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(54) CONTROL UNIT WHICH AUTOMATICALLY CUTS OFF GAS IN CASE OF A POWER OUTAGE

(57) A control unit (10) for gas cookers (20) comprising at least one interface (11) and regulating the operation of the valves (15), which are connected in series with the gas valves (14) introduced on the passage of the fuel supplied from the gas supply (24) to the gas line (16) that will feed cooker ports (21) and which kept open with the voltage supplied by the built-in flame detection sensor (22) introduced at the cooker port (21), wherein, it comprises; at least one voltage detection circuit (12) connected to the interface (11), detecting and interpreting the energy supplied from the power supply (23) to the cooker (20), and at least one relay (13) introduced on the connection path (131) between the interface (11) and the valve (15), cutting off the voltage supplied from the flame detection sensor (22) and closing the gas line (16) by opening the connection path (131) based on a command from the detection circuit (12) when there is no voltage.

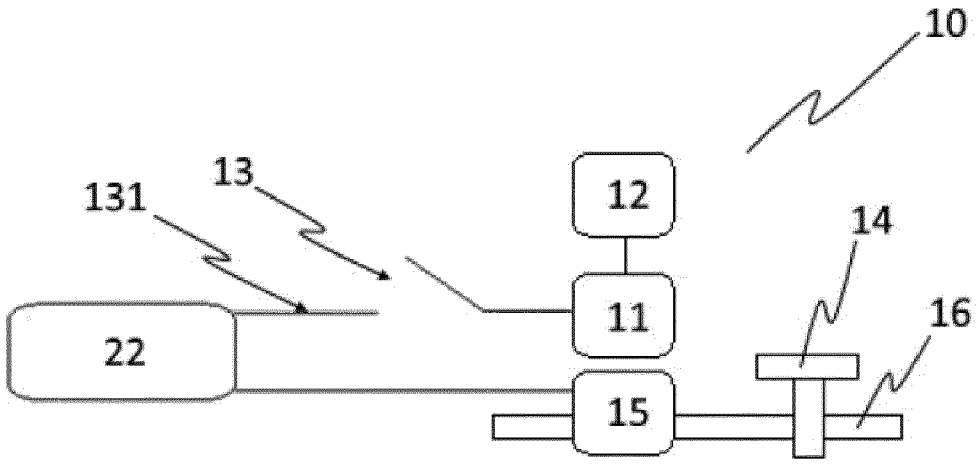

Figure - 2

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Description

Technical Field

[0001] The invention relates to units which controls gas flow in gas cookers.

[0002] The invention particularly relates to the gas control units where the gas line is controlled via electrical signals using solenoid valves and similar components and the gas line is cut off in case of a power outage via a relay connected to a voltage detection circuit to increase safety without requiring a power supply.

Background Art

[0003] In gas cooker applications, an example of which is given by the US patent no US2011207065 titled 'Rapid gas ignition system', mechanical means are preferred in general to enable switching the gas line on and off by the user. Furthermore, as proposed by the European patent no EP1564487, the gas line may be controlled via electrical signals using solenoid valves and similar components connected in series with the gas line. One of the best among such examples is a flame detection unit installed at the ignition department.

[0004] An electrical voltage generated by a flame detector installed at the ignition department or any detection unit, various examples of which can be encountered in the background art, ensures the gas flow to be cut off in certain cases by feeding the solenoid valves or other components connected in series with the gas flow line of the ports of the gas cooker. For example, if the flame detector fails to detect a flame once the gas line is manually switched on, it sends no flame warning and closes the valve. Therefore, releasing of the gas into the environment without being ignited is prevented and risk of accident is reduced.

[0005] The ability to cut off the gas line via electrical signals enables introducing additional safety measures and additional functions. These may take the form of structures which intervenes the electrical connection of a flame detector by means of electronically controlled valves or intervenes the system by interpreting all feedback elements by means of an external control unit. For example, a timer function may be provided for user by means of a touch operated user interface or a control unit with any other form. At the end of the user set time, gas is cut off and cooking stops.

[0006] German patent document numbered DE19752472 introduces a structure which controls the burner valve based a flame detector and a position sensor in addition to an electronic control unit. This and similar structures enables system safety based on the detection of the cooking pot position or ambient temperature conditions.

[0007] Despite the abovementioned safety measures and functional features, gas and electricity operated cooker systems still contain some disadvantages. A main example is the failure to control the system in case of a momentary or a permanent power outage since electrically controlled gas cookers are designed to operate when there is no power supplied. Furthermore, the gas line is expected to be cut off by opening the gas valve at the end of the time which was set by the user via a control unit (interface, mobile phone etc.). However, in case of a power outage, the gas is kept flowing at the end of the relevant duration and cooking proceeds while the gas flow continues. Therefore, this may lead to highly risky situations especially when the cooker is left unattended, by counting on the system.

[0008] In the background art, it is possible to close the valve using battery operated systems as given in the German patent document no DE102004007309 or using systems with solar cells as given in the European patent document no EP1564487. On the other hand, these lead to additional costs and increase the risks in case of a malfunction.

[0009] Therefore, the need for a gas control unit where the gas line is controlled via electrical signals using solenoid valves and similar components and the gas line is cut off in case of a power outage without requiring a power supply, via a relay connected to a voltage detection circuit to increase safety and inadequacy of the previous solutions has made it necessary to make a development in the technical field concerned.

The Object of the Invention

[0010] The present invention relates to gas control units which meets the aforementioned requirements, overcomes all disadvantages and provides several further advantages.

[0011] The primary object of the gas control unit of the invention is to detect if there is power supplied from the grid by means of a voltage detection circuit connected to the user interface, and stopping the operation of the valve to cut off the gas in case of a power outage by means of a relay which is introduced between the valve and the interface. Therefore, risks emanating from longer cooking durations in case of a power outage with the failure to control the valves, which are connected in series with the gas line, by a user interface or a control unit of any other form, are prevented. The designed electronics circuit is able to prevent safety risks by cutting off the gas in case of longer duration power outages and when the system gas feed is intended to be cut off and cooking is stopped via a user set timer function. After the gas cut-off, user is able to use the gas cooker manually whether there is power or not.

[0012] To achieve the objects described above in gas cookers in general, a control unit comprising at least one interface

is developed and regulating the operation of the valves, which are connected in series with the gas valves introduced on the passage of the fuel supplied from the supply lines to the gas supply line of the cooker ports and kept open with the voltage supplied from the built-in flame detection sensors. The developed control unit comprises at least one detection circuit connected to the interface, detects and interprets the energy supplied from the power supply to the cooker, and at least one relay introduced on the connection path between the interface and the valve, cuts off the voltage supplied from the flame detection sensor and closes the gas line by opening the connection path based on a command from the detection circuit when there is no voltage.

[0013] The structural and characteristic properties of the invention will now be described in further detail with reference to the illustrations below, therefore, assessment should be based on these illustrations and the detailed description.

Figures for a Better Understanding of the Invention

[0014] Structure and additional elements of the present invention with its advantages shall be appreciated better with the figures explained below.

Figure - 1: A general top view of the cooker comprising the control according to the invention

Figure - 2: A schematic view of the control unit according to the invention.

Parts References

10	Control unit	16	Gas line
11	Interface	20	Cooker
12	Voltage detection circuit	21	Cooker port
13	Relay	22	Flame detection sensor
131	Connection path	23	Power supply
14	Gas valve	24	Gas supply
15	Valve	25	Supply cable

Detailed Description of the Invention

[0015] The present invention is developed for the gas cookers (20) to regulate the operation of the valves (15) connected in series with the gas valves (14) introduced on the passage of the fuel supplied from the gas supply (24) to the gas line (16) of the cooker ports (21). The developed control unit (10) comprises an interface (11) that enables the user to cut off the gas via a valve (15) by setting a timer, and a built-in flame detection sensor (22) introduced in the cooker port (21). During the normal operation of the cooker (20), whose general top view is shown in Figure 1, the flame present at the cooker port (21) causes a voltage on the flame detection sensor (22) and results in keeping open a valve (15) which is preferably of solenoid type. When the timer in the interface (11) concludes the duration, a command is delivered between the interface (11) and the valve (15) through the connection path (131) to close the valve (15) and stop cooking.

[0016] The problem associated with the present applications is the failure to close the valve (15) in case of a power outage due to the failure to supply the interface (11) and the resulting risk due to the possibility of continuing cooking indefinitely. To overcome this problem, the control unit (10) comprises at least one voltage detection circuit (12) connected to the interface (11), detects and interprets the energy supplied from the power supply (23) to the cooker (20), and at least one relay (13) introduced on the connection path (131), cuts off the voltage supplied from the flame detection sensor (22) and closes the gas line (16) by opening the connection path (131) based on a command from the detection circuit (12) when there is no voltage.

[0017] Figure 2 gives a schematic view of the control unit (10) according to the invention. The cooker (20) is supplied with 220VAC grid power as the power supply (23) to ignite the cooker ports (21). The interface (11) which controls the valve (15) and comprises a timer, operates with low direct current which is supplied with the supply cable (25) and transformed from 220VAC. In practice this voltage may be 3.3, 5 or 12VDC.

[0018] The interface (11) controls the valve (15) via the relay (13) introduced on the connection path (131) and it is able to cut off the gas. Meanwhile, when there is no flame present, the flame detection sensor (22) does not generate voltage and prevents operation of the valve (15). Operation of the solenoid type valve (15), which provides convenience and fast response, requires the flame detection sensor (22) to generate voltage, along with the relay (13), to which the interface (11) is connected, to enable the circuit to switch on.

[0019] The interface (11) accesses the information on the voltage state of the grid via a sampling signal derived from

the 220VAC through the voltage detection circuit (12). The interface (11) is able to stay on for a duration of 500 ms - 2 sec after encountering a power outage. This duration depends on the structure of the interface (11) and the voltage detection circuit (12). This duration is determined based on the time required for the flame detection sensor (22) to detect the absence of the flame and open the valve (15).

[0020] When the power from the power supply (23) cuts off, the interface (11) opens the relay (13) to prevent the voltage from the flame detection sensor (22) to reach the valve (15). The closed valve (15) blocks the gas line (16) to stop cooking and prevents unsafe situations in case of a power outage. Furthermore, the cooker (20) still can be used when there is a power outage. The gas line (16) can be opened manually using the gas valve (14) to continue cooking.

Claims

1. A control unit (10) for gas cookers (20) comprising at least one interface (11) and regulating the operation of the valves (15), which are connected in series with the gas valves (14) introduced on the passage of the fuel supplied from the gas supply (24) to the gas line (16) that will feed cooker ports (21) and which kept open with the voltage supplied by the built-in flame detection sensor (22) introduced at the cooker port (21), wherein, it comprises;

   - at least one voltage detection circuit (12) connected to the interface (11), detecting and interpreting the energy supplied from the power supply (23) to the cooker (20),
   - at least one relay (13) introduced on the connection path (131) between the interface (11) and the valve (15), cutting off the voltage supplied from the flame detection sensor (22) and closing the gas line (16) by opening the connection path (131) based on a command from the detection circuit (12) when there is no voltage.

2. The control unit (10) according to claim 1, **characterized by** comprising at least one solenoid type valve (15) connected in series with the gas valve (14) on each gas line (16).

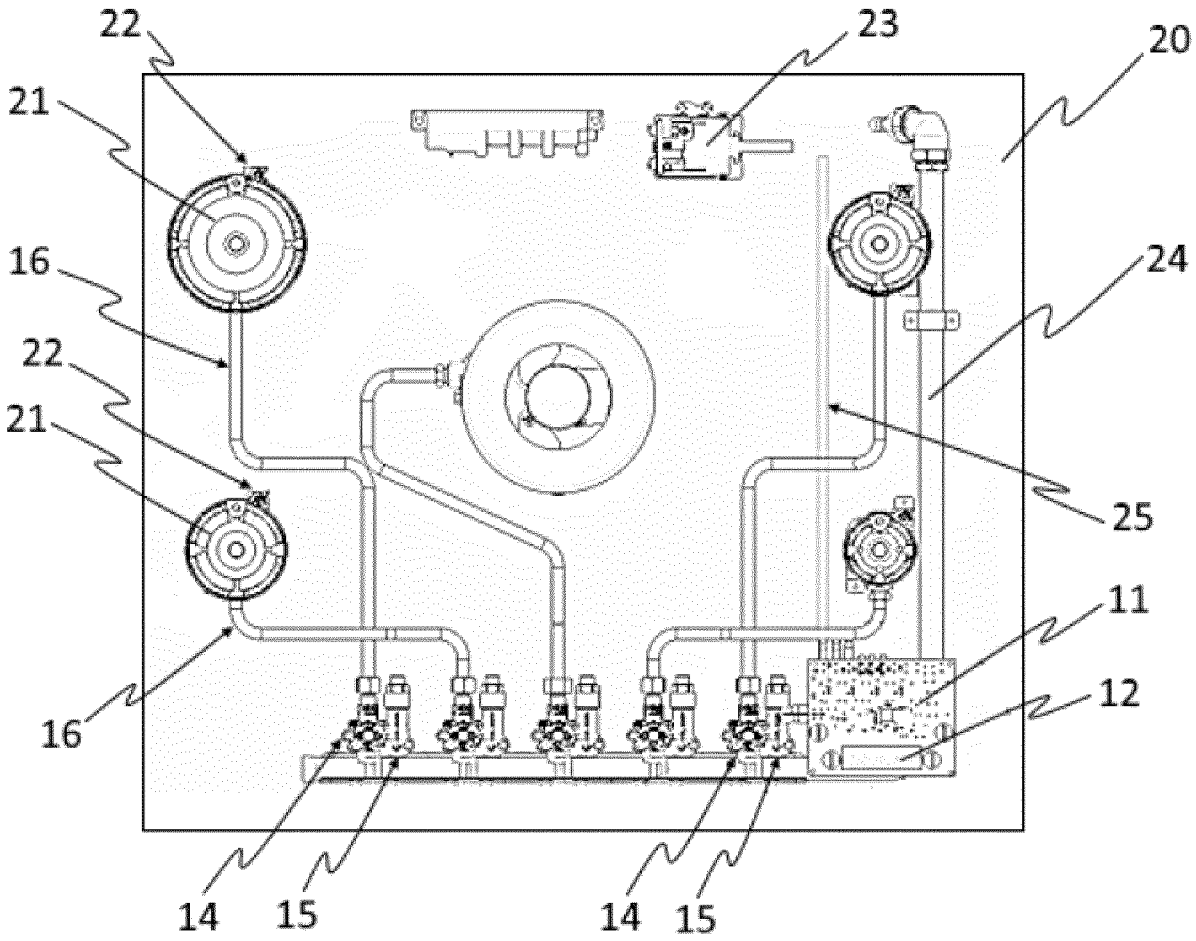

Figure - 1

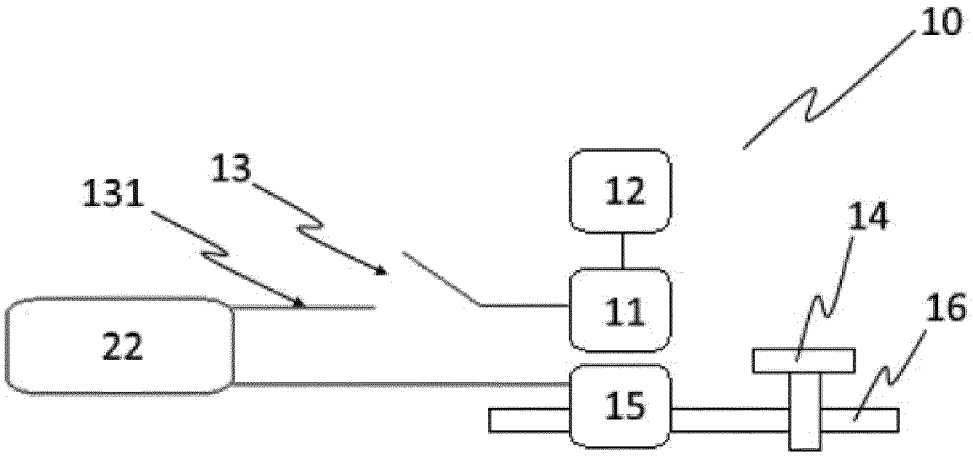

Figure - 2

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 3657

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 722 823 A (HODGKISS NEIL JOHN [GB]) 3 March 1998 (1998-03-03) * column 1, line 6 - line 15; figures 1,2a,2b,2c,3a,3b,3c * * column 1, line 31 - line 40 * * column 2, line 9 - line 19 * * column 2, line 51 - column 4, line 65 * -----	1,2	INV. F23N5/12 F24C3/02 F24C3/12
X,D	DE 197 52 472 A1 (MIELE & CIE [DE]) 2 June 1999 (1999-06-02) * column 1, line 3 - line 40; figure 1 * * column 2, line 24 - line 39 * * column 2, line 57 - line 63 * * column 3, line 9 - line 13 * * column 3, line 33 - column 4, line 19 * * column 4, line 54 - line 57 * -----	1,2	

TECHNICAL FIELDS SEARCHED (IPC)

F23N
F24C
F23D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 November 2017	Hauck, Gunther

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 18 3657

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-11-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- US 2011207065 A **[0003]**
- EP 1564487 A **[0003] [0008]**
- DE 19752472 **[0006]**
- DE 102004007309 **[0008]**