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(54) **HEAT EXCHANGER APPLIED TO CEILING AIR CONDITIONER AND CEILING AIR CONDITIONER**

(57) The present disclose belongs to the field of air conditioner technologies, and discloses a heat exchanger applied to a cassette type air conditioner and a cassette type air conditioner. The heat exchanger includes two side heat exchange parts provided on two sides and at an angle to each other; and an intermediate heat exchange part provided between the two side heat exchange parts, wherein the intermediate heat exchange part has a concave structure facing away from the angle between the two side heat exchange parts, wherein a concave side of the intermediate heat exchange part is smoothly connected with the side heat exchange part on a side corresponding to the concave side through an arc-shaped section. The beneficial effects of the present disclosure are that by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type

air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

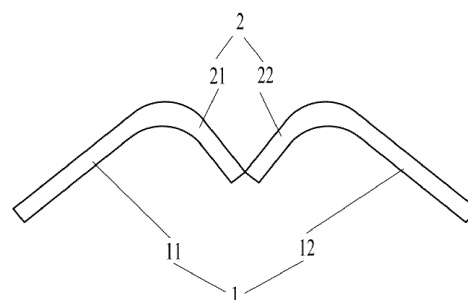


Fig. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The application is based upon and claims priority to Chinese Patent Application No. 201910032557.6, filed January 14, 2019, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of air conditioner technologies, and more particularly, to a heat exchanger applied to a cassette type air conditioner and a cassette type air conditioner.

BACKGROUND

[0003] Cassette type air conditioners, also known as ceiling air conditioners, are a type of commercial air conditioners. Compared with household air conditioners, the cassette type air conditioners have better stability, stronger cooling capacity and more controllable temperature, and are mostly used in some offices and shops.

[0004] During the implementation of the embodiments of the present disclosure, it is found that at least the following problems exist in related arts:

an intermediate heat exchange part of the cassette type air conditioner is a planar structure for supplying air to rooms, which results in poor heat dissipation of an air supply system of the cassette type air conditioner, thereby reducing heat exchange efficiency, wasting electric energy and failing to meet user needs.

SUMMARY

[0005] In order to have a basic understanding of some aspects of disclosed embodiments, a brief summary is given below. The summary is not a general comment, nor is it intended to identify key/important constituent elements or to describe the scope of protection of these embodiments, but serves as a preamble to the following detailed description.

[0006] Embodiments of the present disclosure provide a heat exchanger applied to a cassette type air conditioner.

[0007] In some embodiments, the above heat exchanger includes:

two side heat exchange parts provided on two sides and at an angle to each other; and
an intermediate heat exchange part provided between the two side heat exchange parts, wherein the intermediate heat exchange part has a concave structure facing away from the angle between the two side heat exchange parts.

[0008] The embodiments of the present disclosure provide

vide a cassette type air conditioner.

[0009] In some embodiments, the cassette type air conditioner includes the above heat exchanger, wherein the two side heat exchange parts of the heat exchanger corresponds to an air inlet of the cassette type air conditioner, and the intermediate heat exchange part corresponds to an air outlet of the cassette type air conditioner.

[0010] Some technical solutions provided by the embodiments of the present disclosure may achieve the following technical effects:

by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0011] The above general description and the following description are exemplary and explanatory only and are not intended to limit the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] One or more embodiments are exemplarily described by corresponding accompanying drawings. These exemplary descriptions and drawings do not limit the embodiments. Elements with same reference numerals in the drawings are shown as similar elements. The drawings do not constitute a scale limitation, and in which:

Fig. 1 is a schematic structural diagram of a heat exchanger applied to a cassette type air conditioner according to an embodiment of the present disclosure;

Fig. 2 is a schematic structural diagram of a heat exchanger applied to a cassette type air conditioner according to an embodiment of the present disclosure.

Reference signs:

[0013] 1: side heat exchange part; 2: intermediate heat exchange part; 21: first intermediate heat exchange part; 22: second intermediate heat exchange part; 11: first side heat exchange part; 12: second side heat exchange part.

DETAILED DESCRIPTION

[0014] The following description and accompanying drawings fully illustrate the specific implementation solutions of the present disclosure so that a person skilled in the art can practice them. Parts and characteristics of some implementation solutions may be included in or replace parts and characteristics of other implementation solutions. As used herein, terms such as "first" and "second" are merely for distinguishing one entity or operation from another entity or operation and do not require or imply any actual relationship or sequence among these entities or operations. In fact, a first element can also be

called a second element, and vice versa. Moreover, terms such as "comprise" and "include" or any other variants indicate a non-exclusive inclusion, so that a process, method, or device including a series of elements not only include these elements, but also include other elements not explicitly listed. Without further restrictions, the element defined by the statement "includes a/an ..." does not exclude the existence of other identical elements in the process, method or device that includes the element. As used herein, each embodiment is described progressively, and contents focally described in each embodiment are different from those in other embodiments. The same or similar parts among each of the embodiments may be referred to each other.

[0015] As used herein, orientations or position relationships indicated by terms "longitudinal", "lateral", "up", "down", "front", "behind", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", and the like are orientations or position relationships shown based on the accompanying drawings, and are merely used for describing the present disclosure and for description simplicity, instead of indicating or implying that an indicated device or element need to provide in a specific orientation, or need to be constructed and operated in a specific orientation, therefore, the orientations or position relationships cannot be understood as a limitation of the present disclosure. In the description of the present disclosure, terms "installation", "joint", "connection" should be understood in a broad sense unless otherwise explicitly specified and limited, for example, "connection" may be a mechanical connection or an electrical connection, or may also be an internal connection between two elements, or may be connected direct connection, or may also be an indirect connection based on an intermediate medium. For a person of ordinary skill in the art, a specific meaning of the foregoing terms may be understood according to a specific situation.

[0016] As used herein, a term "a plurality of" indicates two or more unless otherwise explicitly specified.

[0017] As used herein, a character "/" indicates an "or" relationship between objects before and after the character. For example, A/B indicates A or B.

[0018] As used herein, a term "and/or" describes an association relationship for depicting associated objects and represents that three relationships may exist. For example, A and/or B may represent three relationships: A, or B, or A and B.

[0019] In some optional embodiments, there is provided a heat exchanger applied to a cassette type air conditioner, including two side heat exchange parts 1 provided on two sides and at an angle to each other; and an intermediate heat exchange part 2 provided between the two side heat exchange parts 1, wherein the intermediate heat exchange part 2 has a concave structure facing away from the angle between the two side heat exchange parts.

[0020] Optionally, the two side heat exchange parts 1 may be an air outlet part of the cassette type air condi-

tioner, and the intermediate heat exchange part 2 may be an air return part of the cassette type air conditioner; or the two side heat exchange parts 1 may be the air return part of the cassette type air conditioner, and the intermediate heat exchange part 2 may be the air outlet part of the cassette type air conditioner.

[0021] Optionally, the intermediate heat exchange part 2 includes a first intermediate heat exchange part 21 and a second intermediate heat exchange part 22, and the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 can be a symmetrical structure. The two side heat exchange parts 1 include a first side heat exchange part 11 and a second side heat exchange part 12, and the first side heat exchange part 11 and the second side heat exchange part 12 can be a symmetrical structure.

[0022] In the present disclosure, the two side heat exchange parts 1 are provided on both sides of the intermediate heat exchange part 2. The two side heat exchange parts 1 are provided at an angle to each other, which means that if one of the two side heat exchange parts 1 (i.e., the first side heat exchange part 11) is not moved, and the other of the two side heat exchange parts 1 (i.e., the second side heat exchange part 12) is moved in a direction of the first side heat exchange part 11, when the first side heat exchange part 11 and the second side heat exchange part 12 intersect, the plane where the first side heat exchange part 11 is located and the plane where the second side heat exchange part 12 is located cannot completely coincide, that is, the two planes are at a certain angle, which is not limited here.

[0023] Optionally, both the two side heat exchangers 1 and the intermediate heat exchange part 2 can be provided with vent holes. When the wind enters through the vent holes of the two side heat exchangers 1, since the two side heat exchange parts 1 are provided at a certain angle, that is, the two side heat exchange parts 1 are not in the same plane, by using Computational Fluid Dynamics CFD to simulate the wind speed field, when the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are in the same plane, that is, an angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is 180°, an angle between the first intermediate heat exchange part 21 and the first side heat exchange part 11 is adjusted to 144.9°, and an angle between the second intermediate heat exchange part 22 and the second side heat exchange part 12 is adjusted to 144.8°; at this time, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.6m/s, the measured wind speeds discharged from the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are only 0.6m/s, which indicates that when the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is in the same plane, an internal circulation of the cassette type air conditioner is not smooth, and heat exchange efficien-

cy is relatively low, thereby wasting electric energy. By adjusting the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 to 90° and keeping the angle between the first side heat exchange part 11 and the second side heat exchange part 12 unchanged, when the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is 90°, the angle between the first intermediate heat exchange part 21 and the first side heat exchange part 11 is adjusted to 99.9°, and the angle between the second intermediate heat exchange part 22 and the second side heat exchange part 12 is adjusted to 99.8°; at this time, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.48m/s, the measured wind speeds discharged from the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are 1.32m/s and 1.33m/s, respectively. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0024] Optionally, when an angle between two concave sides of the concave structure of the intermediate heat exchange part 2 is 141°, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.58m/s, the measured wind speeds discharged from the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are only 1.2m/s. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0025] Optionally, a concave depth of the concave structure of the intermediate heat exchange part 2 is 0mm, when the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are in the same plane, that is, the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is 180°, the angle between the first intermediate heat exchange part 21 and the first side heat exchange part 11 is adjusted to 144.9°, and the angle between the second intermediate heat exchange part 22 and the second side heat exchange part 12 is adjusted to 144.8°; at this time, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.6m/s, the measured wind speeds discharged from the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are only 0.6m/s, which indicates that when the first intermediate heat exchange part 21 and the second intermediate heat ex-

change part 22 is in the same plane, the internal circulation of the cassette type air conditioner is not smooth, and heat exchange efficiency is relatively low, thereby wasting electric energy.

[0026] Optionally, the concave depth of the concave structure of the intermediate heat exchange part 2 is 152mm, and the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is 103°; at this time, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.48m/s, the measured wind speeds discharged from the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 are 1.26m/s and 1.27m/s, respectively. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0027] Optionally, a maximum width of the concave structure of the intermediate heat exchange part 2 is 127mm to 162mm. It is indicated by experiments that when the width of the concave structure of the intermediate heat exchange part 2 is less than 127mm or greater than 162mm, the wind speed discharged from the intermediate heat exchange part 2 will decrease, and heat exchange efficiency will decrease. Therefore, the width of the concave structure of the intermediate heat exchange part 2 is limited to 127mm to 162mm. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0028] Optionally, the concave side of the intermediate heat exchange part 2 is perpendicular to the side heat exchange part on a side corresponding to the concave side.

[0029] Optionally, by using Computational Fluid Dynamics CFD to simulate the wind speed field, by adjusting the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 to 70.3° and keeping the angle between the first side heat exchange part 11 and the second side heat exchange part 12 unchanged, when the angle between the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 is 70.3°, the angle between the first intermediate heat exchange part 21 and the first side heat exchange part 11 is adjusted to 90°, and the angle between the second intermediate heat exchange part 22 and the second side heat exchange part 12 is adjusted to 90°; at this time, when the wind speeds entering through the first side heat exchange part 11 and the second side heat exchange part 12 are 1.48m/s, the measured wind speeds discharged from the first inter-

mediate heat exchange part 21 and the second intermediate heat exchange part 22 are 1.34m/s and 1.34m/s, respectively. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0030] Optionally, the concave side of the intermediate heat exchange part 2 is smoothly connected with the side heat exchange part on the side corresponding to the concave side through an arc-shaped section.

[0031] Optionally, the concave side of the intermediate heat exchange part 2 can be smoothly connected with the side heat exchange part on the side corresponding to the concave side through an arc-shaped section. Since the resistance of the air on a streamlined surface is relatively small, the formation of vortices can be avoided. Therefore, the resistance when the air flows is greatly reduced, at the same speed of the air inlet, the air outlet becomes smoother. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0032] Optionally, the concave side of each side of the intermediate heat exchange part 2 and the side heat exchange part 1 on a side corresponding to the concave side are of an integral structure. Without affecting the heat dissipation, the integral structure can make the heat exchange part of the cassette type air conditioner as a whole, thereby improving the stability, reducing the failure rate, and avoiding the friction consumption among components. When the cassette type air conditioner operates, the intermediate heat exchange part 2 and the two side heat exchange parts 1 will inevitably generate some tiny vibrations and flash cracks, not only impurities easily enter the body of the air conditioner from tiny gaps, but also cause wear among the components, therefore, the first intermediate heat exchange part 21 and the first side heat exchange part 11 are manufactured as the integral structure, and the second intermediate heat exchange part 22 and the second side heat exchange part 12 are also manufactured as the integral structure. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0033] Optionally, the heat exchanger has a symmetrical structure.

[0034] Optionally, the intermediate heat exchange part 2 includes a first intermediate heat exchange part 21 and a second intermediate heat exchange part 22, and the first intermediate heat exchange part 21 and the second

intermediate heat exchange part 22 can be a symmetrical structure. The two side heat exchange parts 1 include a first side heat exchange part 11 and a second side heat exchange part 12, and the first side heat exchange part 11 and the second side heat exchange part 12 can be a symmetrical structure. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0035] The embodiments of the present disclosure also provide a cassette type air conditioner, including the above heat exchanger, wherein the two side heat exchange parts 1 of the heat exchanger corresponds to an air inlet of the cassette type air conditioner, and the intermediate heat exchange part 2 corresponds to an air outlet of the cassette type air conditioner.

[0036] Optionally, the heat exchanger can include two side heat exchange parts 1 provided on two sides and at an angle to each other; and an intermediate heat exchange part 2 provided between the two side heat exchange parts 1, wherein the intermediate heat exchange part 2 has a concave structure facing away from the angle between the two side heat exchange parts. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0037] Optionally, the intermediate heat exchange part 2 includes a first intermediate heat exchange part 21 and a second intermediate heat exchange part 22, and the first intermediate heat exchange part 21 and the second intermediate heat exchange part 22 can be a symmetrical structure. The two side heat exchange parts 1 include a first side heat exchange part 11 and a second side heat exchange part 12, and the first side heat exchange part 11 and the second side heat exchange part 12 can be a symmetrical structure. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0038] Optionally, the concave side of the intermediate heat exchange part 2 can be smoothly connected with the side heat exchange part on the side corresponding to the concave side through an arc-shaped section. Since the resistance of the air on a streamlined surface is relatively small, the formation of vortices can be avoided. Therefore, the resistance when the air flows is greatly reduced, at the same speed of the air inlet, the air outlet becomes smoother. Therefore, by changing the structure of the heat exchange part of the heat exchanger of the

cassette type air conditioner, an air supply system of the cassette type air conditioner can dissipate heat more smoothly, thereby improving heat exchange efficiency, saving more electric energy and enabling customers to use better.

[0039] It should be understood that, the present disclosure is not limited to the flowchart and structures described above and shown in the accompanying drawings, and various modifications and changes may be made without departing from the scope. The scope of the present disclosure is limited only by the appended claims.

Claims

1. A heat exchanger applied to a cassette type air conditioner, **characterized in that** the heat exchanger comprises:

two side heat exchange parts provided on two sides and at an angle to each other; and
an intermediate heat exchange part provided between the two side heat exchange parts, wherein the intermediate heat exchange part has a concave structure facing away from the angle between the two side heat exchange parts.

2. The heat exchanger according to claim 1, **characterized in that** an angle between two concave sides of the concave structure of the intermediate heat exchange part ranges from 90° to 141°.
3. The heat exchanger according to claim 1, **characterized in that** a concave depth of the concave structure of the intermediate heat exchange part is 0mm to 125mm.
4. The heat exchanger according to claim 1, **characterized in that** a maximum width of the concave structure of the intermediate heat exchange part is 127mm to 162mm.
5. The heat exchanger according to claim 1, **characterized in that** a concave side of the intermediate heat exchange part is perpendicular to the side heat exchange part on a side corresponding to the concave side.
6. The heat exchanger according to claim 1 or 5, **characterized in that** a concave side of the intermediate heat exchange part is smoothly connected with the side heat exchange part on a side corresponding to the concave side through an arc-shaped section.
7. The heat exchanger according to claim 1, **characterized in that** a concave side of each side of the intermediate heat exchange part and the side heat

exchange part on a side corresponding to the concave side are of an integral structure.

8. The heat exchanger according to claim 1, **characterized in that** the heat exchanger has a symmetrical structure.
9. A cassette type air conditioner, **characterized in that** the cassette type air conditioner comprises the heat exchanger according to any one of claims 1 to 8, wherein the two side heat exchange parts of the heat exchanger corresponds to an air inlet of the cassette type air conditioner, and the intermediate heat exchange part corresponds to an air outlet of the cassette type air conditioner.

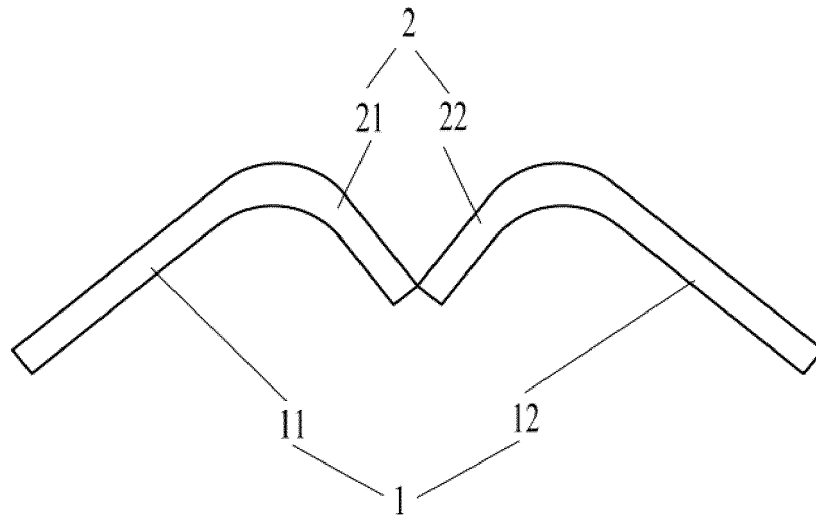


Fig. 1

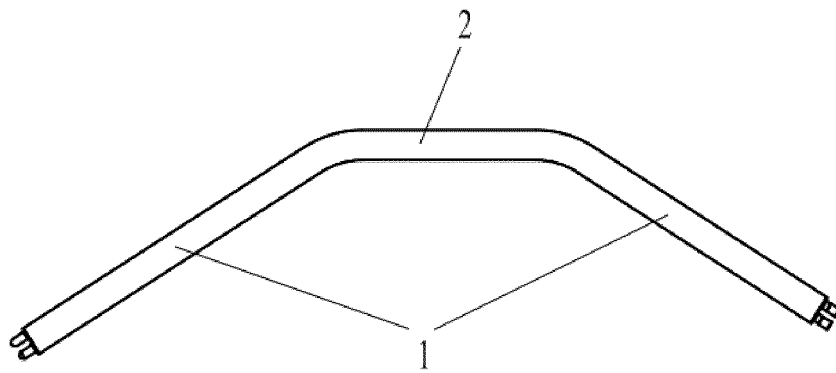


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/084195

A. CLASSIFICATION OF SUBJECT MATTER F24F 1/0063(2019.01)i; F24F 1/0067(2019.01)i; F24F 13/30(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) F24F; F28D; F28F 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) CNABS; CNTXT; DWPI; SIPOABS; CNKI: 青岛海尔股份有限公司, 青岛海尔空调电子有限公司, 刘景升, 刘江彬, 宋强, 孟庆良, 任滔, 李银银, 国德防, 李文波, 换热器, 热交换器, M型, W型, 蒸发器, 冷凝器, 内凹, 凹, 角度, 空调, heat exchanger, "W 1d type", "M 1d type", condenser, evaporator, air conditioner																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>CN 105588227 A (QINGDAO HISENSE HITACHI AIR-CONDITIONING SYSTEMS CO., LTD.) 18 May 2016 (2016-05-18) description, paragraphs 17-22, 25 and 28, and figure 1</td> <td>1-9</td> </tr> <tr> <td>X</td> <td>CN 205037462 U (QINGDAO HISENSE HITACHI AIR-CONDITIONING SYSTEMS CO., LTD.) 17 February 2016 (2016-02-17) description, paragraphs 17-22, 25 and 28, and figure 1</td> <td>1-9</td> </tr> <tr> <td>X</td> <td>CN 203216342 U (XIANGTAN CHONGDE TECHNOLOGY MACHINE MANUFACTURING CO., LTD.) 25 September 2013 (2013-09-25) claims 1-5</td> <td>1-9</td> </tr> <tr> <td>X</td> <td>CN 107957202 A (DUNAN ENVIRONMENT TECHNOLOGY CO., LTD.) 24 April 2018 (2018-04-24) claims 1-10</td> <td>1-9</td> </tr> <tr> <td>X</td> <td>CN 101319859 A (WUXI HUASHEN THERMOTECNICAL FLUID EQUIPMENT FACTORY) 10 December 2008 (2008-12-10) claim 1</td> <td>1-9</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	CN 105588227 A (QINGDAO HISENSE HITACHI AIR-CONDITIONING SYSTEMS CO., LTD.) 18 May 2016 (2016-05-18) description, paragraphs 17-22, 25 and 28, and figure 1	1-9	X	CN 205037462 U (QINGDAO HISENSE HITACHI AIR-CONDITIONING SYSTEMS CO., LTD.) 17 February 2016 (2016-02-17) description, paragraphs 17-22, 25 and 28, and figure 1	1-9	X	CN 203216342 U (XIANGTAN CHONGDE TECHNOLOGY MACHINE MANUFACTURING CO., LTD.) 25 September 2013 (2013-09-25) claims 1-5	1-9	X	CN 107957202 A (DUNAN ENVIRONMENT TECHNOLOGY CO., LTD.) 24 April 2018 (2018-04-24) claims 1-10	1-9	X	CN 101319859 A (WUXI HUASHEN THERMOTECNICAL FLUID EQUIPMENT FACTORY) 10 December 2008 (2008-12-10) claim 1	1-9
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X	CN 101319859 A (WUXI HUASHEN THERMOTECNICAL FLUID EQUIPMENT FACTORY) 10 December 2008 (2008-12-10) claim 1	1-9																
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																		
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Date of the actual completion of the international search 12 September 2019	Date of mailing of the international search report 08 October 2019																	
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INTERNATIONAL SEARCH REPORT

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201246996 Y (WUXI HUASHEN THERMOTECNICAL FLUID EQUIPMENT FACTORY) 27 May 2009 (2009-05-27) claim 1	1-9
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INTERNATIONAL SEARCH REPORT
Information on patent family members

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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