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(54) BURNER AND GAS WATER HEATER

(57) Disclosed are a burner and a gas water heater. The burner includes a first burner row, an ignition needle and a first air baffle, where: the first burner row includes a first ejection channel and a first fire-breathing part and a first fire-breathing inlet located at two ends of the first ejection channel respectively; the ignition needle is located close to the first fire-breathing part; the first air baffle is located at the first fire-breathing inlet and defines a first air hole disposed corresponding to the first ejection inlet, and a radial dimension of the first air hole is smaller than a radial dimension of the first ejection inlet.

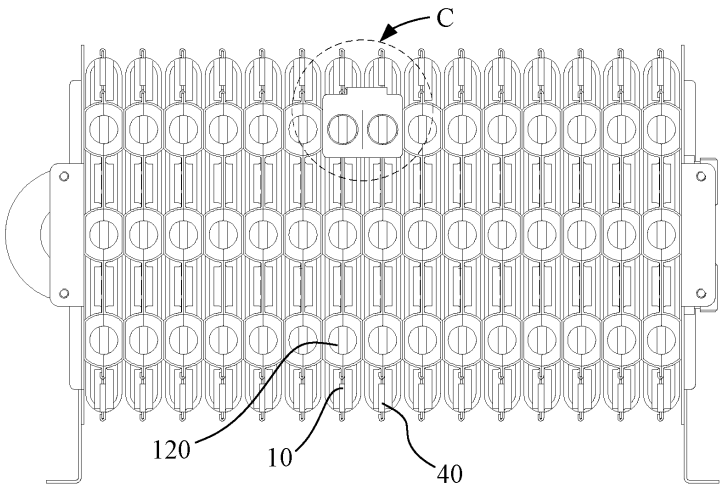

FIG. 5

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the priority of Chinese Patent Application No. 201811508252.X, filed on December 10, 2018 and entitled "Burner and Gas Water Heater", which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present application relates to the technical field of gas appliances, in particular to a burner and a gas water heater.

BACKGROUND

[0003] The burner is a key component of gas products for gas water heaters and gas wall-mounted boilers. In order to achieve low emission of nitrogen oxides during combustion, the burner usually adopts a water-cooled structure, and it requires a large amount of air intake to form a light combustion, but such a structural design will lead to insufficient gas concentration and unreliable ignition, which will lead to the failure of ignition of the burner and the occurrence of deflagration.

SUMMARY

[0004] The main object of the present application is to provide a burner, which aims to improve concentration of gas at an ignition needle by reducing air ejection amount of a burner row at the ignition needle, so as to realize reliable ignition of gas.

[0005] To achieve the above object, the burner provided in the present application includes:

a first burner row including a first ejection channel and a first fire-breathing part and a first ejection inlet located at two ends of the first ejection channel respectively;
an ignition needle arranged close to the first fire-breathing part; and
a first air baffle located at the first ejection inlet and being provided with a first air hole corresponding to the first ejection inlet, a radial dimension of the first air hole being smaller than a radial dimension of the first ejection inlet.

[0006] Preferably, the first burner row includes multiple first ejection inlets, and at least one of the multiple first ejection inlets is provided with the first air baffle.

[0007] Preferably, the first burner row includes multiple first ejection channels, the multiple first ejection channels are all in communication with the first fire-breathing part, and the multiple first ejection inlets and the multiple first ejection channels are arranged in one-to-one correspondence.

[0008] Preferably, the first air baffle includes a body and a connection hem extending from the body to one side, and the connection hem is fixed to the first burner row; and
the body is covered on the first ejection inlet, and the body is provided with the first air hole at a position corresponding to the first ejection inlet.

[0009] Preferably, the first fire-breathing part is provided with multiple first fire-breathing holes, the first fire-breathing part is provided with an induction stopper extending in a direction close to the ignition needle, the induction stopper is disposed at least partially around at least one of the multiple first fire-breathing holes, and one end of the induction stopper close to the ignition needle is arranged in a pointed shape.

[0010] Preferably, a minimum distance between the end of the induction stopper close to the ignition needle and the first fire-breathing hole is 6mm to 7mm.

[0011] Preferably, the burner further includes:

a second burner row arranged in parallel with the first burner row and including a second ejection channel and a second fire-breathing part and a second ejection inlet located at two ends of the second ejection channel respectively;
an induction needle arranged close to the second fire-breathing part; and
a second air baffle located at the second ejection inlet and being provided with a second air hole corresponding to the second ejection inlet, a radial dimension of the second air hole being smaller than a radial dimension of the second ejection inlet.

[0012] Preferably, the second burner row is disposed adjacent to the first burner row.

[0013] Preferably, the first air baffle and the second air baffle are integrally disposed.

[0014] The present application further provides a gas water heater, including a burner, where the burner includes:

a first burner row including a first ejection channel and a first fire-breathing part and a first ejection inlet located at two ends of the first ejection channel respectively;
an ignition needle arranged close to the first fire-breathing part; and
a first air baffle located at the first ejection inlet and being provided with a first air hole corresponding to the first ejection inlet, a radial dimension of the first air hole being smaller than a radial dimension of the first ejection inlet.

[0015] According to the technical solution of the present application, the air ejection amount of the first burner row is reduced by setting the first air baffle at the first ejection inlet of the first burner row, thereby reducing the proportion of air in the mixed gas, that is, relatively increasing the concentration of the gas in the mixed gas, so that when the ignition needle ignites the mixed gas, it is easier to ignite the mixed gas, avoiding ignition deflagration and flame extinguishing during ignition, thus improving the reliability of ignition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] In order to more clearly explain the embodiments of the present application or the technical solutions in the prior art, the drawings used in the description of the embodiments or the prior art will be briefly introduced below. Obviously, the drawings in the following description are merely some embodiments of the present application. For those of ordinary skill in the art, other drawings can be obtained based on the structure shown in these drawings without paying creative work.

FIG. 1 is a structural diagram of a burner according to an embodiment of the present application.
FIG. 2 is a partial enlarged view at A in FIG. 1.
FIG. 3 is a top view of the burner in FIG. 1.
FIG. 4 is a partial enlarged view at B in FIG. 3.
FIG. 5 is a bottom view of the burner in FIG. 1.
FIG. 6 is a partial enlarged view at C in FIG. 5.
FIG. 7 is a structural diagram of a first burner row of the burner in FIG. 1.
FIG. 8 is a top view of the first burner row in FIG. 7.
FIG. 9 is a structural diagram of the first burner row in FIG. 7 from another perspective.

Description of reference numerals:

[0017]

No.	Name	No.	Name
1	Burner	120	First ejection inlet
10	First burner row	130	First fire-breathing part
20	First air baffle	131	First fire-breathing hole
30	Ignition needle	140	Induction stopper
40	Second burner row	210	First air hole
50	Second air baffle	220	Body
60	Induction needle	230	Connection hem
110	First ejection channel	510	Second air hole

[0018] The realization of the object of the present application, functional characteristics, and advantages will be further described in conjunction with the embodiments and with reference to the accompanying drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] In the following, the technical solutions in the embodiments of the present application will be clearly and com-

pletely described with reference to the drawings in the embodiments of the present application. Obviously, the described embodiments are only a part of the embodiments of the present application, but not all of the embodiments. Based on the embodiments of the present application, all other embodiments obtained by those of ordinary skill in the art without creative efforts shall fall within the claimed scope of the present application.

[0020] It should be noted that all directional indicators (such as up, down, left, right, front, back, etc.) in the embodiments of the present application are only used to explain the relative positional relationship, movement situation, etc. between components in a specific posture (as shown in the drawings). If the specific posture changes, the directional indication also changes accordingly.

[0021] In addition, the descriptions related to "first", "second", and the like in the present application are for descriptive purposes only, and cannot be understood as indicating or implying their relative importance or implicitly indicating the number of technical features indicated. Therefore, the features defined with "first" and "second" may explicitly or implicitly include at least one of the features. In addition, the meaning of "and/or" in the full text is to include three parallel schemes, taking "A and/or B" as an example, including scheme A or scheme B, or A and B are met at the same time. In addition, the technical solutions between the various embodiments can be combined with each other, but they must be based on what can be achieved by those of ordinary skill in the art. When the combination of technical solutions is contradictory or cannot be achieved, it should be considered that such a combination of technical solutions does not exist, and does not fall within the claimed scope of the present application.

[0022] The present application provides a burner, which is applied to combustion and heating devices such as gas water heaters and gas wall-mounted boilers. The following takes a gas water heater as an example to explain the burner in detail.

[0023] In an embodiment of the present application, referring to FIGS. 1 to 6, and combined with FIGS. 7 to 9, the burner 1 includes:

a first burner row 10 including a first ejection channel 110 and a first fire-breathing part 130 and a first ejection inlet 120 located at two ends of the first ejection channel 110 respectively;
an ignition needle 30 arranged close to the first fire-breathing part 130; and
a first air baffle 20 located at the first ejection inlet 120 and being provided with a first air hole 210 corresponding to the first ejection inlet 120, a radial dimension of the first air hole 210 being smaller than a radial dimension of the first ejection inlet 120.

[0024] Without loss of generality, the burner 1 includes multiple burner rows arranged in parallel. The burner row includes an ejection channel, a fire-breathing part and an ejection inlet. The fire-breathing part and the ejection inlet are respectively located at two ends of the ejection channel. The gas and air enter the ejection channel from the ejection inlet and are mixed in the ejection channel, and the formed mixed gas is ejected from the fire-breathing part for combustion. The fire-breathing part is usually located at an upper end of the burner row, and the ejection inlet is located at a lower end of the burner row. The ejection inlet can be specifically located at a lower end surface or a side wall of the burner row, which is not specifically limited here.

[0025] The first burner row 10 is a burner row closest to the ignition needle 30 among the multiple burner rows, that is, the ignition needle 30 is arranged corresponding to the first fire-breathing part 130 of the first burner row 10. In order to facilitate the ignition of the ignition needle 30, the ignition needle 30 is disposed close to the first fire-breathing part 130. Correspondingly, the first burner row 10 includes the first ejection channel 110, the first fire-breathing part 130 and the first ejection inlet 120.

[0026] The ignition of the ignition needle 30 can be realized by electronic ignition (piezoelectric ceramic electric spark ignition) or pulse continuous ignition, and the ignition needle 30 can ignite the mixed gas from the first fire-breathing part 130, so as to realize the ignition and combustion of the gas.

[0027] The purpose of setting the first air baffle 20 is to reduce the air ejection amount of the first burner row 10, thereby reducing the proportion of air in the mixed gas, that is, relatively increasing the concentration of the gas in the mixed gas, so that it is easier for the ignition needle 30 to ignite the mixed gas, avoiding ignition deflagration and flame extinguishing during ignition, thus improving the reliability of ignition. In order to reduce the air ejection amount of the first burner row 10, a radial dimension of the first air hole 210 of the first air baffle 20 is smaller than a radial dimension of the first ejection inlet 120, therefore, the ejection effect of the first ejection inlet 120 is relatively weakened, so that the ejection amount of air entering the first ejection inlet 120 is reduced.

[0028] Referring to FIG. 7, and combined with FIGS. 3 to 6, for the first burner row 10, multiple of the first ejection inlets 120 may be arranged at the lower end of the first burner row 10. At this time, at least one first ejection inlet 120 is provided with a first air baffle 20. It can be understood that, when the first burner row includes three first ejection inlets 120, the three first ejection inlets 120 may all be provided with the first air baffle 20, to simultaneously reduce the air ejection amount of the three first ejection inlets 120. Alternatively, any two of the three first ejection inlets 120 may be provided with the first air baffle 20. Alternatively, one of the three first ejection inlets 120 may be provided with the first

air baffle 20. Due to the existence of the first air baffle 20, the air ejection amount of the entire first burner row 10 will inevitably be reduced, that is, the proportion of the air in the mixed gas in the entire first burner row 10 will be reduced, so that the concentration of gas in the mixed gas is relatively increased, and the reliability of ignition is improved.

[0029] It is worth noting that the first burner row 10 may includes multiple first ejection inlets 120, and the first burner row 10 may is provided with one or more first ejection channel 110. When the first burner row 10 includes only one first ejection channel 110, at this time, the lower end of the first ejection channel 110 is provided with multiple first ejection inlets 120 respectively in communication with the the first ejection channel 110. When the first burner row 10 includes multiple first ejection channels 110, the multiple first ejection channels 110 are independent from each other, so that the amount of mixed gas of the first burner row 10 increases, which is beneficial to enhance the combustion intensity.

[0030] In this embodiment, referring to FIG. 7, and combined with FIGS. 3 to 6, preferably, the first burner row 10 includes multiple first ejection channels 110, the multiple first ejection channels are all in communication with the first fire-breathing part 130, and the multiple first ejection inlets and the multiple first ejection channels are arranged in one-to-one correspondence. In a specific embodiment, the first burner row 10 includes three first ejection channels 110 and three first ejection inlets 120, and the three first ejection channels are arranged in parallel along the horizontal direction.

[0031] During the operation of the burner 1, the temperature of the first burner row 10 is relatively high, so that the first air baffle 20 is preferably made of a high temperature resistant material. In order to facilitate the installation of the first air baffle 20, the first air baffle 20 is preferably a sheet metal, so that it can be fixed to the first burner row 10 by welding.

[0032] Further, the first air baffle 20 includes a body 220 and a connection hem 230 extending from the body 220 to one side, and the connection hem 230 is fixed to the first burner row 10.

[0033] The body 220 is covered on the first ejection inlet 120, and the body 220 is provided with the first air hole 210 at a position corresponding to the first ejection inlet 120.

[0034] The connection hem 230 is fixed to the first burner row 10 by welding, so that the first air baffle 20 is reliably fixed to the first burner row 10. The body 220 is located at the lower end of the first burner row 10 and covers the first ejection inlet 120. The structure of being provided with the first air hole 210 on the body 220 is equivalent to reducing the radial dimension of the first ejection inlet 120, so that the ejection effect at the first ejection inlet 120 is weakened, that is, the amount of the air into the first ejection channel through the first ejection inlet is reduced, so that the gas concentration of the mixed gas is relatively increased, which is more beneficial to the reliable ignition of the gas.

[0035] The connection hem 230 is preferably formed by folding an edge of the body 220. In order to facilitate the bending and folding of the connection hem 230, the connection hem 230 may define a notch at a position close to the body 220, so as to reduce a connection area of the connection position between the connection hem 230 and the body 220.

[0036] In order to further improve the ignition effect of the ignition needle 30, in this embodiment, an induction stopper 140 may further be provided on the first burner row 10. The induction stopper 140 is a conductor, and a pointed protrusion is provided on the induction stopper corresponding to the ignition needle 30, and the ignition effect is improved by the tip discharge phenomenon between the pointed protrusion and the ignition needle 30.

[0037] Specifically, for the first burner row 10, the first fire-breathing part 130 is provided with multiple first fire-breathing holes 131. The first fire-breathing part 130 is provided with an induction baffle 140 extending in a direction close to the ignition needle 30. The induction baffle 140 is disposed at least partially around at least one of the multiple first fire-breathing holes 131, and one end of the induction baffle 140 close to the ignition needle 30 is arranged in a pointed shape.

[0038] It can be understood that one end of the induction stopper 140 close to the ignition needle 30 is arranged in a pointed shape, so that a tip discharge phenomenon can be generated between the induction stopper 140 and the ignition needle 30. The induction stopper 140 is arranged around the first fire-breathing hole 131, so that the mixed gas ejected from the first fire hole 131 may be gathered by the induction stopper, and the concentration of the mixed gas at the tip discharge is higher, which is more beneficial to the ignition and combustion of the mixed gas.

[0039] In some specific embodiments, a minimum distance between the end of the induction stopper 140 close to the ignition needle 30 and the first fire-breathing hole 131 is preferably 6mm to 7mm, so that the ignition position of the mixed gas is not too close to the first fire-breathing hole 131, thereby avoiding the flashback phenomenon caused by the combustion flame being too close to the first fire-breathing hole 131.

[0040] Further, for the burner 1, the multiple burner rows further include a second burner row 40, and the second burner row 40 includes a second ejection channel and a second fire-breathing part and a second ejection inlet located at two ends of the second ejection channel respectively. The structure of the second burner row 40 may be similar to or completely different from the structure of the first burner row 10, which is not specifically limited herein.

[0041] In this embodiment, for the burner 1, the structure of the second burner row 40 is preferably similar to the structure of the first burner row 10, and the difference is: the second burner row 40 is not provided with an induction stopper 140. Specifically, the burner 1 further includes:

an induction needle 60 arranged close to the second fire-breathing part; and

a second air baffle 50 located at the second ejection inlet and being provided with a second air hole corresponding to the second ejection inlet, a radial dimension of the second air hole being smaller than a radial dimension of the

second ejection inlet.

[0042] Specifically, the induction needle 60 may employ a thermocouple or a heat sensitive element as a temperature sensing component, thereby realizing detection of the combustion temperature. The working principle of the second air baffle 50 is similar to that of the first air baffle 20. The gas concentration of the mixed gas in the second ejection channel can be increased by setting the second air baffle 50, which is more beneficial to the combustion of the gas at the induction needle 60, so that the induction needle 60 can better detect the combustion temperature.

[0043] Further, in a preferred embodiment, the second burner row 40 is disposed adjacent to the first burner row 10, at this time, the induction needle 60 is disposed adjacent to the ignition needle 30, the local gas concentration near the induction needle 60 and the ignition needle 30 is relatively large, which is more beneficial to the ignition and combustion of the gas at the local position.

[0044] Since the first burner row 10 and the second burner row 40 are close to each other, the first air baffle 20 and the second air baffle 50 are also close to each other, in order to simplify the structure of the burner 1, the first air baffle 20 and the second air baffle 50 are integrally disposed, so that a first air hole 210 corresponding to the first ejection inlet 120 and a second air hole corresponding to the second ejection inlet are respectively defined on the same body 220.

[0045] It is worth noting that, referring to FIG. 3, for the burner 1, the first air baffle 20 and the second air baffle 50 will only reduce the air ejection amount at the first burner row 10 and the second burner row 40, thereby increasing the gas concentration at the ignition and induction positions. For the whole burner 1, the air ejection amount of the remaining burner rows will not change, that is, the first burner row 10 and the second burner row 40 have limited influence on the whole burner 1, therefore, the change of the air ejection amount in the first burner row 10 and the second burner row 40 will not result in the increase of nitrogen oxides produced by the burner 1 after combustion.

[0046] The present application further provides a gas water heater, which includes a burner, and the specific structure of the burner refers to the above embodiments. Since the gas water heater adopts all the technical solutions of all the above-mentioned embodiments, it has at least all the beneficial effects brought by the technical solutions of the above-mentioned embodiments, which will not be repeated here.

[0047] The above are only preferable embodiments of the present application, and thus does not limit the scope of the present application, and the equivalent structural transformation made by the content of the specification and the drawings of the present application, or directly/indirectly applied to other related technical fields are all included in the patent protection scope of the present application.

Claims

1. A burner, wherein the burner comprises:

a first burner row comprising a first ejection channel, and the first burner row comprising a first fire-breathing part and a first ejection inlet located at two ends of the first ejection channel respectively;
an ignition needle arranged close to the first fire-breathing part; and
a first air baffle located at the first ejection inlet, the first air baffle being provided with a first air hole corresponding to the first ejection inlet, a radial dimension of the first air hole being smaller than a radial dimension of the first ejection inlet.

2. The burner of claim 1, wherein the first ejection inlet is located at a lower end surface or a side wall of the first burner row.

3. The burner of claim 1, wherein the ignition needle is an electronic ignition needle or a pulsed continuous ignition needle.

4. The burner of claim 1, wherein a number of the first ejection channel is multiple, the multiple first ejection channels are independent from each other.

5. The burner of claim 1, wherein a number of the first ejection channel is three, the three first ejection channels are arranged in parallel along a horizontal direction.

6. The burner of claim 1, wherein the first air baffle is made of a high temperature resistant material.

7. The burner of claim 1, wherein the first air baffle is a sheet metal part and is welded and fixed to the first burner row.

8. The burner of claim 1, wherein a number of the first ejection inlet is multiple, at least one of the multiple first ejection inlets is provided with the first air baffle.

9. The burner of claim 8, wherein the first burner row comprises the multiple first ejection channels, the multiple first ejection channels are all in communication with the first fire-breathing part, the multiple first ejection inlets and the multiple first ejection channels are arranged in one-to-one correspondence.

10. The burner of claim 1, wherein the first air baffle comprises a body and a connection hem, the connection hem extending from the body to a side, wherein the connection hem is fixed to the first burner row;
the body covers on the first ejection inlet, the body is provided with the first air hole at a position corresponding to the first ejection inlet.

11. The burner of claim 10, wherein the connection hem is formed by folding an edge of the body.

12. The burner of claim 11, wherein the connection hem is provided with a notch at a position close to the body.

13. The burner of claim 1, wherein the first fire-breathing part is provided with multiple first fire-breathing holes, the first fire-breathing part is provided with an induction stopper, the induction stopper extending in a direction close to the ignition needle, the induction stopper is disposed at least partially around at least one of the multiple first fire-breathing holes, an end of the induction stopper close to the ignition needle is provided in a pointed shape.

14. The burner of claim 13, wherein a minimum distance between the end of the induction stopper close to the ignition needle and the first fire-breathing hole is 6mm to 7mm.

15. The burner of claim 1, wherein the burner further comprises:

a second burner row arranged in parallel with the first burner row, the second burner row comprising a second ejection channel, and the second burner row comprising a second fire-breathing part and a second ejection inlet located at two ends of the second ejection channel respectively;
an induction needle arranged close to the second fire-breathing part; and
a second air baffle located at the second ejection inlet, the second air baffle being provided with a second air hole corresponding to the second ejection inlet, a radial dimension of the second air hole being smaller than a radial dimension of the second ejection inlet.

16. The burner of claim 15, wherein the induction needle employs a thermocouple or a thermal sensitive element as a temperature sensing component.

17. The burner of claim 15, wherein the second burner row is disposed close to the first burner row.

18. The burner of claim 15, wherein the first air baffle and the second air baffle are integrally provided.

19. A gas water heater, comprising a burner, wherein the burner comprises:

a first burner row comprising a first ejection channel, and the first ejection channel comprising a first fire-breathing part and a first ejection inlet located at two ends of the first ejection channel respectively;
an ignition needle arranged close to the first fire-breathing part; and
a first air baffle located at the first ejection inlet and being provided with a first air hole corresponding to the first ejection inlet, a radial dimension of the first air hole being smaller than a radial dimension of the first ejection inlet.

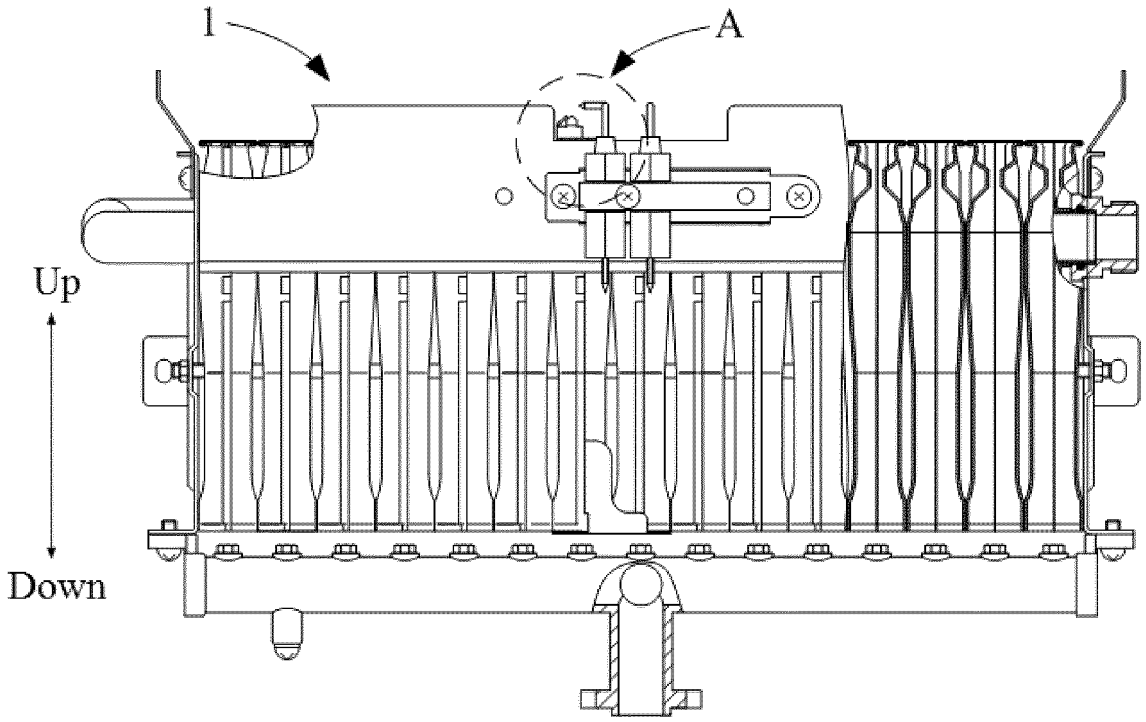

FIG. 1

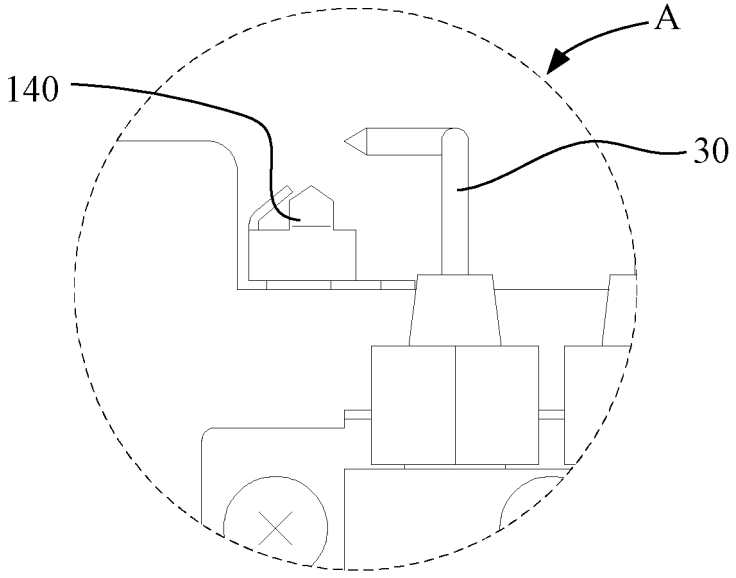

FIG. 2

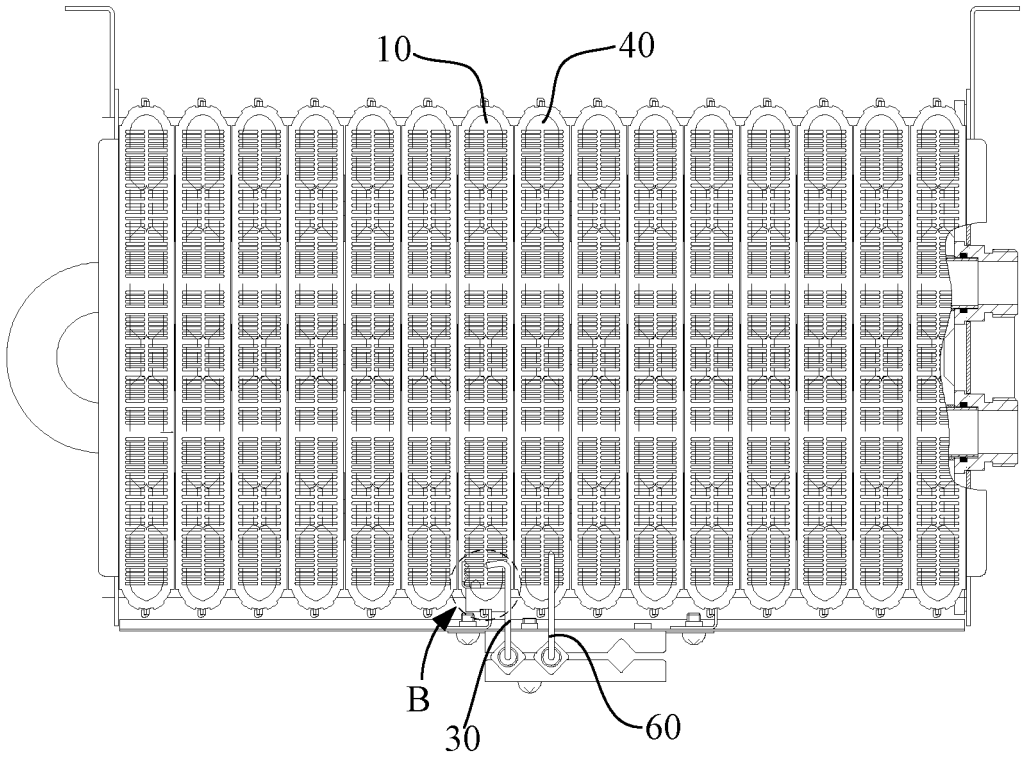

FIG. 3

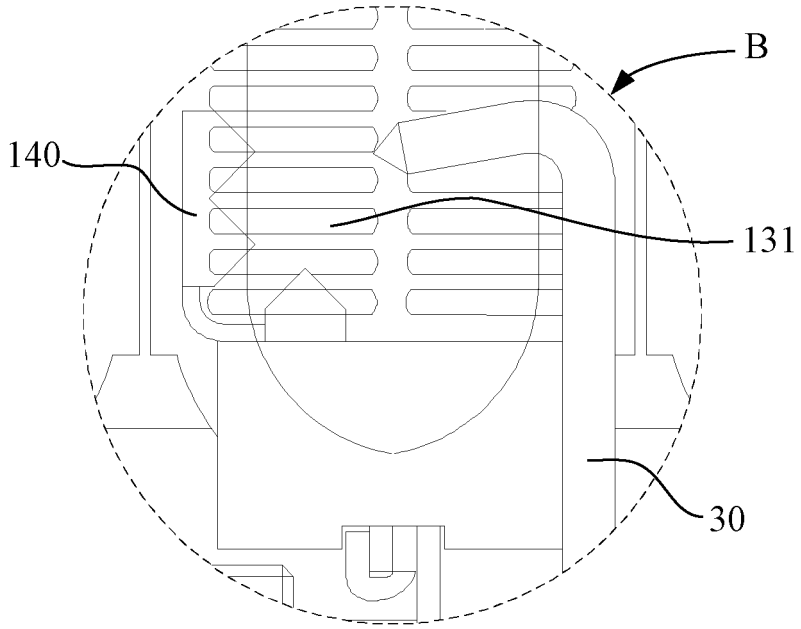

FIG. 4

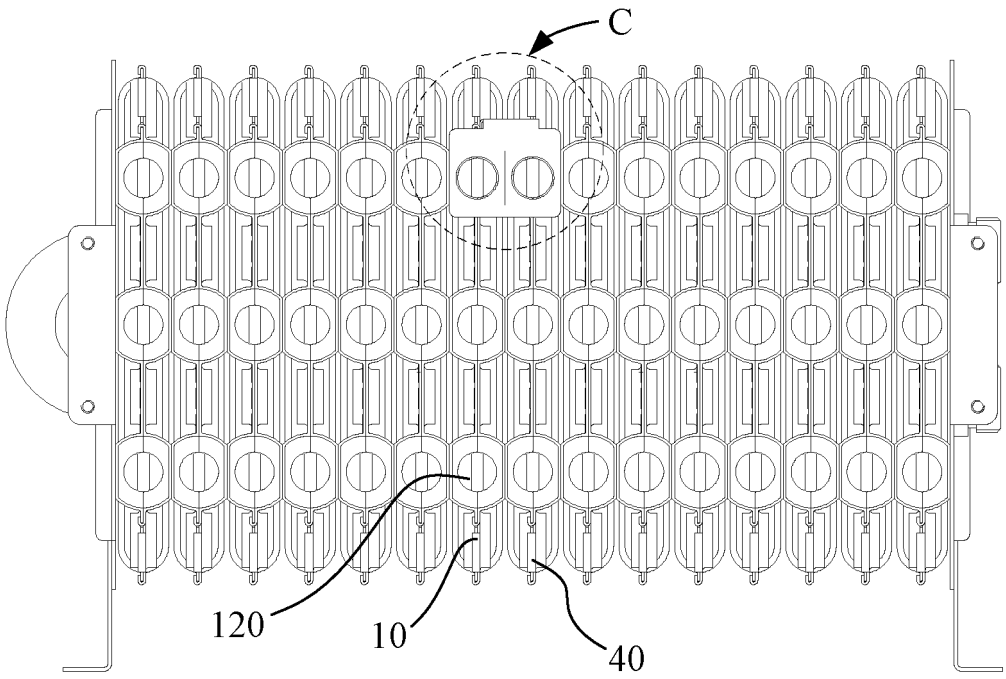

FIG. 5

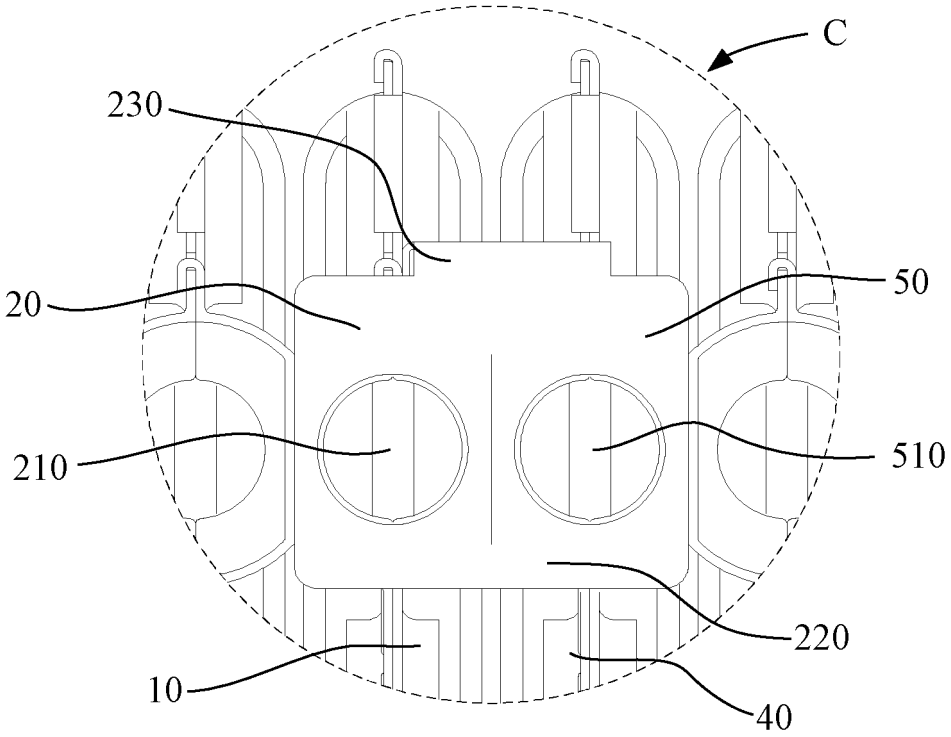

Fig. 6

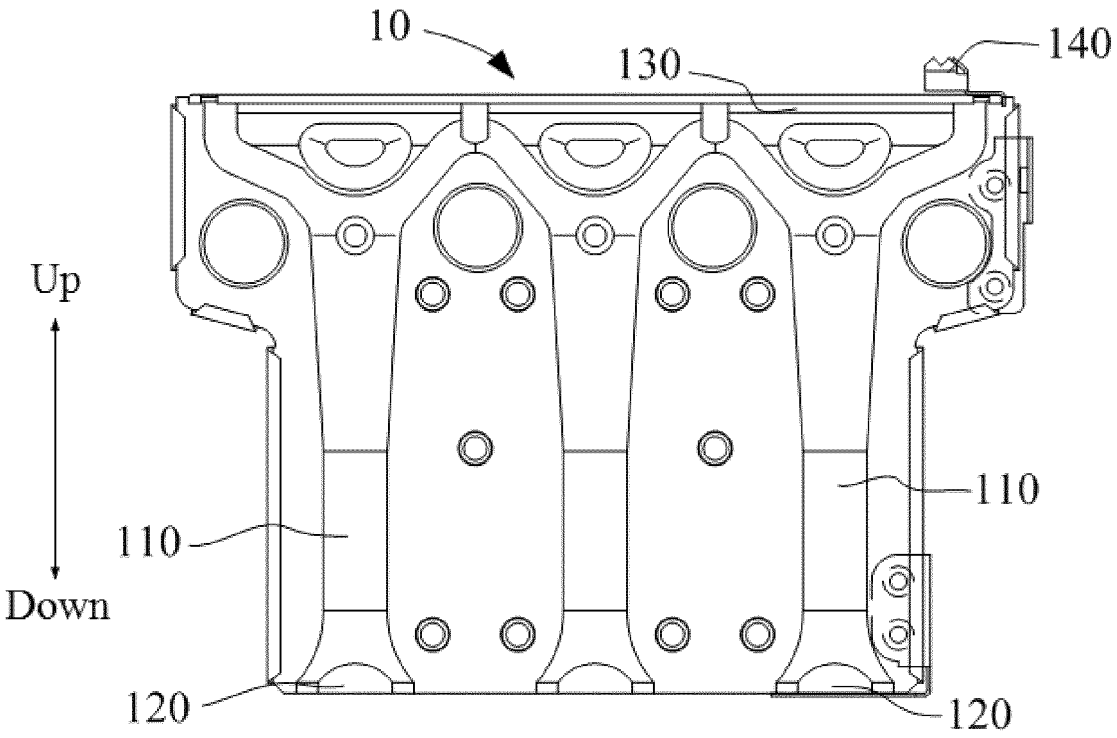

FIG. 7

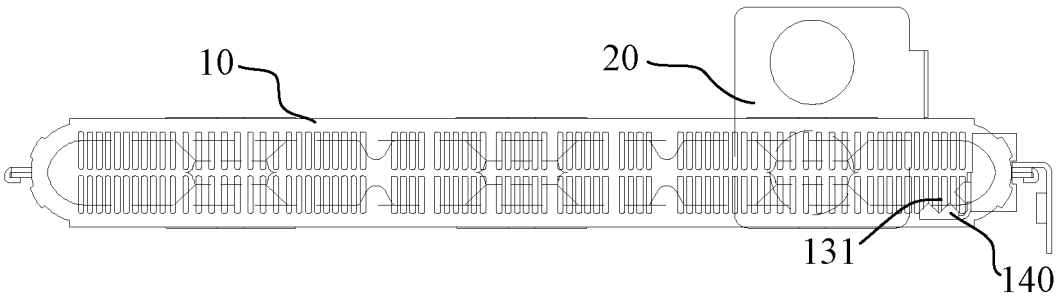

FIG. 8

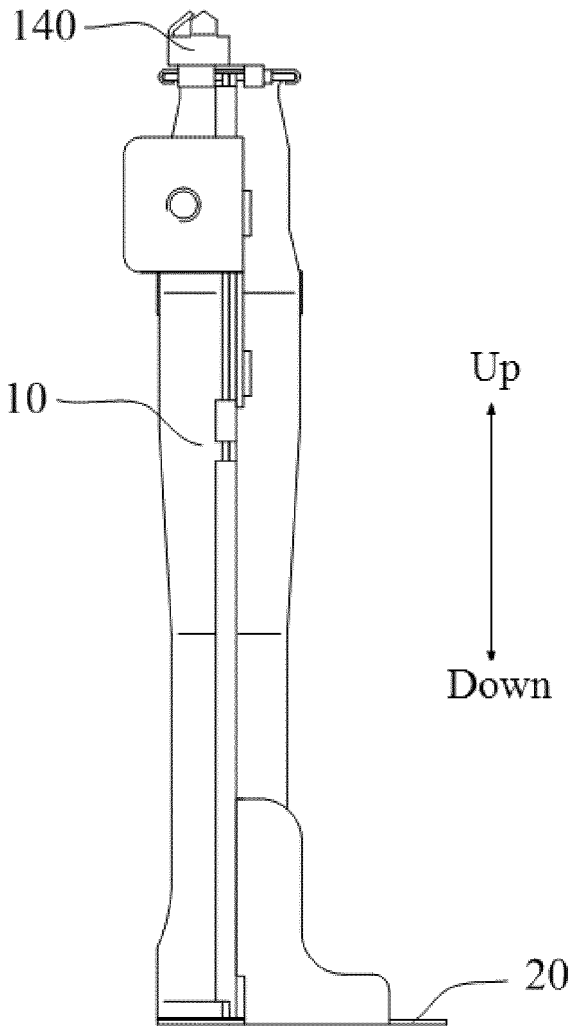

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/124387

A. CLASSIFICATION OF SUBJECT MATTER

F23D 14/72(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F23D14,F23M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI; CNABS; CNTXT; CNKI; VEN: 燃烧器, 燃气, 火排, 引射, 进风, 调风, 板, burner, gas, inject, air, baffle

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 209386288 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 13 September 2019 (2019-09-13) description, paragraphs [0041]-[0069], and figures 1-9	1-19
Y	CN 207065570 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD. et al.) 02 March 2018 (2018-03-02) description, paragraphs [0040]-[0065], and figures 1-13	1-19
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Date of the actual completion of the international search	Date of mailing of the international search report
24 February 2020	**02 March 2020**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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