

GAS STOVE SYSTEM AND METHOD FOR CONTROLLING THE SAME

BACKGROUND OF THE INVENTION

Technical Field

[0001] The present disclosure is related to a gas stove system, and, more particularly, to a gas stove system which could detect accidental extinguishment of the flame and stop the supply of the fuel gas and a method for controlling the same.

Description of Related Art

[0002] Now, the gas stove is commonly used among the cooking units for cooking food. The reason lies in that the heat generated by the gas stove is more than that generated by the electric stove, so the heating time and the response time of the gas stove is less than that of the electric stove. However, during the use of the gas stove, the fuel gas may not be ignited or the flame may be extinguished unexpectedly, which causes the fuel gas leaking continuously and results in an accident.

[0003] Such accident could happen especially when using the gas stove with more than two burners, A gas stove having two burners is taken as an example hereinafter. Each of the two burners communicates to the respective flame control valve. When the fuel gas supplied to one of the burners is not ignited or the flame produced by the burner is extinguished unexpectedly leading to continuous leakage of the fuel gas, the leaking fuel gas may be ignited suddenly if the other burner is producing a flame. As such, a sudden flame may scare the user or even cause a fire.

[0004] Hence, the key point of the gas stove design is to enhance the safety of the gas stove with more than two burners.

BRIEF SUMMARY OF THE INVENTION

[0005] In view of the above, the purpose of the present disclosure is to provide a

gas stove system and a method for controlling the same to avoid the fuel gas leak in one of the burners to be ignited by another burner.

[0006] The present disclosure provides a gas stove system which includes an on-off valve, a plurality of burner assemblies, and a control device. The on-off valve communicates with a fuel gas source and is controlled to be on or be off for fuel gas to pass or be blocked. Each of the burner assemblies includes a fuel gas control valve, a burner, a lighter and sensor set, and an ignition switch. The fuel gas control valve communicates with the on-off valve and is adapted to adjust a fuel gas flow rate. The burner communicates with the fuel gas control valve and is adapted to produce a flame. The lighter and sensor set is provided beside the burner and is controlled to ignite the burner and to detect the flame produced by the burner. The ignition switch is triggered to generate an igniting signal for the lighter and sensor set. The control device is electrically connected to the ignition switches, the lighter and sensor sets, and the on-off valve. After receiving the igniting signal from one of the ignition switches, the control device controls the lighter and sensor set corresponding to the ignition switch for ignition and turns on the on-off valve. When the lighter and sensor set has not detected the flame for a predetermined period of time, the control device turns off the on-off valve to stop the supply of the fuel gas.

[0007] The present disclosure provides a method for controlling a gas stove system. The gas stove system includes an on-off valve, a plurality of fuel gas control valves, a plurality of burners, and a plurality of lighter and sensor sets. The on-off valve communicates with a fuel gas source. The fuel gas control valves communicate with the on-off valve to adjust a fuel gas flow rate. Each of the burners communicates with a corresponding fuel gas control valve, and each of the lighter and sensor sets is respectively provided beside a corresponding burner. The method includes a step A of controlling one of the lighter and sensor sets to ignite the corresponding burner to produce a flame and

turning on the on-off valve, and a step B of detecting the corresponding burner through the lighter and sensor set to confirm that whether the flame is produced within a predetermined period of time. If the flame is produced within the predetermined period of time, there further includes a step b1 of keeping the on-off valve on. If the burner flame is not detected within the predetermined period of time, there further includes a step b2 of turning off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves.

[0008] The advantage of the present disclosure is that when the fuel gas is not ignited in one of the burners, the supply of fuel gas to the fuel gas control valves may be interrupted. As such, the fuel gas leaking from the burner may not be ignited by another burner, which avoids a dangerous occurrence.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0009] The present disclosure will be best understood by referring to the following detailed description of some illustrative embodiments in conjunction with the accompanying drawings, in which

[0010] FIG. 1 is a schematic diagram showing the gas stove system according to an embodiment of the present disclosure;

[0011] FIG. 2 is a schematic diagram showing a fuel gas control valve according to the embodiment in FIG. 1; and

[0012] FIG. 3 is a flow chart showing the method for controlling the gas stove system according to the embodiment in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0013] A gas stove system 100 according to an embodiment of the present disclosure is shown in FIG. 1 and includes a pressure-control valve assembly 10, a plurality of burner assemblies 20, and a control device 30.

[0014] The pressure-control valve assembly 10 communicates with a fuel gas source G. In the present embodiment, the pressure-control valve assembly 10 has a valve body 11, a regulator 12 and an on-off valve 14. The valve body 11 has an entrance 11a and an exit 11b. The regulator 12 and the on-off valve 14 are provided in the valve body 11 and are located between the entrance 11a and the exit 11b. The regulator 12 is adapted to communicate with the fuel gas source G and to regulate the pressure of the fuel gas for providing the fuel gas at a constant pressure. In the present embodiment, the constant pressure of the fuel gas is 280 mmH₂O. The on-off valve 14 is controlled to be on or off. When the on-off valve 14 is on, the fuel gas is allowed to flow through. When the on-off valve 14 is off, the fuel gas is stopped flowing through. In the present embodiment, the on-off valve 14 may be a Normally Closed solenoid valve. In other embodiments, the position of the regulator 12 and that of the on-off valve 14 could be exchanged.

[0015] Each of the burner assemblies 20 includes a fuel gas control valve 22, a burner 24, a lighter and sensor set 26, and an ignition switch 28. The fuel gas control valve 22 communicates with the on-off valve 14 and the burner 24. The lighter and sensor set 26 is provided beside the burner 24 and includes a lighter 26a and a sensor 26b in the present embodiment. The lighter 26a, the sensor 26b, and the ignition switch 28 are electrically connected to the control device. The thermocouple is taken as an example of the sensor 26b. The ignition switch 28 is provided in the fuel gas control valve 22.

[0016] Referring to FIG. 2, the fuel gas control valve 22 is adapted to regulate a fuel gas flow rate. In the present embodiment, the fuel gas control valve 22 is in manual control manner as an example, but it is not limited thereto. In other embodiments, the fuel gas control valve 22 could be controlled by a motor. The fuel gas control valve 22 has a knob 22a and a valve door. The open degree of the valve door inside the fuel gas control valve 22 is adjusted by turning the knob 22a, which further adjusts the flow rate of the fuel gas flowing through the fuel gas control valve 22. When being triggered by the rotating

knob 22a, the ignition switch 28 generates an igniting signal for the control device 30, and then the control device 30 generates a corresponding signal for the lighter 26a. After receiving the signal, the lighter 26a produces a spark to ignite the fuel gas entering the burner 24, which further makes the burner 24 produce a flame. The sensor 26b is used to detect the flame.

[0017] Furthermore, each of the burner assemblies 20 further includes a detector 29 provided in the fuel gas control valve 22 and electrically connected to the control device 30. The detector 29 is adapted to detect the on or off of the fuel gas control valve. When the knob 22a is rotated to a position where the detector 29 is triggered, the detector 29 detects the fuel gas control valve 22 to be on. When the knob 22a is rotated to a position where the fuel gas control valve 22 is off, the detector 29 detects the fuel gas control valve 22 to be off. In other embodiments, the fuel gas control valve 22 could be an electronic valve, and a motor is controlled by the control device 30 to adjust the open degree of the valve door for adjusting the flow rate of the fuel gas. In other embodiments, the ignition switch 28 is provided outside the fuel gas control valve 22 and is triggered by pressing.

[0018] The control device 30 controls each of the lighters 26a to ignite the flame, controls the on-off valve 14 to be on or off and receives the detecting signal about the flame from the sensor 26b.

[0019] With the aforementioned design of the gas stove system, a method for controlling the same will be described hereinafter. The method includes the steps shown in FIG. 3.

[0020] Referring to FIG.3 , in step S1, the user rotates the knob 22a to turn on the fuel gas control valve 22.

[0021] In step S2, when the ignition switch 28 is triggered by the knob 22a, the control device 30 controls the corresponding lighter 26a to ignite the burner 24 to produce

a flame and controls the on-off valve 14 to be on to allow the fuel gas to enter the burner 24.

[0022] In step S3, the sensor 26b detects whether the flame is produced by the burner within a predetermined period of time. In the present embodiment, the predetermined period of time is, for example, ten seconds.

[0023] Following step S3, if the sensor 26b detects the flame, which means the ignition is successful, then perform step S4a of keeping the on-off valve 14 on. If the sensor 26b does not detect the flame, which means the ignition is failed, then perform step S4b of turning off the on-off valve 14 to stop the supply of the fuel gas to the fuel gas control valves 22.

[0024] In the present embodiment, after step S4a, there is further a step S5 as what follows. If one of the sensors 26b detects the flame, but after a period of time the sensor 26b does not detect the flame and the detector 29 further detects the fuel gas control valve 22 to be on, which means that the accidental extinguishment of the flame occurs, then the control device 30 turns off the on-off valve 14 to stop the supply of the fuel gas to the fuel gas control valves 22.

[0025] In other embodiments, after step S4a, there is further a step as what follows. If one of the sensors 26b detects the flame, and the corresponding detector 29 detects the fuel gas control valve to be off, which means that the abnormality occurs in the valve door inside the fuel gas control valve 22 or the sensor 26b, then control device 30 turns off the on-off valve 14 to stop the supply of the fuel gas to the fuel gas control valves 22.

[0026] All in all, what mentioned above is the gas stove system and the method for controlling the same according to the present disclosure. When an abnormality of failure ignition or accidental extinguishment of the flame is detected in any one of burners, the supply of the fuel gas to the fuel gas control valves 22 is stopped. As such, the danger that the fuel gas leaking from the burner may be ignited by another burner is avoided, thereby

enhancing the safety of using the burner.

[0027] It must be pointed out that the embodiments described above are only some embodiments of the present disclosure. All equivalent structures and steps which employ the concepts disclosed in this specification and the appended claims should fall within the scope of the present disclosure.

WHAT IS CLAIMED IS:

1. A gas stove system comprising:

an on-off valve communicating with a fuel gas source and controlled to be on or off for a fuel gas to pass or be stopped;

a plurality of burner assemblies, each of which includes a fuel gas control valve, a burner, a lighter and sensor set, and an ignition switch, wherein:

the fuel gas control valve communicates with the on-off valve and is adapted to adjust a fuel gas flow rate flowing through the fuel gas control valve;

the burner communicates with the fuel gas control valve and is adapted to produce a flame;

the lighter and sensor set is provided beside the burner and is controlled to ignite the burner and to detect the flame produced by the burner; and

the ignition switch is triggered to generate an igniting signal for the lighter and sensor set; and

a control device electrically connected to the ignition switches, the lighter and sensor sets, and the on-off valve,

wherein the on-off valve is controlled to be off to avoid the fuel gas passing through the on-off valve to the fuel gas control valve before the control device receives the igniting signal from one of the ignition switches,

wherein after receiving the igniting signal from the one of the ignition switches, the control device controls the lighter and sensor set in association with the ignition switch for ignition and turns on the on-off valve; and when the lighter and sensor set has not detected the flame for a predetermined period of time, the control device turns off the on-off valve to stop the supply of the fuel gas.

2. The gas stove system as claimed in claim 1, wherein each of the burner assemblies

further includes a detector provided in the fuel gas control valve and electrically connected to the control device; the detector detects the on or off of the corresponding fuel gas control valve; and if the lighter and sensor sets detect the flame, but after a period of time, the lighter and sensor set does not detect the flame, and the detector detects the fuel gas control valve to be on, the control device turns off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves.

3. The gas stove system as claimed in claim 1, wherein each of the burner assemblies further includes a detector provided in the fuel gas control valve and electrically connected to the control device; the detector detects the on or off of the fuel gas control valve; and if at least two lighter and sensor sets detect the flame, but after a period of time, one of the at least two lighter and sensor sets does not detect the flame, and the detector detects the fuel gas control valve to be on, the control device turns off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves.

4. The gas stove system as claimed in claim 1, wherein each of the burner assemblies further includes a detector provided in the fuel gas control valve and electrically connected to the control device; the detector detects the on or off of the corresponding fuel gas control valve; and if one of the lighter and sensor sets detects the flame, but the corresponding detector detects the fuel gas control valve to be off, the control device turns off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves.

5. The gas stove system as claimed in claim 1, further including a pressure-control valve assembly having a valve body in which a regulator is provided along with the on-off valve to regulate the pressure of the fuel gas for providing the fuel gas in a steady pressure.

6. A method for controlling a gas stove system, wherein the gas stove system includes an on-off valve, a plurality of fuel gas control valves, a plurality of burners, a plurality of

lighter and sensor sets, a plurality of ignition switches, and a control device, the on-off valve communicates with a fuel gas source, the fuel gas control valves communicate with the on-off valve to adjust a fuel gas flow rate flowing through the fuel gas control valves, each of the burners communicates with a corresponding fuel gas control valve and is provided with a corresponding lighter and sensor set nearby, a corresponding ignition switch to generate a corresponding igniting signal for the corresponding lighter and sensor set, the control device electrically connected to the plurality of ignition switches, the plurality of lighter and sensor sets and the on-off valve, and the method comprises the steps of:

A、controlling, via the control device, one of the lighter and sensor sets to ignite the fuel gas entering the corresponding burner to produce a flame and turning on the on-off valve by triggering the corresponding ignition switch to generate the corresponding igniting signal, wherein the on-off valve is controlled to be off to avoid the fuel gas passing through the on-off valve to the fuel gas control valve before the control device receives the corresponding igniting signal from the corresponding ignition switch;

B、detecting the corresponding burner through the lighter and sensor set to confirm that whether the flame is produced within a predetermined period of time; wherein

if the flame is produced within the predetermined period of time, a step b1 of keeping the on-off valve on is performed; and

if the flame is not produced within the predetermined period of time, a step b2 of turning off the on-off valve is performed to stop the supply of the fuel gas to the fuel gas control valves.

7. The method according to claim 6, further including the following step after step b1: turning off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves

with the proviso that one of the lighter and sensor sets detects the flame, but after a period of time the lighter and sensor set does not detect the flame, and the corresponding fuel gas control valve is on.

8. The method according to claim 6, further including the following step after step b1: turning off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves with the proviso that at least two lighter and sensor sets detect the flame, but after a period of time one of the at least two lighter, and sensor sets does not detect the flame and the corresponding fuel gas control valve is on.

9. The method according to claim 6, further including the following step after the step b1: turning off the on-off valve to stop the supply of the fuel gas to the fuel gas control valves, if one of the lighter and sensor sets detects the flame and the corresponding fuel gas control valve is off.