



- (51) International Patent Classification: Not classified
- (21) International Application Number:
PCT/EP2013/060859
- (22) International Filing Date:
27 May 2013 (27.05.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
201210176448.X 28 May 2012 (28.05.2012) CN
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- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
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SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,

[Continued on next page]

(54) Title: GAS COOKER AND GAS FLOW CONTROL DEVICE AND METHOD THEREOF

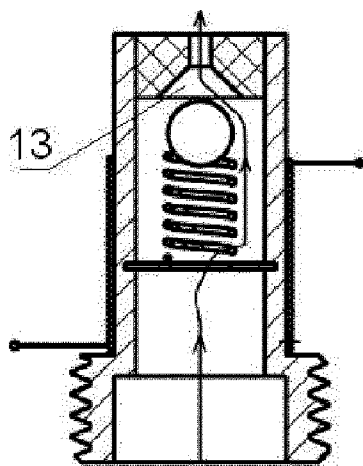


FIG. 3

(57) Abstract: The present invention provides a novel gas flow control device for a gas cooker, including a fuel gas inlet and a fuel gas outlet, and also including a control module and at least one control valve; the control module is used for opening the control valve; when the control valve is opened, gas sequentially flows through the fuel gas inlet and the control valve, and then flows toward the fuel gas outlet, and the control valve alternately opens and closes an airflow passage by which the gas flows through the control valve. In this way, even if the gas flow is unstable, by means of the technical solution of the present invention, the gas flow finally flowing to the burner is relatively stable.





UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

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GAS COOKER AND GAS FLOW CONTROL DEVICE AND METHOD THEREOF

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to the field of gas cookers, and in particular, to a gas cooker and a gas flow control technology.

Related Art

Gas cookers are common household ranges in people's daily life, and mainly use combustible gases as fuel for combustion. Based on different combustible gas types, the gas cookers are divided into multiple classes such as liquefied petroleum gas cookers, manual coal gas cookers, and natural gas cookers. Although the current gas cooker technology is very mature, a lot of problems still remain to be solved in the field of gas cookers. For example, if the gas pressure is unstable or the gas components are uneven, the gas flow will be unstable, causing the flame to be unstable. For another example, the current gas cooker has only few grades, which can no longer meet user requirements.

Unless otherwise supported by sufficient evidence, the prior art described herein does not mean acknowledging that the prior art is known to persons of ordinary skill in the art before the filing date of the present application.

SUMMARY OF THE INVENTION

20 In view of at least one technical problem described above, the present invention is directed to a novel gas cooker, and a gas flow control device and method thereof.

A gas flow control device for a gas cooker provided in the present invention includes a fuel gas inlet and a fuel gas outlet, and also includes a control module and at least one control valve; the control module is used for opening the control valve; when the control valve is opened, gas sequentially flows through the fuel gas inlet and the control valve,
5 and then flows toward the fuel gas outlet, and the control valve alternately opens and closes an airflow passage by which the gas flows through the control valve. In this way, even if the gas flow is unstable, by means of the technical solution of the present invention, the gas flow finally flowing to the burner is relatively stable.

Optionally, the control valve includes a valve body, a valve core, a reset device, and
10 an electromagnetic converting device; the valve body includes an gas inlet and an gas outlet; when the control valve is not opened, the valve core butts against an inner wall of the valve body under the action of the reset device, and then closes an airflow passage by which the gas flowing in from the gas inlet flows toward the gas outlet; the control module is used for controlling power supplied to the electromagnetic converting device; the
15 electromagnetic converting device is used for generating magnetism after receiving the supplied power, drawing the valve core to move, and then opening the airflow passage by which the gas flowing in from the gas inlet flows toward the gas outlet; and after the supplied power disappears, the magnetism disappears, and the valve core again butts against the inner wall of the valve body under the action of the reset device. The
20 disappearance of supplied power herein should be understood in a broad sense, which not only includes the case where the supplied power completely disappears, but also includes the case where the supplied power is insufficient to generate magnetism for drawing the valve core.

Optionally, the electromagnetic converting device includes a coil.

25 Optionally, the coil winds around the valve body.

Optionally, a containing portion adapting to the shape of the valve core is disposed on the inner wall of the valve body, and the containing portion is disposed between the gas inlet and the gas outlet.

Optionally, the reset device includes a spring or rubber or elastic plastic.

5 Optionally, the valve core is of a spherical structure.

Optionally, the control module is used for supplying a periodically changing current to the electromagnetic converting device.

Optionally, the control module is used for supplying a pulse-type direct current to the electromagnetic converting device.

10 Optionally, the control module is used for supplying an alternating current to the electromagnetic converting device.

Optionally, the valve body includes a bushing and a nozzle; the gas outlet is disposed on the nozzle, and the gas inlet is disposed on the bushing; and the electromagnetic converting device is disposed on the bushing.

15 Optionally, the bushing is made of a plastic material.

Optionally, an outer surface of the valve core is disposed with a coating, and the coating is a plastic or rubber or epoxy coating.

Optionally, the number of control valves is at least two; and bore diameters of the gas outlets of the control valves are different from each other. In this way, when a single
20 control valve or a combination of multiple control valves are opened, different grades can be generated; moreover, by properly setting the bore diameters of the gas outlets of the control valves, the gas flow can be smoothly switched between two adjacent grades.

Optionally, the control module is further used for controlling a frequency of a periodic opening and closing operation of the control valve. In this way, by controlling the frequency of the periodic opening and closing operation of the control valve, the gas flow is adjusted, thereby generating different grades. Especially, fine adjustment of the gas flow is conveniently achieved.

The present invention further provides a gas cooker, and the gas flow control device described above is disposed thereon.

The present invention further provides a gas flow control method for a gas cooker, which includes the step of: when gas is supplied to a burner of the gas cooker, alternately opening and closing an airflow passage by which the gas flows toward the burner. In this way, even if the gas flow is unstable, by means of the technical solution of the present invention, the gas flow finally flowing to the burner is relatively stable.

The above summary of the present invention is not intended to describe all possible implementation manners of the present invention. In the entire application, guidance is provided at many parts through examples, and these examples can be used for various feasible combinations.

BRIEF DESCRIPTION OF THE DRAWINGS

The following drawings are merely used for exemplary description and illustration, and are not intended to limit the scope of the present invention, where:

FIG. 1 is a schematic structural view of an embodiment of a gas flow control device for a gas cooker according to the present invention;

FIG. 2 is a schematic structural view of a control valve of an embodiment of a gas flow control device in FIG. 1;

FIG. 3 is another schematic structural view of a control valve of an embodiment of a

gas flow control device in FIG. 1;

FIG. 4 is an oscillogram of a current supplied to an electromagnetic converting device by a control module of an embodiment of a gas flow control device in FIG. 1;

FIG. 5 is an oscillogram of a current supplied to an electromagnetic converting device
5 by a control module of another embodiment of a gas flow control device for a gas cooker according to the present invention; and

FIG. 6 is a schematic view of an application state of still another embodiment of a gas flow control device for a gas cooker according to the present invention.

Description of reference numerals in the drawings:

10 1-fuel gas inlet, 2-fuel gas outlet, 3-control valve, 4-valve core, 5-coil, 6-spring, 7-support portion, 8-gas inlet, 9-gas outlet, 10-bushing, 11-nozzle, 12-main gas inlet pipe, 13-containing portion, 14-seal ring, 15-inner ring flame cover, 16-outer ring flame cover

DETAILED DESCRIPTION OF THE EMBODIMENTS

To make the objective, solution and beneficial effect of the present invention clearer,
15 the present invention is further described below with reference to the accompanying drawings and exemplary embodiments. It should be noted that in the following description of the exemplary embodiments, the same or similar features have the same mark in the drawings. In addition, some drawing may be not precise enough, and in this case, the embodiment shall subject to the text description.

20 As shown in FIG. 1, the present invention provides an embodiment of a gas flow control device for a gas cooker, which includes a fuel gas inlet 1, a fuel gas outlet 2, a control module (not shown in the figure), and three control valves 3. In addition, to improve the sealing effect, the three control valves 3 are each provided with a seal ring 14.

The three control valves 3 are of the same mechanical structure. As shown in FIG. 2 and FIG. 3, each control valve 3 includes a valve body, a valve core 4, a reset device, and an electromagnetic converting device. The valve core 4 is of a spherical structure, and an outer surface of the valve core 4 is provided with an epoxy coating. The valve body includes an gas inlet 8, an gas outlet 9, a bushing10, and a nozzle 11. The bushing10 is made of a high-temperature resistant plastic material and is formed through an integral forming process. The nozzle 11 is made of brass. The gas outlet 9 is disposed on the nozzle 11, and the gas inlet 8 is disposed on the bushing 10. In addition, the bushing 10 is further provided with threads, and is used for fixedly connecting the bushing 10 on an gas inlet pipe. A containing portion 13 adapting to the shape of the valve core 4 is disposed on the inner wall of the valve body, and the containing portion 13 is disposed between the gas inlet 8 and the gas outlet 9. The adapting should be construed as follows: the valve core 4 can be at least partly contained in the containing portion 13, thereby closing an airflow passage by which the gas flows through the control valve 3 (namely, an airflow passage by which the gas flowing in from the gas inlet 8 flows towards the gas outlet 9). The electromagnetic converting device includes a coil 5, and the coil 5 winds around the bushing 10. The reset device includes a spring 6 and a support portion 7; an end of the spring 6 butts against the support portion 7, and the other end of the spring 6 butts against the valve core 4. The support portion 7 is a thermal ring mounted inside the bushing10.

The control module is used for opening the control valves 3. It should be noted that the wording "opening" should not be taken literally, but be understood with reference to the specification. When some control valve 3 is opened, gas sequentially flows through the fuel gas inlet 1, the gas inlet 8 of the control valve 3, and the gas outlet 9 of the control valve 3, then flows toward the fuel gas outlet 2, and finally flows to the burner; and the control valve 3 alternately opens and closes an airflow passage by which the gas flows through the control valve 3. When the control valve 3 is not opened, the valve core 4 butts against an inner wall of the valve body under the action of the reset device, so as to close an airflow passage by which the gas flowing in from the gas inlet 8 flows toward the gas outlet 9.

Specifically, when some control valve 3 is opened, the control module supplies a periodically changing pulse-type direct current to the electromagnetic converting device of the control valve 3, and the corresponding current oscillogram is shown in FIG. 4. It can be seen that the supplied current is intermittent; the current is turned on, and cut off, and then turned on again. This cycle is repeated. When the current is turned on, the electromagnetic converting device generates magnetism, drawing the valve core 4 to move (undoubtedly, the valve core 4 should be made of a material capable of being attracted by magnetism). The valve core 4 squeezes the spring 6, and is separated from the containing portion 13, hence opening the airflow passage by which the gas flowing in from the gas inlet 8 flows towards the gas outlet 9, as shown in FIG. 3 (in FIG. 3, the arrow direction is the flowing direction of the gas flow). When the current is cut off, the magnetism of the electromagnetic converting device disappears. At this time, the valve core 4 butts against interior of the containing portion 13 again under the action of the reset device, thereby closing the airflow passage by which the gas flowing in from the gas inlet 8 flows toward the gas outlet 9, as shown in FIG. 2. In this way, it is easily implemented that the control valve 3 alternately opens and closes the airflow passage by which the gas flows through the control valve 3. It can be seen that the frequency of the periodic opening and closing action of the control valve 3 is the same as the frequency of the above pulse-type direct current. Therefore, the control module can control the frequency of the supplied pulse-type direct current, so as to indirectly control the frequency of the opening and closing of the airflow passage.

The bore diameters of the gas outlets 9 of the three control valves 3 are different from each other. In this way, when a single control valve 3 or a combination of multiple control valves 3 are opened, different grades can be generated.

The exemplary embodiment of the present invention is described above, and some technical features may be modified or replaced to obtain other embodiments. For example, the control module may also supply the alternating current shown in FIG. 5 to the electromagnetic converting device. In another example, the number of the control valves

may be one, two, four or more. In still another example, the control module may also provide non-periodically changing current to the electromagnetic converting device. In still another example, the valve core may be of other feasible structures such as a tapered structure. In still another example, the bushing may be fixedly connected on the gas inlet pipe through interference fitting. In still another example, the support portion may also be a protruding part extended from the bushing. In still another example, the reset device may use rubber or elastic plastic. In still another example, the diameters of the gas outlets of the control valves are the same or partially the same. In still another example, the technical solution of the present invention is also applicable to the situation where gas is supplied to multiple ring flame covers respectively. FIG. 6 is a schematic structural view of the technical solution of the present invention being applied to the situation where gas is supplied to an inner ring flame cover 15 and an outer ring flame cover 16 respectively. As shown in FIG. 6, gas of the inner ring flame cover 15 and the outer ring flame cover 16 is supplied by a main gas inlet pipe 12, and gas supply pipes of the inner ring flame cover 15 and the outer ring flame cover 16 are each provided with a control valve 3; the control valves 3 are uniformly controlled by one control module.

In addition, the present invention further provides an embodiment of a gas flow control method for a gas cooker, which at least includes the gas flow control method implied in the above embodiment of the gas flow control device for a gas cooker.

It should be additionally noted that the present invention should not be construed as being limited to the implementation described above, but should be construed as covering all possible implementations determined according to the claims of the present invention in combination with the content disclosed in the specification. Therefore, any simple alteration, equivalent variation or modification made to the embodiment without departing from the content of the technical solution of the present invention and according to the technical essence of the present invention shall fall within the protection scope of the technical solution of the present invention. It should be particularly noted that any inferior

application based on the present invention still falls within the protection scope of the technical solution of the present invention.

CLAIMS

What is claimed is:

1. A gas flow control device for a gas cooker, comprising a fuel gas inlet (1) and a fuel gas outlet (2), characterized by:

5 further comprising a control module and at least one control valve (3), wherein

the control module is used for opening the control valve (3);

when the control valve (3) is opened, gas sequentially flows through the fuel gas inlet (1) and the control valve (3), and then flows toward the fuel gas outlet (2), and the control valve (3) alternately opens and closes an airflow passage by which the gas flows through
10 the control valve (3).

2. The gas flow control device according to claim 1, characterized in that:

the control valve (3) comprises a valve body, a valve core (4), a reset device and an electromagnetic converting device;

the valve body comprises an gas inlet (8) and an gas outlet (9);

15 when the control valve (3) is not opened, the valve core (4) butts against an inner wall of the valve body under the action of the reset device, and then closes an airflow passage by which the gas flowing in from the gas inlet (8) flows toward the gas outlet (9);

the control module is used for controlling power supplied to the electromagnetic converting device; and

20 the electromagnetic converting device is used for generating magnetism after receiving the supplied power, drawing the valve core (4) to move, and then opening the airflow passage by which the gas flowing in from the gas inlet (8) flows toward the gas

outlet (9); and after the supplied power disappears, the magnetism disappears, and the valve core (4) again butts against the inner wall of the valve body under the action of the reset device.

3. The gas flow control device according to claim 2, characterized in that:

5 the electromagnetic converting device comprises a coil (5).

4. The gas flow control device according to claim 3, characterized in that:

the coil (5) winds around the valve body.

5. The gas flow control device according to claim 2, characterized in that:

10 a containing portion (13) adapting to the shape of the valve core (4) is disposed on the inner wall of the valve body, and the containing portion (13) is disposed between the gas inlet (8) and the gas outlet (9).

6. The gas flow control device according to claim 2, characterized in that:

the reset device comprises a spring (6) or rubber or elastic plastic.

7. The gas flow control device according to claim 2, characterized in that:

15 the valve core (4) is of a spherical structure.

8. The gas flow control device according to claim 2, characterized in that:

the control module is used for supplying a periodically changing current to the electromagnetic converting device.

9. The gas flow control device according to claim 2, characterized in that:

20 the control module is used for supplying a pulse-type direct current to the electromagnetic converting device.

10. The gas flow control device according to claim 2, characterized in that:

the control module is used for supplying an alternating current to the electromagnetic converting device.

11. The gas flow control device according to any one of claims 2 to 10,
5 characterized in that:

the valve body comprises a bushing (10) and a nozzle (11);

the gas outlet (9) is disposed on the nozzle (11), and the gas inlet (8) is disposed on the bushing (10); and

the electromagnetic converting device is disposed on the bushing (10).

10 12. The gas flow control device according to claim 11, characterized in that:

the bushing (10) is made of a plastic material.

13. The gas flow control device according to any one of claims 2 to 10,
characterized in that:

15 an outer surface of the valve core (4) is disposed with a coating, and the coating is a plastic or rubber or epoxy coating.

14. The gas flow control device according to any one of claims 2 to 10,
characterized in that:

the number of control valves (3) is at least two; and

20 bore diameters of the gas outlets (9) of the control valves (3) are different from each other.

15. The gas flow control device according to claim 1, characterized in that:

the control module is further used for controlling a frequency of a periodic opening and closing operation of the control valve (3).

16. A gas cooker, comprising the gas flow control device according to any one of claims 1 to 15.

5 17. A gas flow control method for a gas cooker, comprising the step of: when gas is supplied to a burner of the gas cooker, alternately opening and closing an airflow passage by which the gas flows toward the burner.

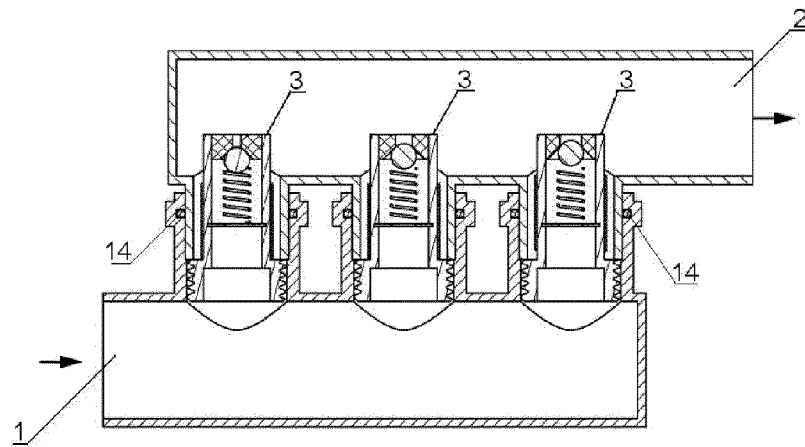


FIG. 1

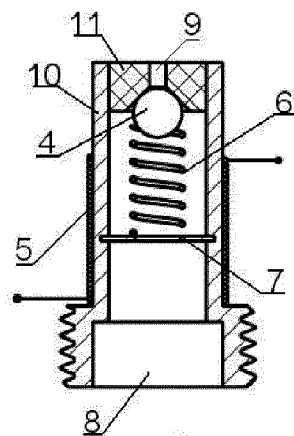


FIG. 2

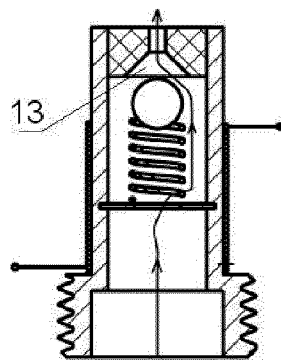


FIG. 3

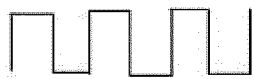


FIG. 4

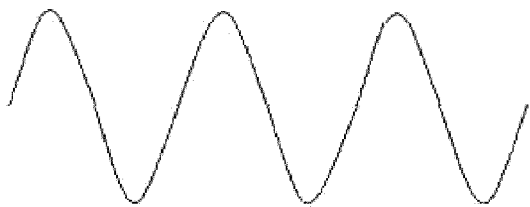


FIG. 5

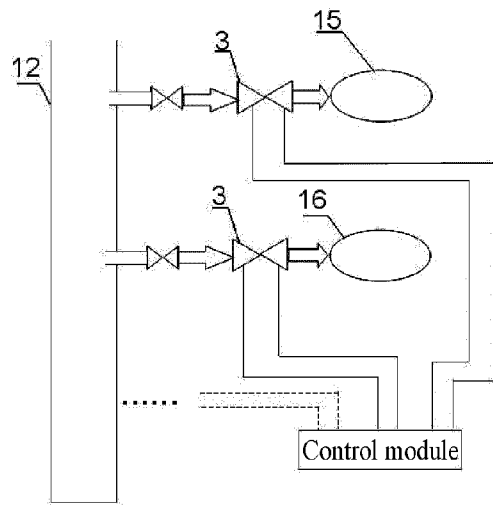


FIG. 6