A gas appliance includes a pilot burner, one or more main burners, a solenoid valve coupled to the pilot burner and the main burners for controlling the pilot burner and the main burners, and a control circuit coupled to the solenoid valve for controlling the solenoid valve to operate the pilot burner or the main burner remotely. An igniting device may be coupled to the control circuit for being operated by the control circuit to selectively ignite the pilot burner. One or more batteries may be coupled to the control circuit for energizing the control circuit, and a thermo-couple may be coupled to the control circuit for selectively energizing the control circuit when the battery is out of electricity.
SAFETY DEVICE FOR GAS APPLIANCE

BACKGROUND OF THE INVENTION

[0001] Field of the Invention

[0002] The present invention relates to a gas appliance, and more particularly to a gas appliance including a safety or security device for automatically shut-off the fire or flame in response to flame outage, and/or even when the energizing batteries are out of electricity.

[0003] Description of the Prior Art

[0004] Typical gas stoves or gas appliances comprise an igniting device actuable or operable by the users to selectively ignite a pilot burner which may then be used to ignite one or more main gas stove heads or gas or main burners for burning or for cooking purposes.

[0005] For example, U.S. Pat. No. 5,094,259 to Hsu discloses one of the typical automatic shut-off safety devices for gas stoves comprising a safety valve control device retrofitted between a gas inlet pipe and a catch base of the stove, and including a function shaft which is controlled by an electromagnetic control rod to maintain the open state of the gas intake valve, and a circuit device for energizing an electromagnetic coil to actuate the function shaft to operate the gas intake valve.

[0006] However, the electromagnetic control rod and the electromagnetic coil and the circuit device are all required to be coupled to an electric source, such as a battery, and the members or elements may not be operated or actuated when the battery is out of electricity.

[0007] U.S. Pat. No. 6,059,562 to Anderson, II discloses another typical gas appliance having an automatic gas shut-off device responsive to flame outage and comprising a flame sensor or temperature sensor located at a gas nozzle for detecting the absence of the flame.

[0008] However, the flame sensor or temperature sensor is also required to be coupled to an electric source, such as a battery, and the members or elements also may not be operated or actuated when the battery is out of electricity, i.e., the main gas stove heads or gas or main burners may not be suitably shut-off when the battery is out of electricity, particularly when an emergency circumstance or condition is occurred.

[0009] The present invention has arisen to mitigate and/or obviate the afore-described disadvantages of the conventional gas stoves or gas appliances.

SUMMARY OF THE INVENTION

[0010] The primary objective of the present invention is to provide a gas appliance including a safety or security device for automatically shut-off the fire or flame in response to flame outage.

[0011] The other objective of the present invention is to provide a gas appliance including a safety or security device for automatically shut-off the fire or flame even when the energizing battery is out of electricity.

[0012] In accordance with one aspect of the invention, there is provided a gas appliance comprising a pilot burner, at least one main burner, a solenoid valve coupled to the pilot burner and the main burner for controlling the pilot burner and the main burner, a control circuit coupled to the solenoid valve for controlling the solenoid valve to operate the pilot burner or the main burner, an igniting device coupled to the control circuit for being operated by the control circuit to selectively ignite the pilot burner, at least one battery coupled to the control circuit for supplying an electric energy to energize the control circuit, a thermo-couple coupled to the control circuit for selectively energizing the control circuit when the battery is out of electricity, and a remote device may further be provided and coupled to the control circuit for operating the control circuit remotely.

[0013] A detecting device may further be provided and disposed beside the main burner for detecting whether the main burner is working or not, and the detecting device is coupled to the control circuit for sending the detected signal to the control circuit and then to control the pilot burner and/or the main burner.

[0014] A changing device may further be provided and coupled to the control circuit and coupled to the battery and the thermo-couple for switching between the battery and the thermo-couple, particularly for supplying electric energy from the thermo-couple to the control circuit when the battery is out of electricity. A supercharging device may further be provided and coupled between the changing device and the thermo-couple for supercharging or boosting the signal from the thermo-couple.

[0015] A switch may further be provided and coupled to the control circuit for selectively operating the control circuit by the users manually.

[0016] Further objectives and advantages of the present invention will become apparent from a careful reading of the detailed description provided hereinafter, with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a block diagram illustrating a control circuit of a gas appliance in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] Referring to FIG. 1, a gas appliance in accordance with the present invention comprises an igniting device 10 actuable or operable by the users to selectively ignite a pilot burner 11 which may then be used to ignite one or more main stove heads or main burners 12 for burning. A solenoid valve 13 may be provided and coupled to the pilot burner 11 and/or the main burners 12 for controlling the gas supply to either or both of the pilot burner 11 and the main burners 12.

A control circuit 14 is coupled to the igniting device 10 and coupled to the solenoid valve 13 for controlling or actuating the solenoid valve 13 to operate the pilot burner 11 and/or the main burners 12. A switch 15 may be provided and coupled to the control circuit 14 for being actuated or operated by the users to issue an initiating or initializing signal in order to actuate or operate the control circuit 14 and thus to control or actuate the solenoid valve 13 to operate the pilot burner 11 and/or the main burners 12.

[0019] A signal receiving device or remote device 16 may further or optionally be provided and coupled to the control circuit 14 for initializing or actuating or operating the control circuit 14 remotely. For example, a remote control device or remote signal issuing device may be operated or actuated by the users, and the signal receiving device or remote device 16 may receive the remote signals, such as the audio signals which may be amplified, rectified and/or decoded to actuating or operating the control circuit 14.
remotely. A detecting device 20, such as a detecting circuit 20, a detecting probe 20 or the like may further be provided and coupled to the control circuit 14 and/or to the solenoid valve 13 and/or to the pilot burner 11 and/or the main burners 12 and/or disposed beside the pilot burner 11 and/or the main burners 12 for detecting whether the pilot burner 11 and/or the main burners 12 is working or not or for detecting whether a flame has been generated by the pilot burner 11 and/or the main burners 12 or not.

For example, the detecting device 20 or the detecting circuit 20 or the detecting probe 20 may be used for detecting the absence of flame or for detecting the temperature of the flame or the like and may send the detected signal, such as the detected temperature signal of the flame to the control circuit 14 which may compare the detected signal or the detected temperature signal with a presetting or predetermined high value, such as a presetting or predetermined high temperature value and/or a presetting or predetermined low value, such as a presetting or predetermined low temperature value in order to determine whether the temperature of the flame or of the main burners 12 or of the pilot burner 11 is over or below the predetermined high or low value. When the detected signal is higher or lower than the presetting or predetermined high or low value, the control circuit 14 may control or actuate the solenoid valve 13 to shut-off or to switch off the pilot burner 11 and/or the main burners 12.

A switching or converting or changing circuit or device 30 may be provided and coupled to the control circuit 14, and one or more batteries 31 are coupled to the changing device 30 or directly coupled to the control circuit 14 for supplying the electric energy or electric source to energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10. A thermo-couple 32 may be provided and directly coupled to the changing device 30 or indirectly coupled to the changing device 30 via a supercharging circuit or device 33 or directly coupled to the control circuit 14, and the thermo-couple 32 may be disposed beside the pilot burner 11 and/or the main burners 12 for allowing the thermo-couple 32 to be actuated by the flame generated by the pilot burner 11 and/or the main burners 12 in order to selectively supply the electric energy or electric source to energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10.

For example, when the pilot burner 11 and/or the main burners 12 is working or generating the flame, the thermo-couple 32 may be heated or the flame to generate a voltage or an electric energy or electric source which may be supercharged or boosted by the supercharging circuit or device 33, and the thermo-couple 32 may thus be used to energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10 when the pilot burner 11 and/or the main burners 12 is working or generating the flame, such that the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10 may still be operated or actuated by the thermo-couple 32 even when the batteries 31 are out of electricity. The changing device 30 may automatically switch between the thermo-couple 32 and the batteries 31 when the batteries 31 are out of electricity.

In operation, the control circuit 14 may be operated or actuated by the switch 15 or the remote device 16 in order to actuate or operate the igniting device 10 which may be used to selectively ignite the pilot burner 11, and the pilot burner 11 in turn may be used to ignite the main stove heads or main burners 12. At this moment, the control circuit 14 may be energized by the batteries 31, and the igniting device 10 may not be used to ignite the pilot burner 11 when the batteries 31 are out of electricity. When the pilot burner 11 and/or the main burners 12 is working or generating the flame, the thermo-couple 32 may be actuated to generate the electric energy or electric source and may thus be selectively used to energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10 by the changing device 30.

It is to be noted that the thermo-couple 32 may generate and supply the electric energy or electric source to selectively energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10 such that the batteries 31 may be economized and may be used longer, and the thermo-couple 32 may still be used to selectively energize the control circuit 14 and/or the solenoid valve 13 and/or the detecting device 20 and/or the igniting device 10 even when the batteries 31 are out of electricity such that the pilot burner 11 and/or the main burners 12 may still be switched off when the batteries 31 are out of electricity or when an emergency circumstance or condition is occurred.

The devices or elements 10-15, 20 and 30-33 have been fully disclosed in a co-pending patent application without the remote device 16, and the remote device 16 is separately disclosed and claimed in the present invention.

Accordingly, the gas appliance in accordance with the present invention includes a safety or security device for automatically shut-off the fire or flame in responsive to flame outage, and/or when the energizing battery is out of electricity.

Although this invention has been described with a certain degree of particularity, it is to be understood that the present disclosure has been made by way of example only and that numerous changes in the detailed construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

1 claim:
- 1. A gas appliance comprising:
  a. a pilot burner,
  b. at least one main burner,
  c. a solenoid valve coupled to said pilot burner and said at least one main burner for controlling said pilot burner and said at least one main burner,
  d. a control circuit coupled to said solenoid valve for controlling said solenoid valve to operate said pilot burner or said at least one main burner,
  e. an igniting device coupled to said control circuit being operated by said control circuit to selectively ignite said pilot burner,
  f. at least one battery coupled to said control circuit for supplying an electric energy to energize said control circuit,
  g. a thermo-couple coupled to said control circuit for selectively energizing said control circuit when said at least one battery is out of electricity, and
  h. a remote device coupled to said control circuit for operating said control circuit remotely.

2. The gas appliance as claimed in claim 1, wherein a detecting device is disposed beside said at least one main
burner for detecting whether said at least one main burner is working or not, and said detecting device is coupled to said control circuit for sending a detected signal to said control circuit.

3. The gas appliance as claimed in claim 1, wherein a changing device is provided and coupled to said control circuit and coupled to said at least one battery and said thermo-couple for switching between said at least one battery and said thermo-couple.

4. The gas appliance as claimed in claim 3, wherein a supercharging device is further coupled between said changing device and said thermo-couple.

5. The gas appliance as claimed in claim 1, wherein a switch is provided and coupled to said control circuit for selectively operating said control circuit.

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