustion chamber.

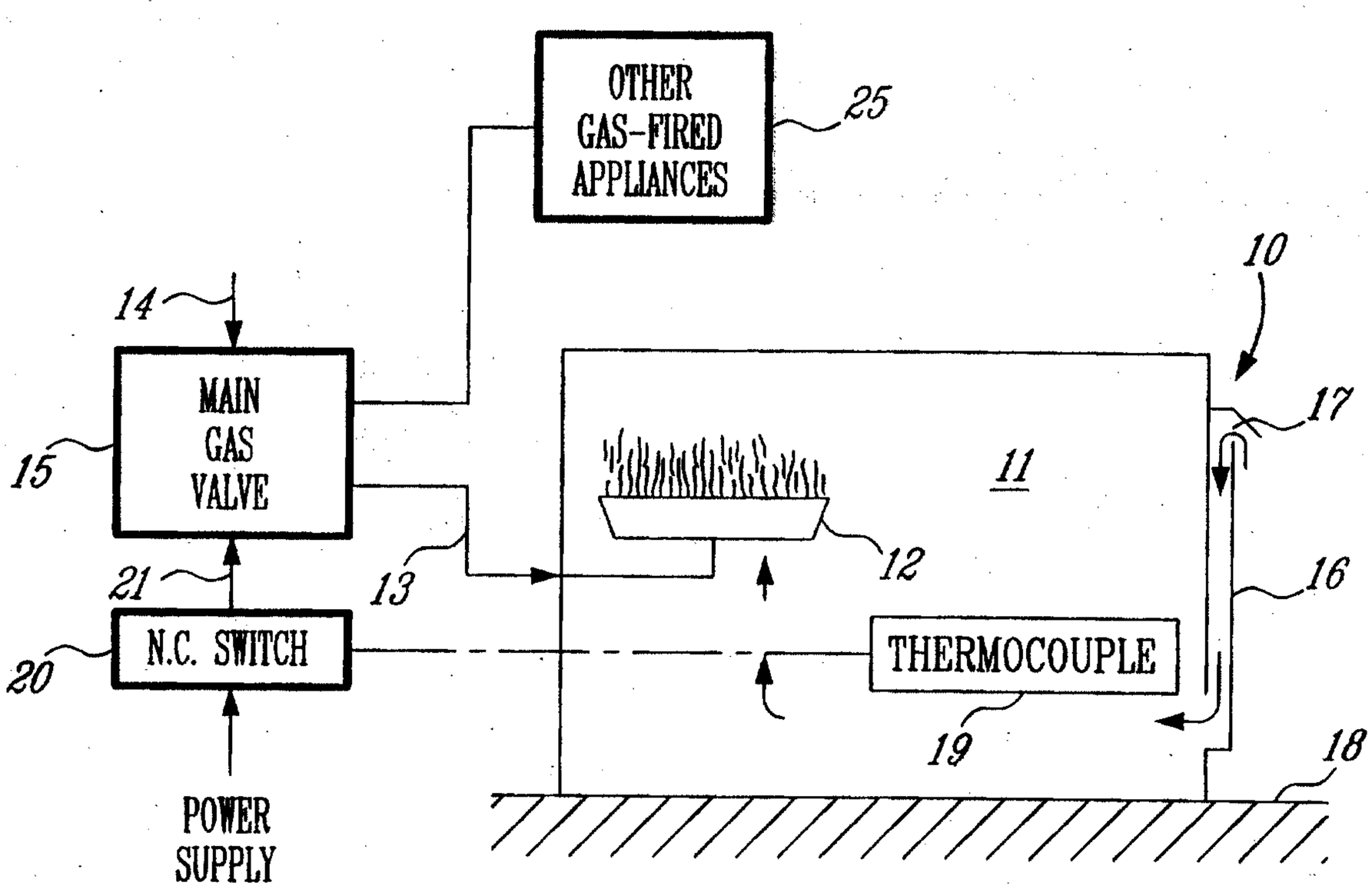
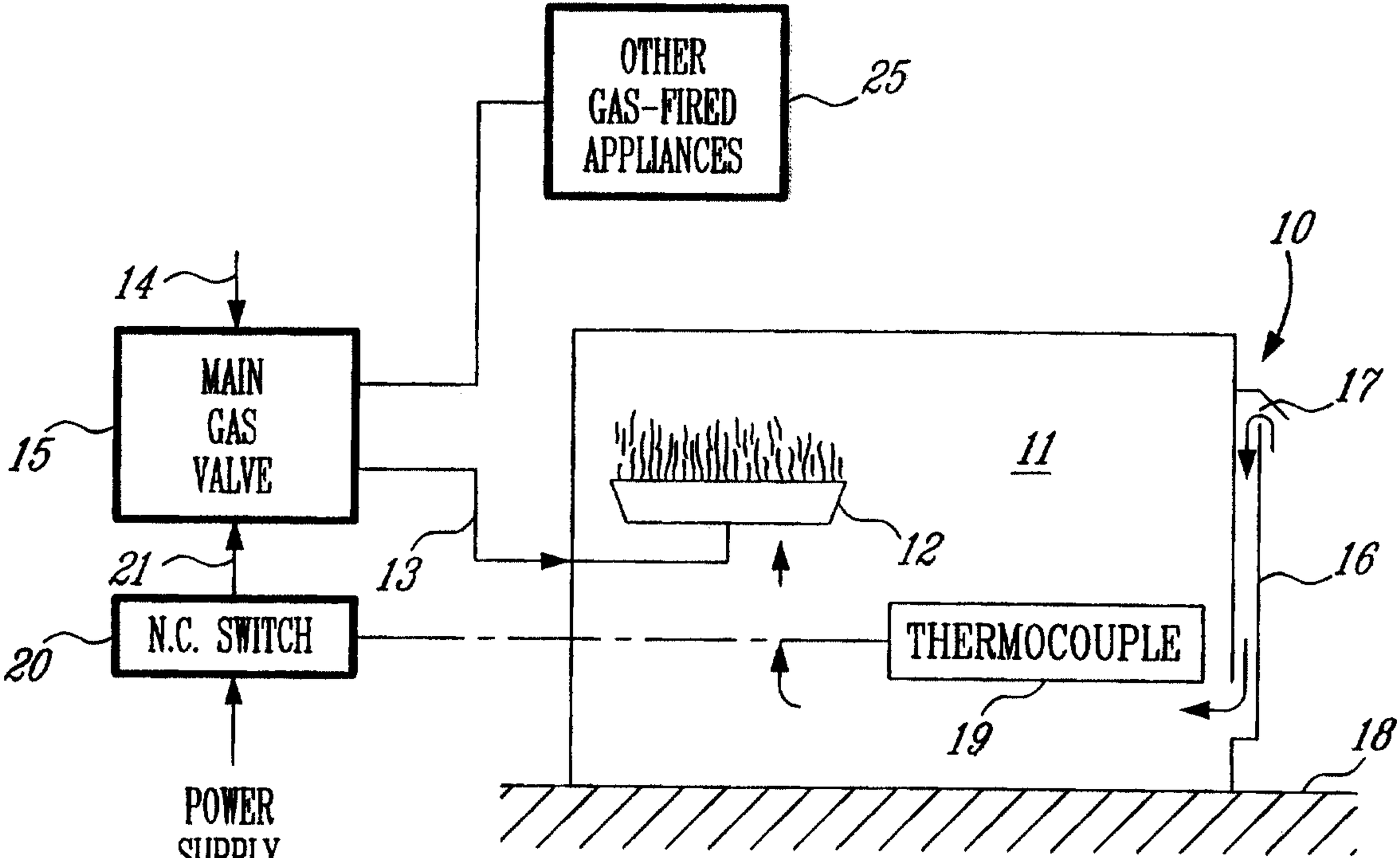

OTHER
GAS-FIRED
APPLIANCES
25
14
MAIN
GAS
VALVE
15
21
N.C. SWITCH
20
POWER
SUPPLY
25ma
13
10
17
11
12
16
THERMOCOUPLE
19
18

FIG. 1


OTHER
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