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(54) CEILING-MOUNTED AIR-CONDITIONER INDOOR-UNIT SYSTEM

(57) The disclosure discloses a ceiling-type air-conditioner indoor unit system. An indoor unit (10) is provided in a ceiling (20). The system further includes: a return air inlet (30), provided on a side surface of the ceiling (20); and an air outlet (40), provided on a bottom surface of the ceiling (20). A closeable return air inlet apparatus (31) is provided at the return air inlet (30), and a closeable air outlet apparatus (41) is provided at the air outlet (40).

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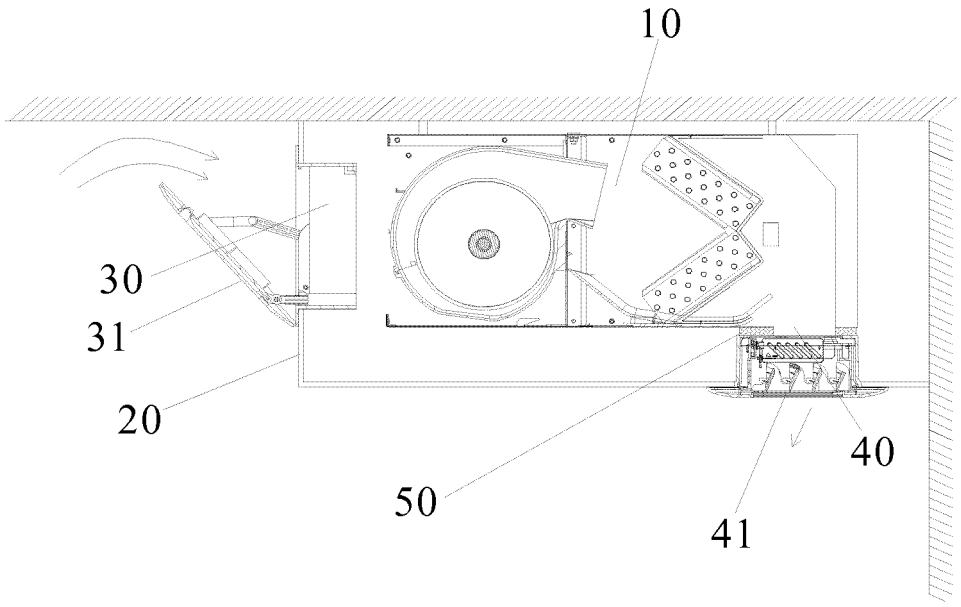

Fig. 2

Description

Technical field of the invention

[0001] The disclosure relates to the field of air conditioners, and in particular to a ceiling-type air-conditioner indoor unit system.

Background of the invention

[0002] With the improvement of people's living standards, decoration is required more and more highly, and hidden air conditioners are more and more welcomed by people. Compared with an all-ceiling type air conditioner, a partial-ceiling type air conditioner serving as one of the hidden air conditioners is more space-efficient. Conventional partial-ceiling type hidden indoor units on the market adopt an airflow circulating mode of laterally supplying air which is laterally returned or laterally supplying air which is downwardly returned. The mounting height of a unit is about 2.8m, so that during heating of the unit, after hot air is laterally supplied, the hot air floats over an air-conditioning room by following a principle of thermal expansion, the hot air cannot reach an active area of people, and therefore the thermal comfort of the room is bad. Moreover, engineering aluminium frame type air ports or guide blade plastic type air ports adopted for a traditional unit cannot be closed, insects and dust cannot be prevented from entering the unit, and therefore the reliability of the unit is low.

Summary of the invention

[0003] The disclosure aims to provide a ceiling-type air-conditioner indoor unit system, which is intended to solve the technical problem of bad thermal comfort of a room in a traditional unit air supply mode.

[0004] In order to achieve the aim, the disclosure provides a ceiling-type air-conditioner indoor unit system. An indoor unit may be provided in a ceiling. The system may further comprise: a return air inlet, provided on a side surface of the ceiling; and an air outlet, provided on a bottom surface of the ceiling. A closeable return air inlet apparatus may be provided at the return air inlet, and a closeable air outlet apparatus may be provided at the air outlet.

[0005] Furthermore, the air outlet apparatus may comprise an air output apparatus and an air guide portion movably sleeved inside the air output apparatus in a vertical direction.

[0006] Furthermore, the air guide portion may comprise a side wall, and a first air outlet may be formed at the bottom of the air guide portion.

[0007] Furthermore, the air guide portion may further comprise a second air outlet, provided on the side wall. When the air guide portion retracts into the air output apparatus, the second air outlet may be closed. When the air guide portion extends out of the air output apparatus, the second air outlet may be opened.

[0008] Furthermore, the side wall may comprise two first side walls which are provided oppositely and two second side walls which are provided between the two first side walls, and the second air outlet may be provided on at least one of the two first side walls.

[0009] Furthermore, a first air outlet and a second air outlet independent of each other may be provided on the air guide portion.

[0010] Furthermore, the first air outlet may be provided with an air guide blade. When the air guide blade is closed, the first air outlet is able to be closed by the air guide blade.

[0011] Furthermore, the first air outlet may be provided with a plurality of air guide blades. When the air guide blades are closed, the first air outlet is able to be closed by the air guide blades.

[0012] Furthermore, the indoor unit may be provided with a cross flow fan, comprising a volute and a fan blade. In a longitudinal section of the cross flow fan, a volute profile of the volute may comprise: a circular arc segment, provided at an air inlet of the fan; and a helix segment, smoothly connected to the circular arc segment and extending towards an air outlet direction of the fan, the helix segment and the circular arc segment being tangent to a first connecting point B.

[0013] Furthermore, the volute profile may further comprise a straight-line segment, provided at an air outlet of the cross flow fan, the straight-line segment and the helix segment being tangent to a second connecting point A.

[0014] Furthermore, an evaporator may be provided at a return air inlet of an inner cavity of the indoor unit and may be detachably provided in the indoor unit. The return air inlet of the inner cavity of the indoor unit may be configured to enable the evaporator to enter or exit from the inner cavity of the indoor unit.

[0015] Furthermore, the indoor unit may be provided with a centrifugal fan and a V-shaped evaporator matched with the centrifugal fan.

[0016] Furthermore, a sealing material may be provided at a joint of the indoor unit and the air outlet.

[0017] The disclosure has the beneficial effects as follows.

[0018] A air outlet direction of the air outlet is arranged to face the ground, so that hot air can be supplied to the lowest position in a room, the thermal comfort of the room is good, the size of a unit is smaller, the space is saved, much decoration space is reserved, and diversified demands are met.

[0019] In addition to the aims, features and advantages described above, the disclosure also has other aims, features and advantages. The disclosure will be further described below in detail with reference to the drawings.

Brief description of the drawings

[0020] The drawings forming a part of the disclosure are intended to provide further understanding of the dis-

closure. The schematic embodiments and descriptions of the disclosure are intended to explain the disclosure, and do not form improper limits to the disclosure. In the drawings:

Fig. 1 is a diagram of a non-working state of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 2 is a diagram of air output from a first air outlet of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 3 is a diagram of air output from a first air outlet and a second air outlet of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 4 is a diagram of air output from a second air outlet of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 5 is a diagram of a first air outlet and a second air outlet of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 6 is a diagram of a single air guide blade of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 7 is a diagram of a plurality of air guide blades of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 8 is a diagram of output airflow of a ceiling-type air-conditioner indoor unit system according to the disclosure;

Fig. 9 is a diagram of a sectional structure of an indoor unit of a ceiling-type air-conditioner indoor unit system according to the disclosure; and

Fig. 10 is a diagram of main control features of a volute profile of an indoor unit of a ceiling-type air-conditioner indoor unit system according to the disclosure.

[0021] The drawings comprise drawing marks: 10, indoor unit; 11, fan blade; 12, volute profile; 121, circular arc segment; 122, helix segment; 123, straight-line segment; 20, ceiling; 30, return air inlet; 31, return air inlet apparatus; 40, air outlet; 41, air outlet apparatus; 411, air output apparatus; 412, air guide portion; 4120, side wall; 4121, first air outlet; 4122, second air outlet; 42, air guide blade; and 50, sealing material.

Detailed description of the embodiments

[0022] The embodiments of the disclosure are described below in detail with reference to the drawings. However, the disclosure can be implemented in multiple different modes limited and covered by claims.

[0023] As shown in Fig. 1 to Fig. 10, according to a ceiling-type air-conditioner indoor unit system in the disclosure, an indoor unit 10 is provided in a ceiling 20. The system further comprises: a return air inlet 30, provided on a side surface of the ceiling; and an air outlet 40, provided on a bottom surface of the ceiling 20. A closeable return air inlet apparatus 31 is provided at the return air inlet 30, and a closeable air outlet apparatus 41 is provided at the air outlet 40. A air outlet direction of the air outlet is arranged to face the ground, so that hot air can be supplied to the lowest position in a room, the thermal comfort of the room is good, the width of the ceiling 20 is reduced, the space is saved, much decoration space is reserved, and diversified demands are met.

[0024] As shown in Fig. 1 to Fig. 5, the indoor unit 10 has the most important features that air is output downwardly; the air outlet 40 of the indoor unit 10 is connected to the lower side of the ceiling 20 to form an air duct, a connection mode may be an air duct flexible connection mode, or an air pipe specially configured to connect the air outlet 40 of the indoor unit 10 and an air port is designed and manufactured mainly in accordance with the sizes of the air outlet 40 of the indoor unit 10 and the air port; one end of the air pipe is connected to the air outlet 40 of the indoor unit 10, and the other end of the air pipe can be connected to a ceiling and communicated with the air port, or the air duct is connected to a side, close to the indoor unit 10, of the air port; under the two situations, the size of the ceiling 20 will be relatively large; and in order to lower the ceiling 20, a mode of providing soft sponge between the indoor unit 10 and the air port is also invented to achieve sealing, and the soft sponge can be replaced with other soft materials. Components of the air outlet 40 can be fixed to the ceiling by using screws, can be fixed to the ceiling by using clips, can be fixed to the ceiling by the combination of the screws and the clips or can be fixed to the indoor unit 10. When a size difference is larger, the height of the indoor unit 10 can be adjusted by adjusting a lead screw which using lifting the indoor unit 10 at the position of the return air inlet 30 to achieve a needed size, and sealing sponge between the indoor unit 10 and the air outlet 40 also has a tiny height adjustment ability.

[0025] As shown in Fig. 1 to Fig. 5, the return air inlet 30 of the indoor unit 10 is provided on the side surface of the indoor unit 10 and matched with an opening in the side surface of the ceiling 20 to form the return air inlet 30, an air duct for connection can be provided between the return air inlet 30 of the ceiling and the return air inlet 30 of the indoor unit 10, and therefore it can be guaranteed that air is returned only from the position of the return air inlet 30 provided herein; when the partial ceiling 20 is well sealed, the air can be returned without the arrangement of the air duct; when the indoor unit 10 operates, a centrifugal fan of the indoor unit 10 acts, and a negative pressure is formed at the return air inlet 30; and other parts of the partial ceiling 20, except the return air inlet 30, are sealed, and only the return air inlet 30 is not sealed, so that an air duct flow field is formed between the return air inlet 30 of the indoor unit 10 and the return air inlet 30 of the ceiling naturally by means of a pressure difference. Components of the return air inlet 30 are fixed to the ceiling ordinarily. When the sizes of the ceiling and the air port are quite accurate, the components can also

be fixed to the indoor unit 10.

[0026] As shown in Fig. 1 to Fig. 5, the closeable return air inlet apparatus 31 is provided at the return air inlet 30. The closeable air outlet apparatus 41 is provided at the air outlet 40. Thus, insects and dust can be prevented from entering the indoor unit 10 when the indoor unit 10 is closed. The return air inlet 30 may be colsed in a single-panel type, a single panel is opened or closed by rotation, and the rotation of the panel is achieved by the associated movement of a connecting rod and a push rod. The return air inlet apparatus 31 and the air outlet apparatus 41 can be closed and opened by the rotation of a plurality of air guide blades. The air outlet 40 can be designed to have a single air guide blade. When the indoor unit 10 works, the blade extends out, and an air guide function is achieved by the rotation of the guide blade.

[0027] As shown in Fig. 1 to Fig. 7, the air outlet apparatus 41 comprises an air output apparatus 411 and an air guide portion 412 movably sleeved inside the air output apparatus in a vertical direction. The air guide portion 412 comprises a side wall 4120, and a first air outlet 4121 is formed at the bottom of the air guide portion 412. The first air outlet 4121 and a second air outlet 4122 are provided on the air outlet apparatus 41. The first air outlet 40 is provided with an air guide blade 42, or the first air outlet 40 is provided with a plurality of air guide blades 42. In order to solve the problem that air blown from the indoor unit 10 makes people feel uncomfortable, the air outlet apparatus 41 is provided with double lift-type air outlets namely the first air outlet 4121 and the second air outlet 4122, which can be controlled to be closed and opened or can be partially closed or opened. The first air outlet 4121 can be closed and opened by the rotation of a plurality of air guide blades. The second air outlet 4122 can be closed and opened by lifting, is opened during stretching, and is closed during retraction. The second air outlet 4122 can be unidirectional or multidirectional.

[0028] An evaporator is provided at a return air inlet of an inner cavity of the indoor unit 10 and is detachably provided in the indoor unit 10. The return air inlet of the inner cavity of the indoor unit 10 is configured to enable the evaporator to enter or exit from the inner cavity of the indoor unit 10. The indoor unit comprises a shell, the evaporator and a fixing assembly. The shell is provided with an inner shell cavity, an air outlet and the return air inlet. The evaporator is provided in the inner shell cavity and is located at the return air inlet. The fixing assembly detachably fixes the evaporator to the interior of the shell. The return air inlet is configured to enable the evaporator to enter or exit from the inner shell cavity, and the fixing assembly is configured to be suitable for operating from the return air inlet. By means of a structure of configuring the return air inlet to enable the evaporator to enter or exit from the inner shell cavity and configuring the fixing assembly to be suitable for operating from the return air inlet, an operator can disassemble the fixing assembly by means of the return air inlet, so that the evaporator provided at the return air inlet can be taken out, and an internal assembly of the air conditioner is maintained. Furthermore, service ports in the prior art can be saved, thereby achieving the aim of improving the overall appearance effect.

[0029] As shown in Fig. 1 to Fig. 4, the indoor unit may be provided with a cross flow fan or a centrifugal fan. The cross flow fan is designed to be in an air suction type, and the centrifugal fan may be designed to be in an air blowing type or an air suction type. Preferably, the cross flow fan is adopted for the indoor unit 10. The indoor unit is provided with a V-shaped evaporator matched with the cross flow fan. The size of the ceiling 20 needed by the indoor unit 10 is small due to the fact that the size of the indoor unit 10 is small and a connecting size between the air outlet 40 and the indoor unit 10 is small. A traditional fan adopts the centrifugal fan, the size of the centrifugal fan is relatively large to achieve the needed air volume of the indoor unit 10, and centrifugal air output is intermittent. In order to more uniformly exchange hot air on the evaporator, it is necessary to reserve a certain uniform air outlet diffusion region between a fan outlet and the evaporator. The newly designed indoor unit 10 is provided with the cross flow fan and the V-shaped evaporator, the cross flow fan achieves the same air volume, the size of the fan is relatively small, the air volume of the cross flow fan is continuous, an air volume diffusion mixed region is not needed, the cross flow fan matchs with a V-shaped opening of the evaporator, and the size of the indoor unit 10 can be reduced.

[0030] As shown in Fig. 9 and Fig. 10, the indoor unit 10 is provided with the cross flow fan, comprising a volute and a fan blade 11. In a longitudinal section of the cross flow fan, a volute profile 12 of the volute comprises: a circular arc segment 121, provided at an air inlet of the fan; and a helix segment 122, smoothly connected to the circular arc segment and extending towards an air outlet direction of the fan, the helix segment and the circular arc segment being tangent to a first connecting point B. The volute profile further comprises a straight-line segment 123, provided at an air outlet of the cross flow fan, the straight-line segment 123 and the helix segment 122 being tangent to a second connecting point A. The cross flow fan comprises the volute and the fan blade 11. In the longitudinal section of the fan, the volute profile 12 of the volute comprises: the circular arc segment 121, the helix segment 122 and the straight-line segment 123, wherein the circular arc segment 121 is provided at the air inlet of the fan. The helix segment 122 is smoothly connected to the circular arc segment 121. The straight-line segment 123 is provided at the air outlet of the fan and is smoothly connected to one end, away from the circular arc segment 121, of the helix segment 122.

[0031] By smoothly connecting the circular arc segment 121, the helix segment 122 and the straight-line segment 123 at each connecting point, the size of a sudden change structure generated at a joint can be reduced, or even the sudden change structure can be avoided, so that airflow can be prevented from eddying when flowing

through the joint, and a ratio of the air volume of the fan to the noise is enabled to meet design requirements.

[0032] Preferably, the helix segment 122 and the circular arc segment 121 are tangent to the first connecting point B. The straight-line segment 123 and the helix segment 122 are tangent to the second connecting point A. The three segments are connected end to end to form a smooth airflow guide line, and therefore a turbulent flow is not easily generated when the airflow is flowing, thereby achieving the aim of noise reduction.

[0033] It is important to note that the helix segment 122 plays a role in fitting with the fan blade 11 to form a uniform outlet air containing space. The straight-line segment 123 is designed due to the fact that the fan blade 11 is no longer effective after the airflow passes through the helix segment 122, so it is necessary to design the straight-line segment 123 to guide the airflow to steadily flow out. The effects of the circular arc segment 121 are as follows. The helix segment 122 and the straight-line segment 123 of the fan belong to an air outlet segment, an air inlet segment corresponds to the air outlet segment, and an intersection point of the air inlet segment and the air outlet segment is a point closest to the fan blade 11 and also serves as a boundary point of air inlet and air outlet. In order to allow the entry of more streams of airflow in the air inlet segment in the embodiment of the disclosure, the circular arc segment 121 is designed to be of a reverse circular arc structure, namely the circular arc segment 121 bends and extends towards a direction away from the fan blade 11. Certainly, in order to widen the application range of the fan, the circular arc segment can be designed as some other smoothly transitional curves.

[0034] As shown in Fig. 1 to Fig. 4, a sealing material 50 is provided at a joint of the indoor unit and the air outlet 40. The fit dimension of the indoor unit 10 and the air port can be reduced by means of sponge since it is difficult to guarantee the avoidance of air leakage when two hard objects are connected. The surface of the air outlet 40 of the newly designed indoor unit 10 is a plane, and the aligned connection of the air port and the air duct can be realized conveniently by sponge-based flexible connection. Compared with a traditional flexibly connected air duct, the ceiling 20 occupies a smaller space.

[0035] As shown in Fig. 1, when the indoor unit 10 does not work, the air port can be closed, insects and dust can be prevented from entering the indoor unit 10, and therefore the reliability of the indoor unit 10 is effectively improved.

[0036] From the above descriptions, it can be seen that the embodiment of the disclosure achieves the technical effects as follows.

[0037] The air outlet direction of the air outlet is set to face the ground, so that the hot air can be supplied to the lowest position in the room, and the thermal comfort of the room is good. When the unit is shut down, the air port is closed, the insects and the dust cannot enter the unit, and therefore the reliability of the unit is high. The size of the unit is smaller, the space is saved, much decoration space is reserved, and the diversified demands are met.

[0038] The above is only the preferred embodiments of the disclosure, and is not intended to limit the disclosure. There can be various modifications and variations in the disclosure for those skilled in the art. Any modifications, equivalent replacements, improvements and the like within the spirit and principle of the disclosure shall fall within the protection scope of the disclosure.

Claims

1. A ceiling-type air-conditioner indoor unit system, wherein, an indoor unit (10) being provided in a ceiling (20), the system further comprising:

   a return air inlet (30), provided on a side surface of the ceiling; and
   an air outlet (40), provided on a bottom surface of the ceiling (20),
   a closeable return air inlet apparatus (31) is provided at the return air inlet (30), and a closeable air outlet apparatus (41) is provided at the air outlet (40).

2. The ceiling-type air-conditioner indoor unit system according to claim 1, wherein the air outlet apparatus (41) comprises an air output apparatus (411) and an air guide portion (412) movably sleeved inside the air output apparatus in a vertical direction.

3. The ceiling-type air-conditioner indoor unit system according to claim 2, wherein the air guide portion (412) comprises a side wall (4120), and a first air outlet (4121) is formed at the bottom of the air guide portion (412).

4. The ceiling-type air-conditioner indoor unit system according to claim 3, wherein the air guide portion (412) further comprises a second air outlet (4122), provided on the side wall (4120); when the air guide portion (412) retracts into the air output apparatus (411), the second air outlet (4122) is closed; and when the air guide portion (412) extends out of the air output apparatus (411), the second air outlet (4122) is opened.

5. The ceiling-type air-conditioner indoor unit system according to claim 4, wherein the side wall (4120) comprises two first side walls which are provided oppositely and two second side walls which are provided between the two first side walls, and the second air outlet (4122) is provided on at least one of the two first side walls.

6. The ceiling-type air-conditioner indoor unit system according to claim 2, wherein a first air outlet (4121)

and a second air outlet (4122) independent of each other are provided on the air guide portion (412).

7. The ceiling-type air-conditioner indoor unit system according to any one of claims 3 to 6, wherein the first air outlet (4121) is provided with an air guide blade (42), and when the air guide blade (42) is closed, the first air outlet (4121) is able to be closed by the air guide blade.

8. The ceiling-type air-conditioner indoor unit system according to any one of claims 3 to 6, wherein the first air outlet (4121) is provided with a plurality of air guide blades (42), and when the air guide blades (42) are closed, the first air outlet (4121) is able to be closed by the air guide blades (42).

9. The ceiling-type air-conditioner indoor unit system according to claim 1, wherein the indoor unit (10) is provided with a cross flow fan, comprising a volute and a fan blade (11); and in a longitudinal section of the cross flow fan, a volute profile (12) of the volute comprises: a circular arc segment (121), provided at an air inlet of the cross flow fan; and a helix segment (122), smoothly connected to the circular arc segment and extending towards an air outlet direction of the cross flow fan, the helix segment and the circular arc segment being tangent to a first connecting point B.

10. The ceiling-type air-conditioner indoor unit system according to claim 9, wherein the volute profile further comprises a straight-line segment (123), provided at an air outlet of the cross flow fan, the straight-line segment (123) and the helix segment (122) being tangent to a second connecting point A.

11. The ceiling-type air-conditioner indoor unit system according to claim 1, wherein an evaporator is provided at a return air inlet of an inner cavity of the indoor unit (10) and is detachably provided in the indoor unit (10); and the return air inlet of the inner cavity of the indoor unit (10) is configured to enable the evaporator to enter or exit from the inner cavity of the indoor unit (10).

12. The ceiling-type air-conditioner indoor unit system according to claim 1, wherein the indoor unit (10) is provided with a centrifugal fan and a V-shaped evaporator matched with the centrifugal fan.

13. The ceiling-type air-conditioner indoor unit system according to claim 1, wherein a sealing material (50) is provided at a joint of the indoor unit and the air outlet (40).

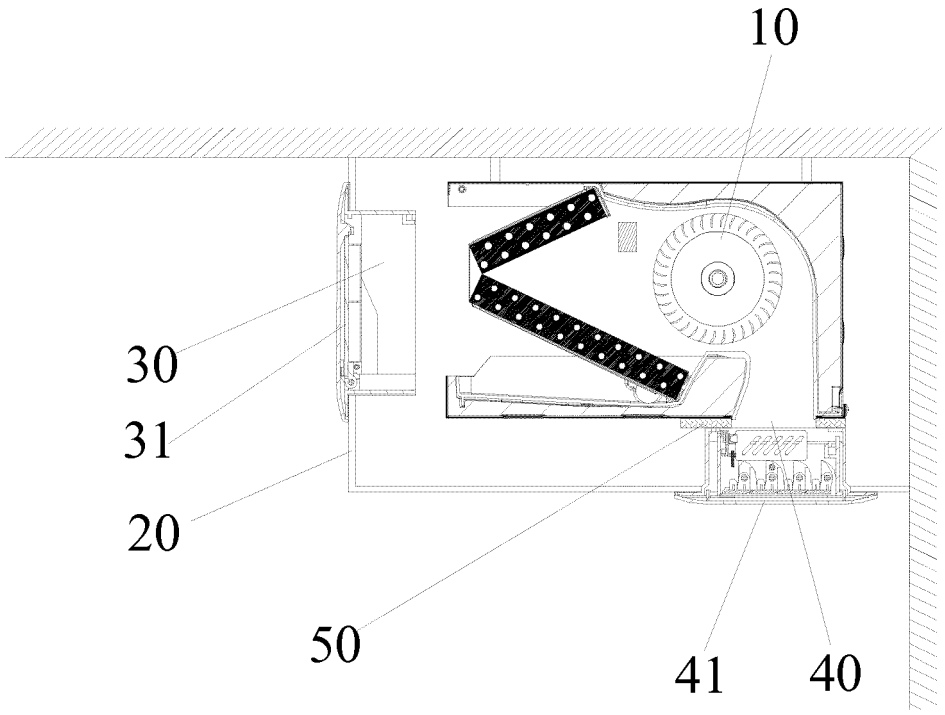

Fig. 1

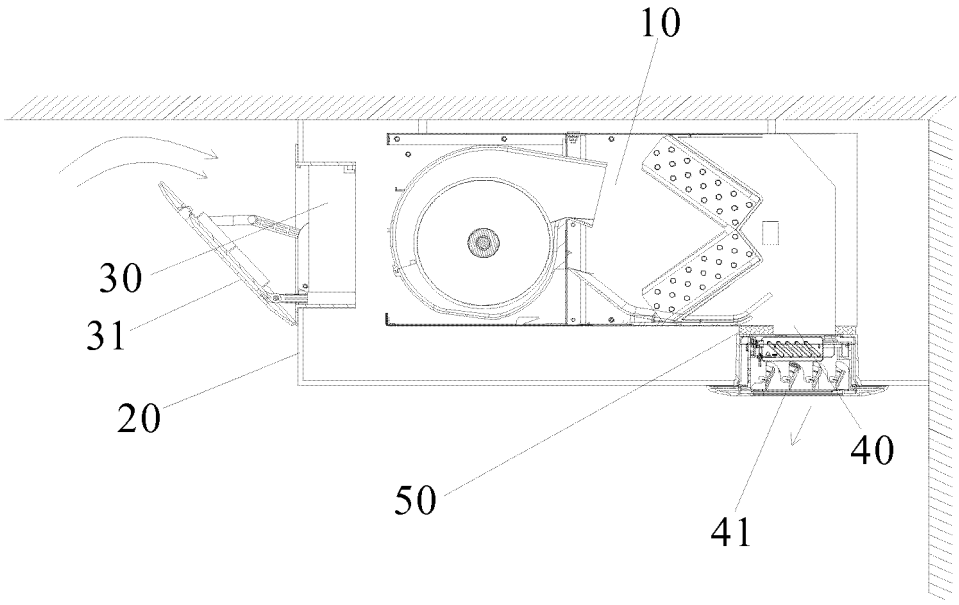

Fig. 2

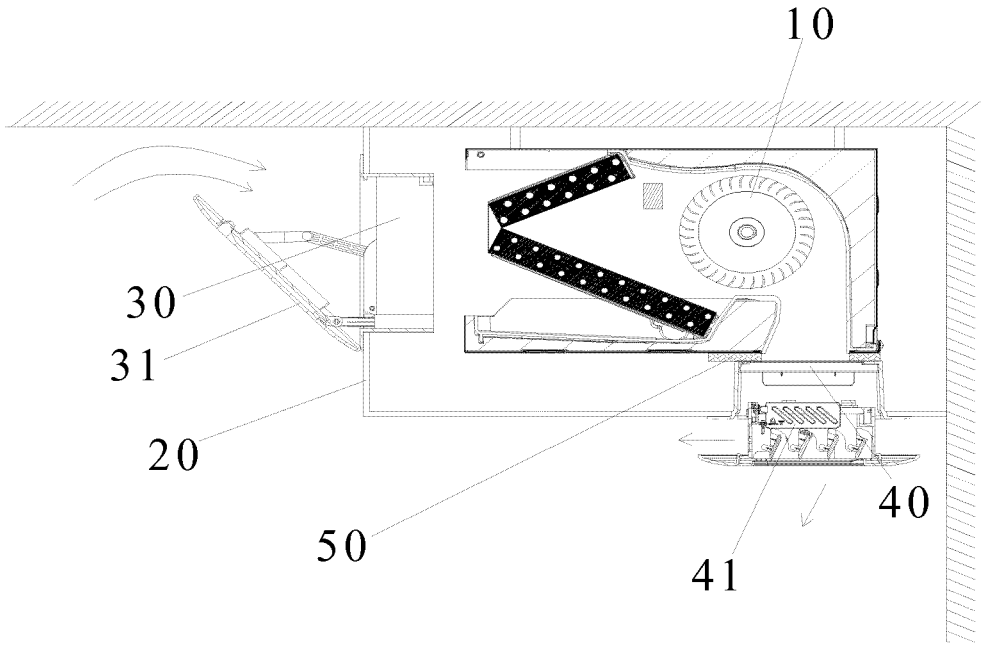

Fig. 3

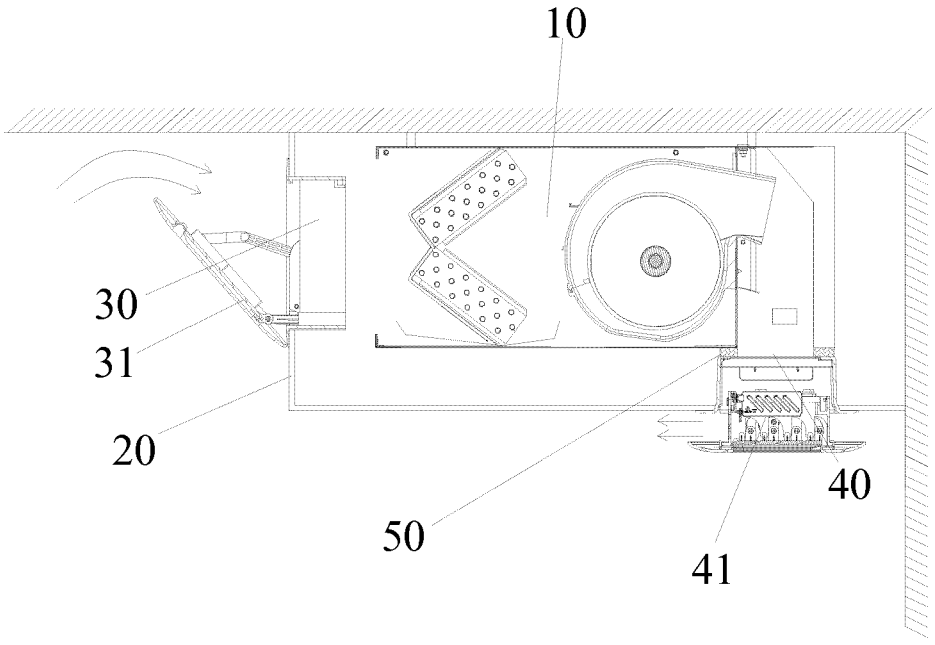

Fig. 4

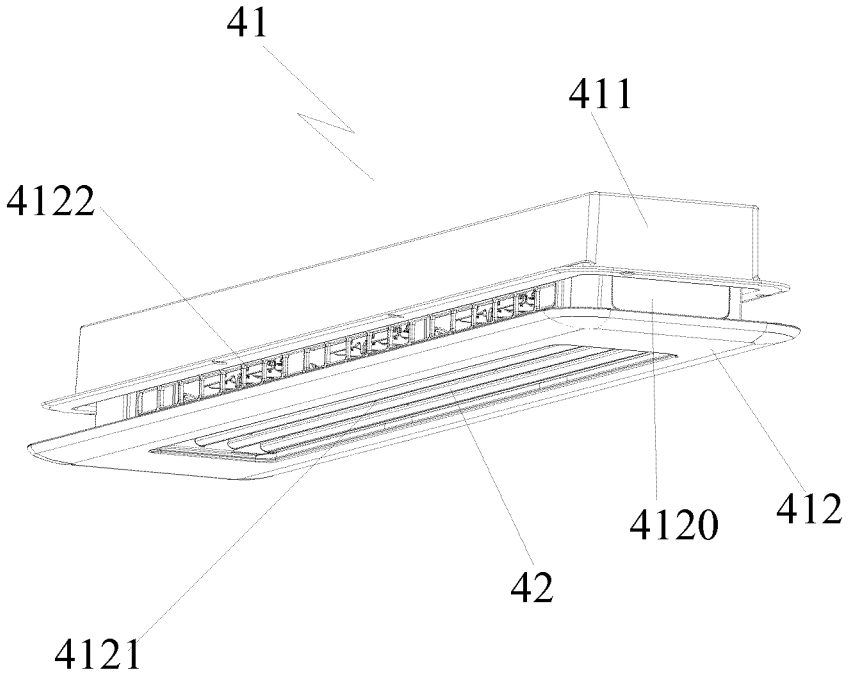

Fig. 5

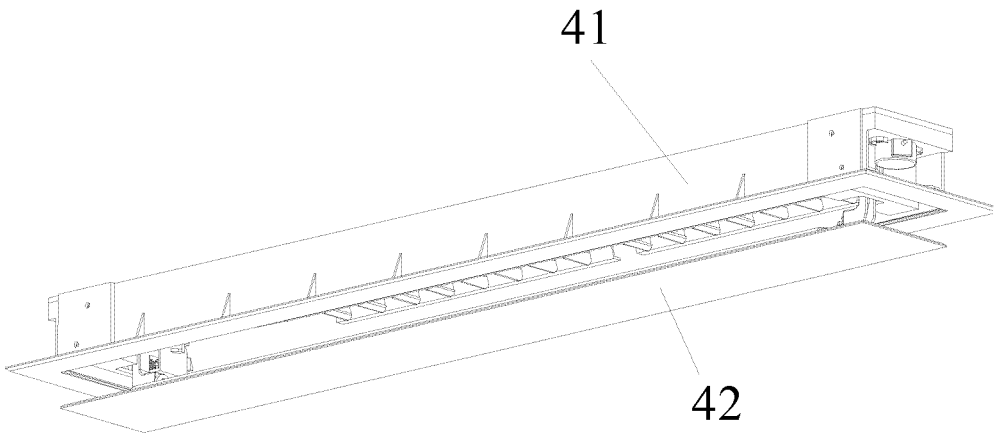

Fig. 6

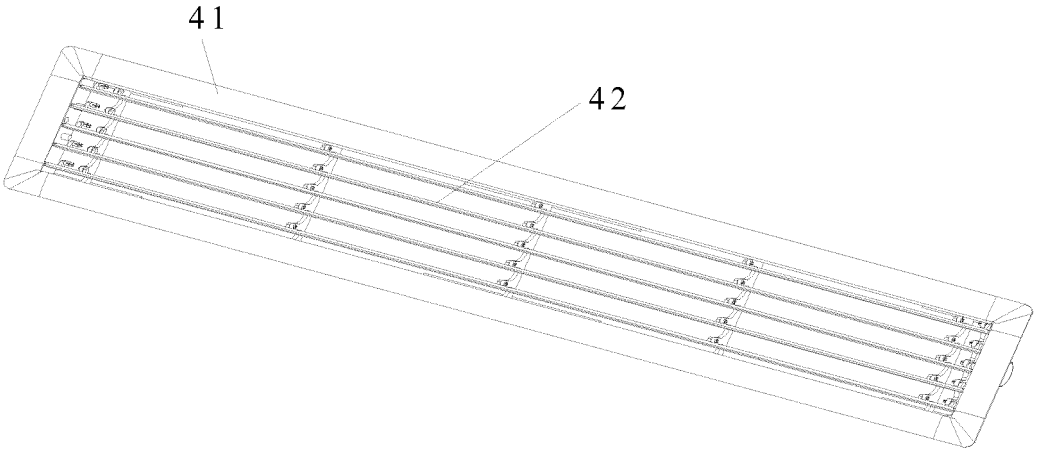

Fig. 7

Fig. 8

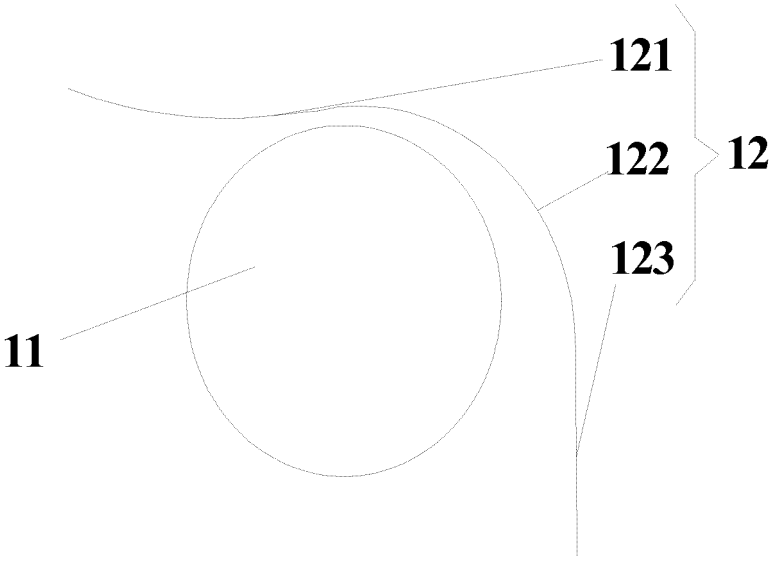

Fig. 9

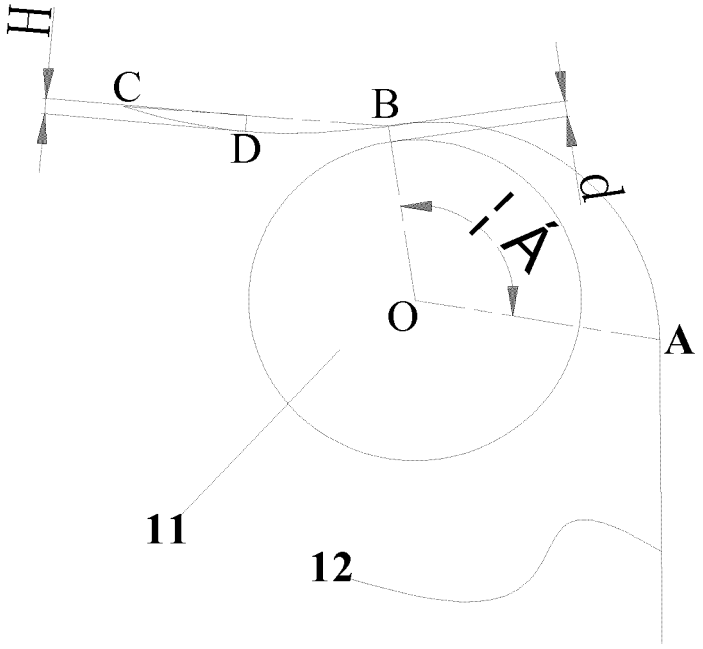

Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/082646

A. CLASSIFICATION OF SUBJECT MATTER

F24F 1/00 (2011.01) i; F24F 13/06 (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)

IPC: F24F 1; F24F 13

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)

CPRS, CNKI: air conditioning, ceiling, overhead, lifting, cross-flow fan, turbine housing, arc, spiral, segmental arc, arc-shaped, outlet, outlet air, air blow

EPODOC, WPI: air condition+, ceiling, lift+, elevat+, up, down, arc, curve, spiral, helix, outlet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JPS 5050248 U (TAKASAGO NETSUGAKU KOGYO KK), 16 May 1975 (16.05.1975), description, page 1, 7th line from the bottom to page 4, line 10, and figures 1-5	1-13
Y	CN 202993382 U (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI), 12 June 2013 (12.06.2013), description, paragraph 0029, and figure 3	1-13
Y	KR 20120017876 A (HUI, S.P. et al.), 29 February 2012 (29.02.2012), description, paragraphs 0011-0034, and figures 1-2	2-8
Y	CN 102969645 A (ACADEMY OF OPTO-ELECTRONICS, CHINESE ACADEMY OF SCIENCES), 13 March 2013 (13.03.2013), description, paragraphs 0042-0043, and figure 3	9-10
PX	CN 203586407 U (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI), 07 May 2014 (07.05.2014), the whole document	1-13
A	CN 101464040 A (LG ELECTRONICS (TIANJIN) APPLIANCES CO., LTD.), 24 June 2009 (24.06.2009), the whole document	1-13
A	CN 202141141 U (XUAN, Bomin), 08 February 2012 (08.02.2012), the whole document	1-13

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 September 2014 (15.09.2014)	**30 September 2014 (30.09.2014)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **ZHONG, Dehui** Telephone No.: (86-10) **62084834**

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/082646

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 202131789 U (ZHEJIANG TRAFFIC FACILITIES CO., LTD.), 01 February 2012 (01.02.2012), the whole document	1-13
A	JP 2000274728 A (SANYO ELECTRIC CO., LTD.), 06 October 2000 (06.10.2000), the whole document	1-13
A	JPS 60194239 A (SANYO ELECTRIC CO. et al.), 02 October 1985 (02.10.1985), the whole document	1-13
A	US 5595068 A (CARRIER CORP.), 21 January 1997 (21.01.1997), the whole document	1-13

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/082646

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
JPS 5050248 U	16 May 1975	None	
CN 202993382 U	12 June 2013	None	
KR 20120017876 A	29 February 2012	KR 101161153 B1	11 July 2012
CN 102969645 A	13 March 2013	WO 2014079174 A1	30 May 2014
CN 203586407 U	07 May 2014	None	
CN 101464040 A	24 June 2009	None	
CN 202141141 U	08 February 2012	None	
CN 202131789 U	01 February 2012	None	
JP 2000274728 A	06 October 2000	JP 3842920 B2	08 November 2006
JP S60194239 A	02 October 1985	None	
US 5595068 A	21 January 1997	JP H09210455 A	12 August 1997
		JP 2898607 B2	02 June 1999
		EP 0779478 A2	18 June 1997
		EP 0779478 A3	10 December 1997
		EP 0779478 B1	26 February 2003
		DE 69626364 T2	04 December 2003
		ES 2192601 T3	16 October 2003

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