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(54) **FRESH AIR PLENUM MODULE FOR A FAN COIL UNIT**

(57) A fresh air plenum module (10) for attachment to a fan coil unit (12) for introducing air from an outdoor setting, wherein the fresh air plenum module comprises: a first inlet (14) for connection to an outlet (24) of the fan coil unit; a second inlet (16) for connection to an air handling unit; an outlet (18) for discharge of the outdoor air and the conditioned air; and a merging volume (20) in

communication with the first inlet, the second inlet and the outlet; wherein, in use, a flow of the outdoor air from the second inlet through the merging volume to the outlet generates a pressure gradient which induces a flow of air through the first inlet and into the fresh air plenum module from the fan coil unit.

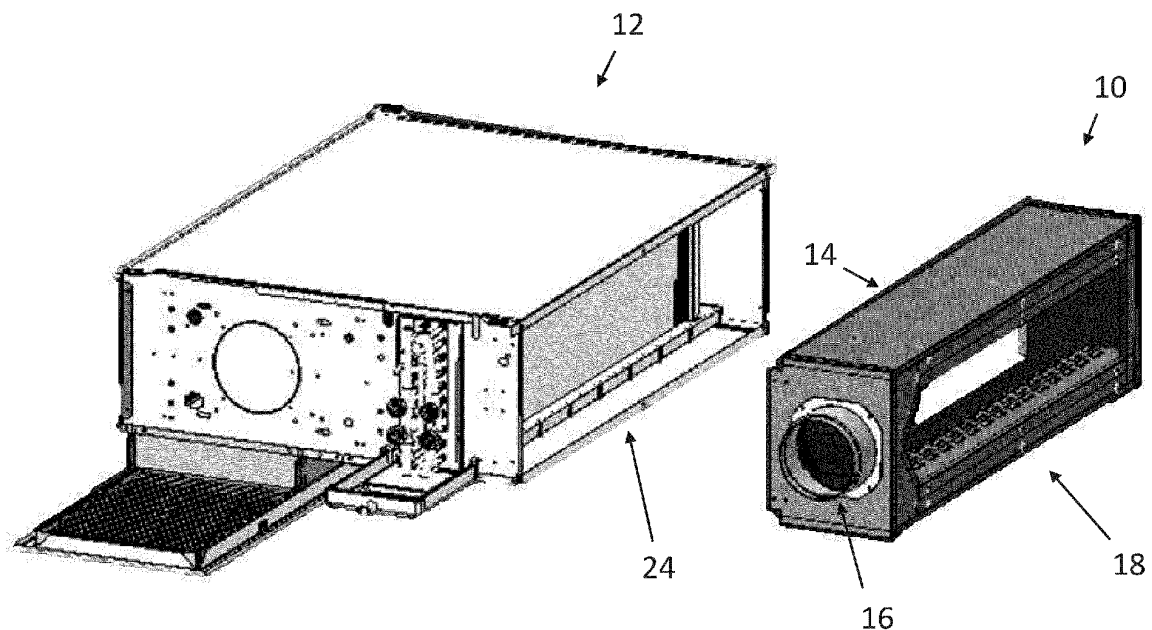


Fig. 1

Description

[0001] The present invention relates to a fresh air plenum module for the introduction of fresh air into an indoor setting, where the fresh air plenum module is for fitting to a fan coil unit. It also relates to a corresponding method of operating a system comprising a fan coil unit fitted with a fresh air plenum module.

[0002] Conventionally, air handling units (AHUs) and the like are responsible for the distribution of fresh air within a commercial or industrial building such as a hotel or office.

[0003] For example, an AHU takes fresh ambient air from outside (e.g. outdoors) and distributes it to one or more rooms inside of the building (e.g. indoors) via one or more ducts. One or more of these rooms may each comprise a fan coil unit (FCU) responsible for conditioning (e.g. heating and/or cooling) the air in its associated room.

[0004] A typical FCU comprises a heat exchanger coil and a fan. The coil is configured to receive hot or cold fluid from a central plant, and the fan is configured to blow or draw air from the room through the coil so that heat can be exchanged between the air flow and the fluid in the coil.

[0005] It would be beneficial if the flow of fresh ambient air that is introduced into a room of a building could be utilised to improve the efficiency of operation of a FCU located in said room.

[0006] According to a first aspect of the invention, there is provided a fresh air plenum module for attachment to a fan coil unit for introducing air from an outdoor setting, wherein the fresh air plenum module comprises: a first inlet for connection to an outlet of the fan coil unit; a second inlet for connection to an air handling unit; an outlet for discharge of the outdoor air and the conditioned air; and a merging volume in communication with the first inlet, the second inlet and the outlet; wherein, in use, a flow of the outdoor air from the second inlet through the merging volume to the outlet generates a pressure gradient which induces a flow of conditioned air through the first inlet and into the fresh air plenum module from the fan coil unit.

[0007] With the above fresh air plenum module it is possible to easily modify a pre-existing fan coil unit to add a fresh (outdoor) air injection capability where the injection of fresh air induces an increase in the flow of conditioned air through the fan coil unit. Thus, upon new installation or as a retrofit for previously installed fan coil units it becomes possible to add in the proposed fresh air plenum module to thereby introduce a fresh air induction function to the system, which improves the efficiency of the operation of the fan coil unit (when the fan is operated) and also provides a new mode of operation of the fan coil unit (wherein the fan is not operated) which allows the system to provide some air conditioning at a greatly reduced energy consumption.

[0008] The flow of outdoor air through the merging vol-

ume causes a drop in static pressure in the merging volume. This decrease in pressure, e.g. generating a negative (gauge) pressure, in the merging volume relative to the pressure in the fan coil unit causes air to be pulled passively from the fan coil unit, through the first inlet and into the fresh air plenum module. Thus, the flow of outdoor air through the merging volume induces an airflow through the fan coil unit.

[0009] The fresh air plenum module is considered to be a new air plenum module, in that it is configured/suitable for introducing new air into a fan coil unit system and/or its environment, the new air being fresh/outdoor air.

[0010] On the other hand, conditioned air is air from the environment (e.g. indoors, hotel room) that has passed through the coil of the fan coil unit (so that heat can be exchanged between the air flow and the fluid in the coil).

[0011] In some implementations the fresh air plenum module is advantageously configured to induce a flow of conditioned air through the fan coil unit at an air flow rate of between 20% and 300% of the air flow rate through the second inlet (e.g. the maximum air flow rate that can be generated by an AHU).

[0012] The fresh air plenum module may comprise at least one nozzle fluidly connected to the second inlet for injecting the outdoor air into the merging volume.

[0013] The fresh air plenum module may comprise a first plenum compartment connected to the second inlet and configured to supply outdoor air to at least one first nozzle; and a second plenum compartment connected to the second inlet and configured to supply outdoor air to at least one second nozzle.

[0014] The first plenum compartment may be located on a first internal side of the fresh air plenum module; and the second plenum compartment may be located on a second internal side of the fresh air plenum module; wherein the first internal side and the second internal side are in a facing spaced relationship.

[0015] The second inlet may be configured to divide the outdoor air flow from the air handling unit equally between the first plenum compartment and the second plenum compartment.

[0016] The second inlet may be configured to direct more than half of the outdoor airflow from the air handling unit to the first plenum compartment.

[0017] The second inlet may be configured to direct more than half of the outdoor airflow from the air handling unit to the second plenum compartment.

[0018] A volume of the first plenum compartment may be the same as a volume of the second plenum compartment.

[0019] A volume of the first plenum compartment may be greater than a volume of the second plenum compartment.

[0020] A volume of the second plenum compartment may be greater than a volume of the first plenum compartment.

[0021] A width of the or each first nozzle may be the same as a width of the outlet.

[0022] A width of the or each second nozzle may be the same as a width of the outlet.

[0023] The shape of the or each first nozzle may be rectangular or semi-circular.

[0024] The shape of the or each second nozzle may be rectangular or semi-circular.

[0025] The shape of the or each first nozzle and/or the shape of the or each second nozzle may be configured to induce a flow of air at a predetermined air flow rate.

[0026] The shape of the or each first nozzle may be the same as the shape of the or each second nozzle.

[0027] The shape of the or each first nozzle may be different from the shape of the or each second nozzle.

[0028] The at least one first nozzle may be a first set of nozzles; and the at least one second nozzle may be a second set of nozzles.

[0029] The first set of nozzles may comprise more nozzles than the second set of nozzles.

[0030] The second set of nozzles may comprise more nozzles than the first set of nozzles.

[0031] The first set of nozzles may comprise a plurality of nozzles distributed in a straight line facing the outlet.

[0032] The first set of nozzles may comprise a plurality of nozzles distributed in a plurality of straight lines facing the outlet.

[0033] Where the first set of nozzles is distributed in a plurality of straight lines, the nozzles in one line may be offset from the nozzles in adjacent line(s).

[0034] The second set of nozzles may comprise a plurality of nozzles distributed in a straight line facing the outlet.

[0035] The second set of nozzles may comprise a plurality of nozzles distributed in a plurality of straight lines facing the outlet.

[0036] Where the second set of nozzles is distributed in a plurality of straight lines, the nozzles in one line may be offset from the nozzles in adjacent line(s).

[0037] The arrangement of the first set of nozzles and/or the arrangement of the second set of nozzles may be configured to suit the target FCU.

[0038] The arrangement of the first set of nozzles and/or the arrangement of the second set of nozzles may be configured to induce a flow of air at a predetermined air flow rate.

[0039] The arrangement of the first set of nozzles and/or the arrangement of the second set of nozzles may be configured to maintain a predetermined pressure in the first plenum compartment and/or the second plenum compartment, respectively.

[0040] The nozzle wall of the first plenum compartment may comprise a curved portion.

[0041] The nozzle wall of the first plenum compartment may comprise a straight portion, and an angle between the straight portion and the first internal side of the fresh air plenum module is less than 60 degrees, preferably less than 30 degrees.

[0042] The nozzle wall of the second plenum compartment may comprise a curved portion.

[0043] The nozzle wall of the second plenum compartment may comprise a straight portion, and an angle between the straight portion and the second internal side of the fresh air plenum module is less than 60 degrees, preferably less than 30 degrees.

[0044] According to a second aspect of the invention, there is provided a system comprising the fresh air plenum module according to the first aspect and a fan coil unit, wherein the first inlet of the fresh air plenum module is coupled to the outlet of the fan coil unit.

[0045] The system may comprise an air handling unit, wherein the second inlet of the fresh air plenum module is connected to the outlet of the air handling unit.

[0046] The fan coil unit may have a controller configured to independently operate the coil of the fan coil unit and the fan of the fan coil unit.

[0047] The controller may be configured to operate the system in an induction mode.

[0048] The induction mode may be defined in that: the coil of the fan coil unit is operated and the fan of the fan coil unit is not operated, and wherein the flow of conditioned air through the fan coil unit is induced by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module.

[0049] The controller may be configured to operate the system in a boost mode.

[0050] The boost mode may be defined in that: the coil of the fan coil unit is operated and the fan of the fan coil unit is operated, and wherein the flow of conditioned air through the fan coil unit is provided by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module and the operation of the fan.

[0051] The controller may be configured to operate the system in an eco mode.

[0052] The eco mode may be defined in that: the coil of the fan coil unit is not operated and the fan of the fan coil unit is not operated, and wherein the flow of outdoor air through the fresh air plenum module generates a pressure gradient which induces a flow of air through the fan coil unit.

[0053] It is thus apparent that the 'eco mode' is a mode of operation wherein the fan coil unit is turned off and/or consuming no (or at least low) power. Accordingly, 'eco mode' as used herein can also be taken to mean economy mode', or 'green mode'.

[0054] According to a third aspect, there is provided a method of installation of a fresh air plenum module or system according to the first or second aspect, the method comprising: providing the fresh air plenum module; fitting the first inlet of the fresh air plenum module to the outlet of a fan coil unit; and connecting the second inlet of the fresh air plenum module to the outlet of an air handling system.

[0055] According to a fourth aspect, there is provided a method of operating a system according to the second aspect, the method comprising operating the system in

an induction mode, the induction mode comprising: providing outdoor air to the second inlet of the fresh air plenum module; operating a coil of the fan coil unit; and not operating a fan of the fan coil unit; wherein the flow of conditioned air through the fan coil unit is induced by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module.

[0056] The method may comprise operating the system in a boost mode, the boost mode comprising: providing outdoor air to the second inlet of the fresh air plenum module; operating the coil of the fan coil unit; and operating the fan of the fan coil unit; wherein the flow of conditioned air through the fan coil unit is provided by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module and the operation of the fan.

[0057] The method may comprise operating the system in an eco mode, the eco mode comprising: providing outdoor air to the second inlet of the fresh air plenum module; not operating a coil of the fan coil unit; and not operating a fan of the fan coil unit; wherein the pressure gradient generated by the flow of outdoor air through the fresh air plenum module induces a flow of air through the fan coil unit.

[0058] The present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a fresh air plenum module and a fan coil unit;

Figure 2 shows the fresh air plenum module of Figure 1 connected to the fan coil unit of Figure 1;

Figure 3 shows a cross-sectional side view of the system of Figure 2;

Figure 4 shows a cross-sectional front view of the fresh air plenum module of Figures 1 and 2 without the fan coil unit; and

Figure 5 shows a perspective view of another fresh air plenum module .

[0059] Figure 1 shows a fresh air plenum module 10 and a fan coil unit 12, and Figures 2 and 3 show a system comprising the fresh air plenum module 10 coupled to the fan coil unit 12. This connection can be done as a modification to a system with a pre-existing fan coil unit 12 to provide an added air injection capability, or it can be done along with installation of the fan coil unit 12. The fresh air plenum module 10 is for introducing a flow of fresh air from an outdoor setting to induce a flow of (conditioned) air through the fan coil unit which improves the efficiency of the operation of the fan coil unit (when the fan is operated) and also provides a new mode of operation of the fan coil unit (wherein the fan is not operated), the new mode allowing the system to provide a small amount of air conditioning at a greatly reduced energy consumption.

[0060] The fresh air plenum module comprises a first inlet 14 for connection to an outlet 24 of the fan coil unit

12, a second inlet 16 for connection to an air handling unit (not shown), an outlet 18 for discharge of the outdoor air and the conditioned air, and a merging volume 20 in communication with the first inlet 14, the second inlet 16 and the outlet 18.

[0061] Figures 3 and 4 show further detail of the fan coil unit 12 and fresh air plenum module 10.

[0062] The fan coil unit 12 comprises an inlet 22, the outlet 24, a fan 26 and a heat exchanger coil 28. The coil 28 is configured to receive hot or cold fluid from a central source (not shown), and the fan 26 is configured to blow/draw air from the room through the coil 28 so that heat can be exchanged between the air flow and the fluid in the coil 28. The fan coil unit 12 also comprises a controller (not shown) which is able to operate the fan 26 and the coil 28 separately and independently of each other.

[0063] In particular, the fresh air plenum module 10 comprises a first plenum compartment 30a and a second plenum compartment 30b. The first plenum compartment 30a and the second plenum compartment 30b are connected to the second inlet 16 such that outdoor air is able to flow from the second inlet 16 into either the first plenum compartment 30a and the second plenum compartment 30b.

[0064] In this example, the first plenum compartment 30a is located on a first internal side of the fresh air plenum module 10, the first internal side being a top side of the fresh air plenum module 10. The second plenum compartment 30b is located on a second internal side of the fresh air plenum module 10, the second internal side being a bottom side of the fresh air plenum module 10. Accordingly, the first internal side and the second internal side are in a facing spaced relationship. The first plenum compartment 30a and second plenum compartment 30b extend along the whole width of the first internal side and the second internal side respectively.

[0065] In this example, the volume of the first plenum compartment 30a is the same as the volume of the second plenum compartment 30b. However, the volume of the first plenum compartment 30a may be greater than the volume of the second plenum compartment 30b or the volume of the second plenum compartment 30b may be greater than the volume of the first plenum compartment 30a.

[0066] The fresh air plenum module 10 comprises an air divider 32 configured to distribute the outdoor air flow from the second inlet 16 between the first plenum compartment 30a and the second plenum compartment 30b. In this example the air divider 32 is configured to distribute the outdoor air flow from the second inlet 16 equally between the first plenum compartment 30a and the second plenum compartment 30b, but the air divider 32 may be configured to distribute the outdoor air flow from the second inlet 16 unequally between the first plenum compartment 30a and the second plenum compartment 30b depending on the requirements of the environment.

[0067] The first plenum compartment 30a is configured

to supply the outdoor air to a first set 34a of one or more nozzles 34, and the second plenum compartment 30b is configured to supply the outdoor air to a second set 34b of one or more nozzles 34.

[0068] Each nozzle 34 is configured to inject the outdoor air into the merging volume 20 of the fresh air plenum module 10. As such, each nozzle 34 may be shaped in order to provide a high-velocity injection of outdoor air into the merging volume 20. Each nozzle 34 is facing/directed towards the outlet 18.

[0069] The first set of nozzles 34a and the second set of nozzles 34b are configured to provide air injection flow characteristics depending on the requirements of the system/environment.

[0070] In the exemplary fresh air plenum 10 of Figures 1-4, the first set of nozzles 34a comprises the same number of nozzles 34 as the second set of nozzles 34b; however, the first set of nozzles 34a may comprise more nozzles 34 than the second set of nozzles 34b, or the second set of nozzles 34b may comprise more nozzles 34 than the first set of nozzles 34a.

[0071] The first set of nozzles 34a is distributed on a nozzle wall of the first plenum compartment 30a. The first set of nozzles 34a comprises four rows of nozzles 34, each row comprising a straight line of nozzles 34 facing towards the outlet 18. Each row of nozzles 34 is offset from the rows of nozzles adjacent to it, to form a "staggered" arrangement.

[0072] The second set of nozzles 34b is distributed on a nozzle wall of the second plenum compartment 30b. In this example, the second set of nozzles 34b is arranged in the same way as the first set of nozzles 34a.

[0073] In this example, as shown in Figure 3, the nozzle wall of the first plenum compartment 30a and the nozzle wall of the second plenum compartment 30b each comprise a curved portion on which the nozzles 34 are distributed. The curved portions are secured to the first internal side and second internal side respectively.

[0074] Figure 5 shows another example of a fresh air plenum 100. The fresh air plenum 100 is similar to the fresh air plenum 10 except in that it has differently shaped plenum compartments 30a, 30b and different nozzle 34 arrangements.

[0075] For example, the nozzle wall of the first plenum compartment 30a and the nozzle wall of the second plenum compartment 30b each comprise a straight portion. The straight portion of the nozzle wall of the first plenum compartment 30a is angled at 60 degrees from the first internal side of the fresh air plenum module 100. The straight portion of the nozzle wall of the second plenum compartment 30b is angled at 60 degrees from the second internal side of the fresh air plenum module 100.

[0076] The nozzle wall of each plenum compartment 30a, 30b further comprises a curved portion that protrudes into the merging volume 20 and a second straight portion which joins the curved portion to an edge of the outlet 18. Thus, it can be seen that the volume of the plenum compartments 30a, 30b of the fresh air plenum

module 100 is greater than the volume of the plenum compartments 30a, 30b of the fresh air plenum module 10.

[0077] The first set of nozzles 34a is distributed on the nozzle wall of the first plenum compartment 30a. The first set of nozzles 34a comprises four nozzles 34 spaced apart from each other, each facing towards the outlet 18. Each nozzle 34 is rectangular in shape, and extends across the full width of the outlet 18.

[0078] The second set of nozzles 34b is distributed on a nozzle wall of the second plenum compartment 30b in the same way as the first set of nozzles 34a.

[0079] In both of the examples above, the first plenum compartment 30a is the same as the second plenum compartment 30b. Particularly, the second set of nozzles 34b is arranged in the same way as the first set of nozzles 34a. However, the nozzle wall and arrangement of the second set of nozzles 34 of the second plenum compartment 30b may be different from first plenum compartment 30a, depending on the situation.

[0080] In other words, the shape, number and arrangement of the nozzles of the first set of nozzles 34a and/or the nozzles of the second set of nozzles 34b may be selected to adapt the air flow to differing types of fan coil unit and/or for different shapes of interior/housing of the plenum module 10, 100.

[0081] The fresh air plenum module 10, 100 can be fitted to the fan coil unit 12 prior to installation of the system or can be retrofitted to a pre-installed fan coil unit 12.

[0082] In order to connect the fresh air plenum module 10, 100 to the fan coil unit 12, the first inlet 14 is fitted to the outlet 24 of the fan coil unit 12. The second inlet 16 of the fresh air plenum module 10, 100 is fluidly connected (e.g. by a tube or pipe network) to the outlet of an air handling system (not shown).

[0083] In use, the system comprising the fresh air plenum module 10, 100 and the fan coil unit 12 can be operated in one of an induction mode, a boost mode, and an eco mode.

[0084] In the induction mode of operation, fresh/outdoor air is provided to the second inlet 16 of the fresh air plenum module 10, 100, the coil 28 of the fan coil unit 12 is operated (to condition the air by heating or cooling) and the fan 26 of the fan coil unit 12 is not operated. The flow of fresh/outdoor air from the second inlet 16, through the merging volume 20 and out of the outlet 18 causes a drop in pressure in the merging volume 20. This negative (gauge) pressure in the merging volume 20 pulls air passively from the fan coil unit 12 through the first inlet 14 and into the fresh air plenum module 10, 100. Thus, the flow of fresh/outdoor air through the fresh air plenum module 10, 100 induces a flow of air through the fan coil unit 12 and the fresh air plenum module 10, 100, this flow of air being conditioned by the coil 28 as it passes through it.

[0085] The induction mode of the system is therefore able to provide fresh air circulation and conditioning functionality without requiring the fan 26 to be operated, re-

ducing the energy consumption required for this functionality in comparison to present air conditioning systems.

[0086] In the boost mode of operation, fresh/outdoor air is provided to the second inlet 16 of the fresh air plenum module 10, 100, the coil 28 of the fan coil unit 12 is operated (to condition the air by heating or cooling) and the fan 26 of the fan coil unit 12 is operated to draw air through the fan coil unit 12 and fresh air plenum module 10, 100.

[0087] In this mode, the flow of fresh/outdoor air through the fresh air plenum module 10, 100 still induces a flow of air through the fan coil unit 12 and the fresh air plenum module 10, 100, therefore increasing the overall volume of air flow through the system and increasing the efficiency of operation of the system in comparison to present air conditioning systems.

[0088] In the eco mode of operation, fresh/outdoor air is provided to the second inlet 16 of the fresh air plenum module 10, 100, and the coil 28 and the fan 26 of the fan coil unit 12 are not operated. Again, the flow of fresh/outdoor air through the fresh air plenum module 10 in this mode still induces a flow of air through the fan coil unit 12 and the fresh air plenum module 10, 100, even when air conditioning functionality is not required.

[0089] The induction of a flow of air through the coil 28 of the fan coil unit 12 even when air conditioning functionality is not required can prevent dust from building up on the coil 28 and/or improve the air change rate of the room/system, without requiring the fan 26 to be operated (and, for example, consuming energy unnecessarily).

Claims

1. A fresh air plenum module for attachment to a fan coil unit for introducing air from an outdoor setting, wherein the fresh air plenum module comprises:

- a first inlet for connection to an outlet of the fan coil unit;
- a second inlet for connection to an air handling unit;
- an outlet for discharge of the outdoor air and the conditioned air; and
- a merging volume in communication with the first inlet, the second inlet and the outlet;

wherein, in use, a flow of the outdoor air from the second inlet through the merging volume to the outlet generates a pressure gradient which induces a flow of air through the first inlet and into the fresh air plenum module from the fan coil unit.

2. A fresh air plenum module as claimed in claim 1, wherein the fresh air plenum module comprises at least one nozzle fluidly connected to the second inlet for injecting the outdoor air into the merging volume.

3. A fresh air plenum module as claimed in claim 2, wherein the fresh air plenum module comprises a first plenum compartment connected to the second inlet and configured to supply outdoor air to a first set of one or more nozzles; and a second plenum compartment connected to the second inlet and configured to supply outdoor air to a second set of one or more nozzles.

4. A fresh air plenum module as claimed in claim 3, wherein the first plenum compartment is located on a first internal side of the fresh air plenum module; and the second plenum compartment is located on a second internal side of the fresh air plenum module; wherein the first internal side and the second internal side are in a facing spaced relationship.

5. A fresh air plenum module as claimed in claim 3 or claim 4, wherein the second inlet is configured to divide the outdoor air flow from the air handling unit equally between the first plenum compartment and the second plenum compartment.

6. A fresh air plenum module as claimed in claim 3 or claim 4, wherein the fresh air plenum module is configured to direct more than half of the outdoor airflow from the air handling unit to the first plenum compartment; or the fresh air plenum module is configured to direct more than half of the outdoor airflow from the air handling unit to the second plenum compartment.

7. A fresh air plenum module as claimed in any of claims 3 to 6, wherein a volume of the first plenum compartment is greater than a volume of the second plenum compartment; or the volume of the second plenum compartment is greater than the volume of the first plenum compartment.

8. A fresh air plenum module as claimed in any of claims 3 to 7, wherein the first set of nozzles comprises more nozzles than the second set of nozzles; or wherein the second set of nozzles comprises more nozzles than the first set of nozzles.

9. A system comprising the fresh air plenum module of any preceding claim and a fan coil unit, wherein the first inlet of the fresh air plenum module is coupled to the outlet of the fan coil unit.

10. A system as claimed in claim 9, comprising an air handling unit, wherein the second inlet of the fresh air plenum module is connected to the outlet of the air handling unit.

11. A system as claimed in claim 9 or claim 10, wherein the fan coil unit has a controller configured to independently operate the coil of the fan coil unit and the

fan of the fan coil unit.

12. A method of installation of a fresh air plenum module or system as claimed in any preceding claim, the method comprising: providing the fresh air plenum module; fitting the first inlet of the fresh air plenum module to the outlet of a fan coil unit; and connecting the second inlet of the fresh air plenum module to the outlet of an air handling system. 5
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13. A method of operating a system as claimed in any of claims 9 to 11, the method comprising operating the system in an induction mode, the induction mode comprising: 15
providing outdoor air to the second inlet of the fresh air plenum module;
operating a coil of the fan coil unit; and
not operating a fan of the fan coil unit;
wherein the flow of conditioned air through the fan coil unit is induced by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module. 20
14. A method as claimed in claim 13, the method comprising operating the system in a boost mode, the boost mode comprising: 25
providing outdoor air to the second inlet of the fresh air plenum module; 30
operating the coil of the fan coil unit; and
operating the fan of the fan coil unit;
wherein the flow of conditioned air through the fan coil unit is provided by the pressure gradient generated by the flow of outdoor air through the fresh air plenum module and the operation of the fan. 35
15. A method as claimed in claim 13 or claim 14, the method comprising operating the system in an eco mode, the eco mode comprising: 40
providing outdoor air to the second inlet of the fresh air plenum module;
not operating the coil of the fan coil unit; and 45
not operating the fan of the fan coil unit;
wherein the pressure gradient generated by the flow of outdoor air through the fresh air plenum module induces a flow of air through the fan coil unit. 50
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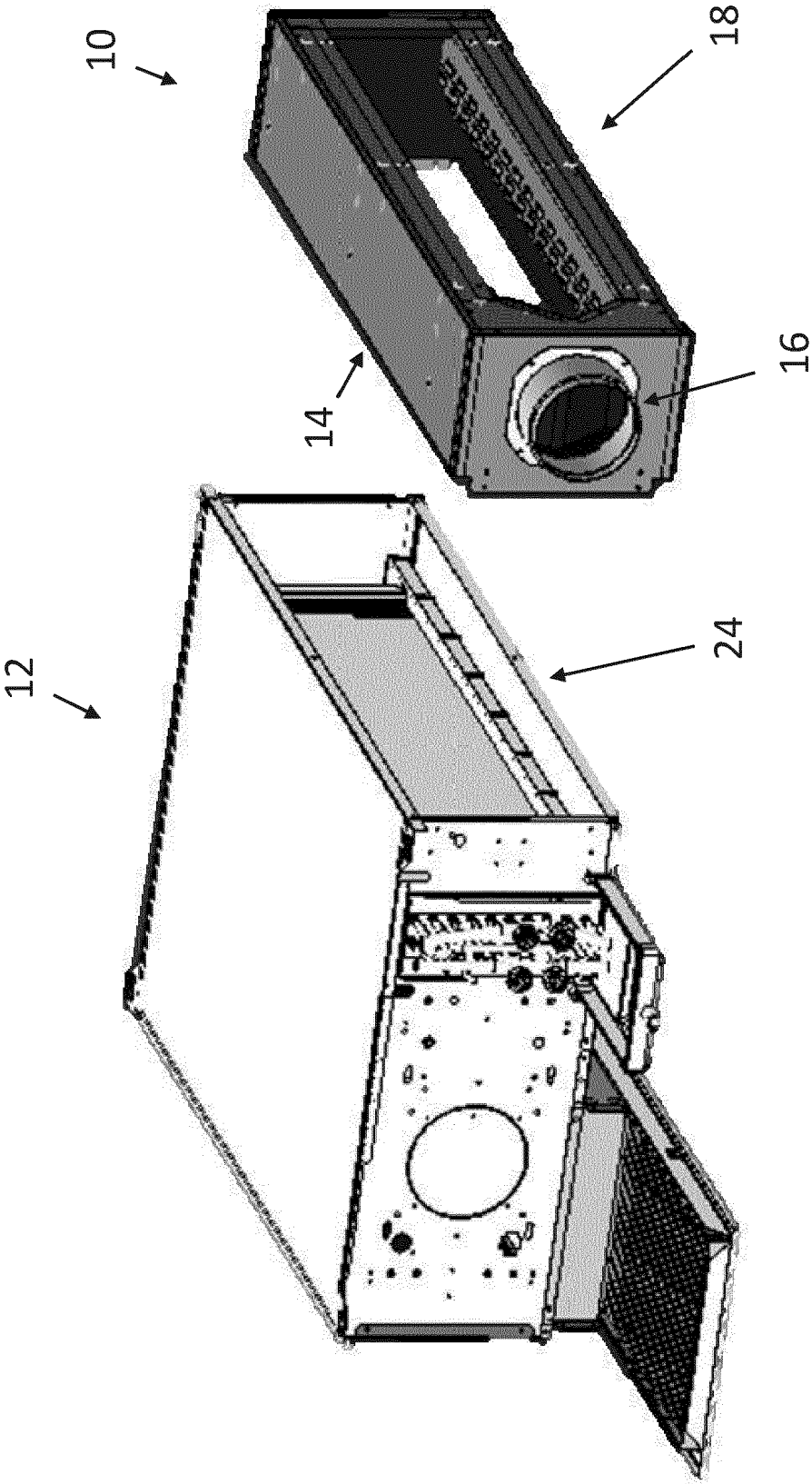


Fig. 1

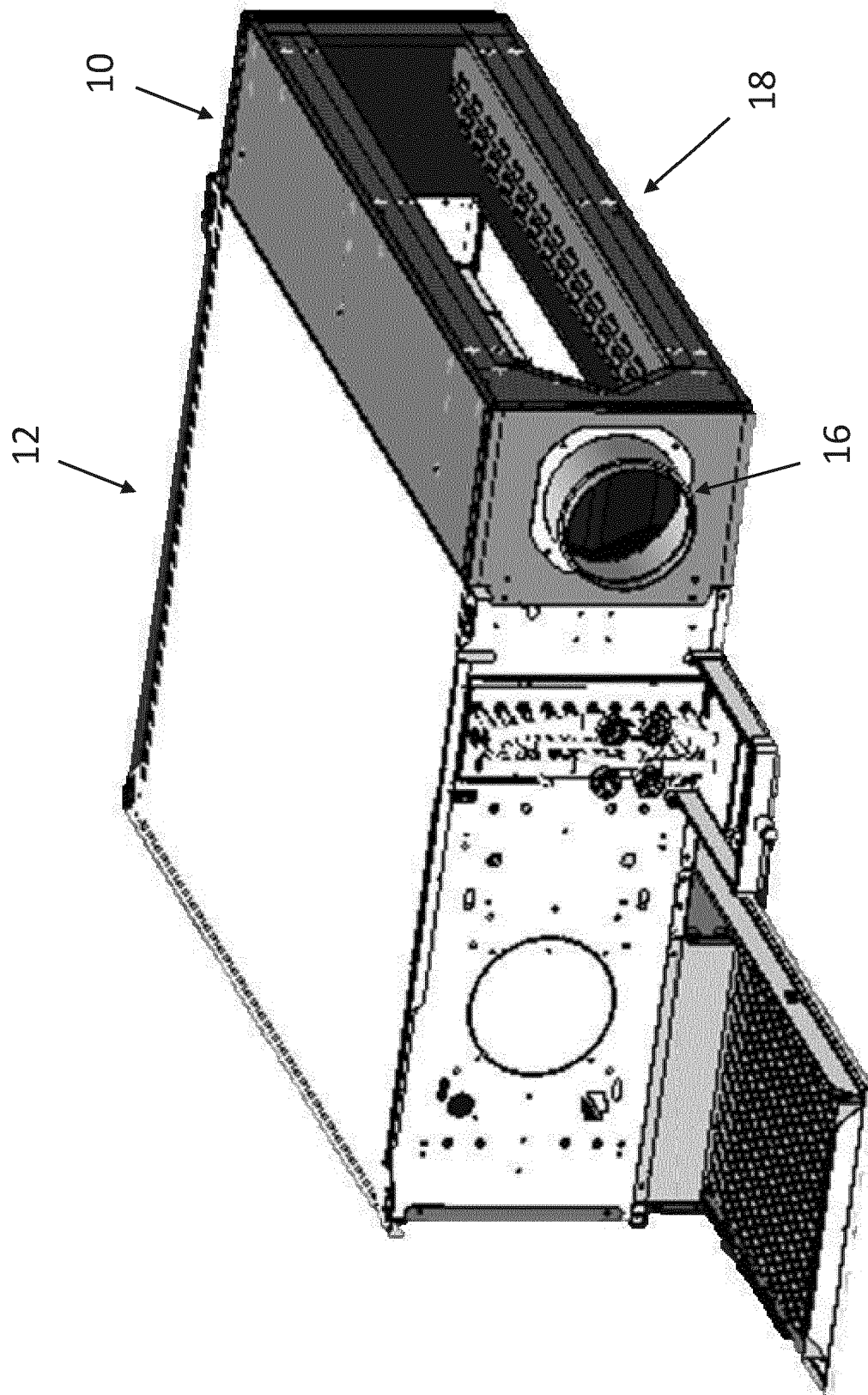


Fig. 2

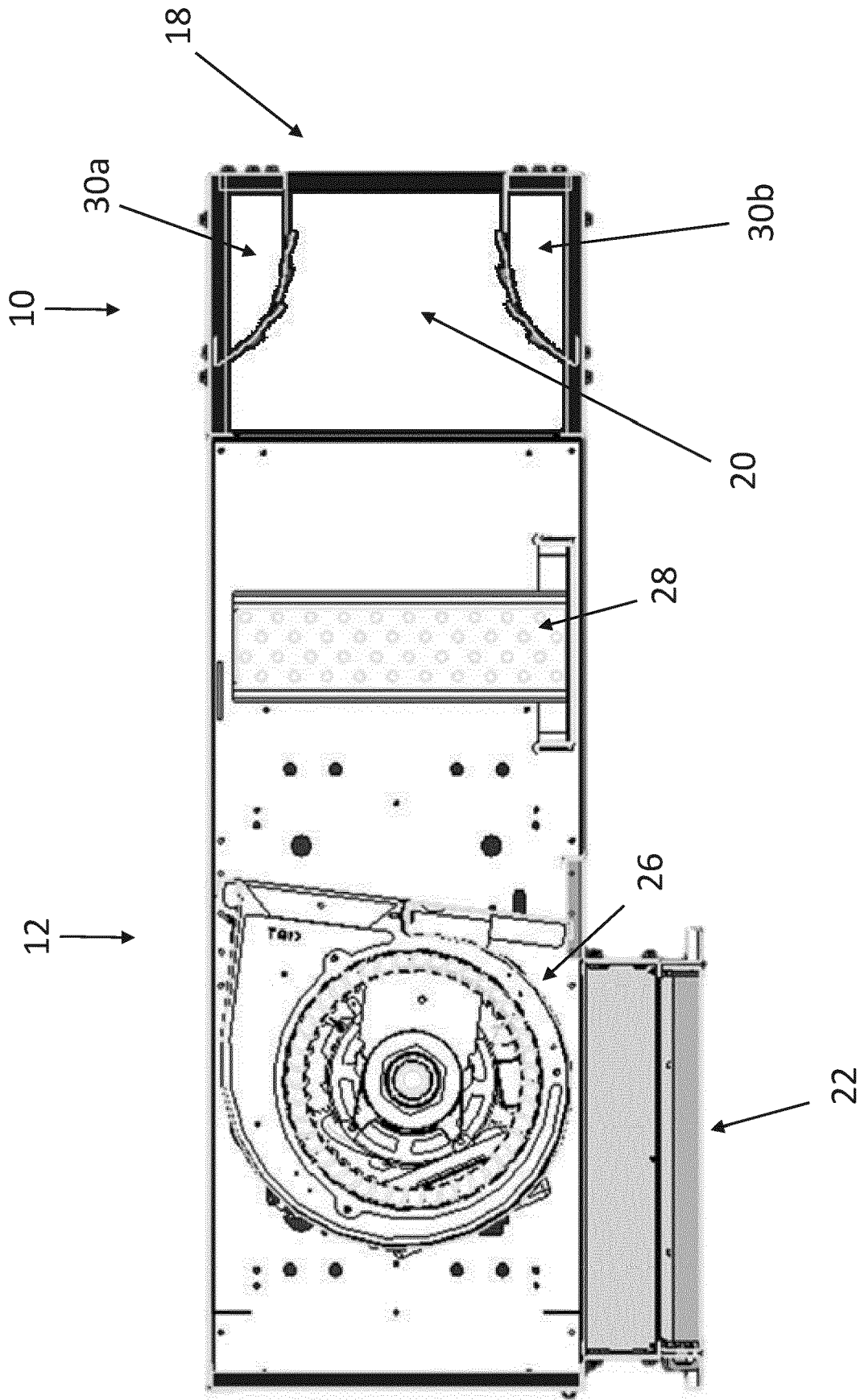


Fig. 3

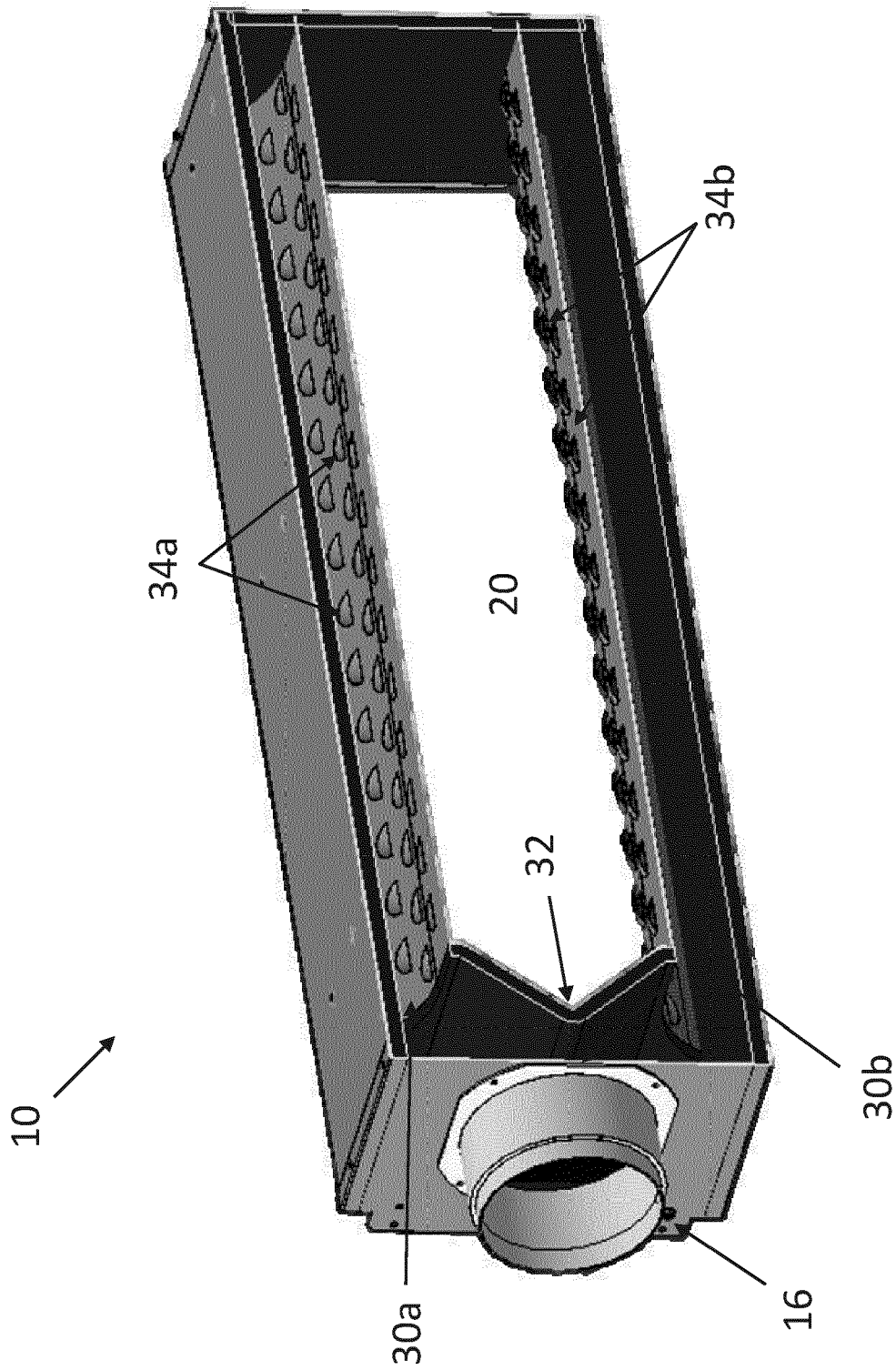


Fig. 4

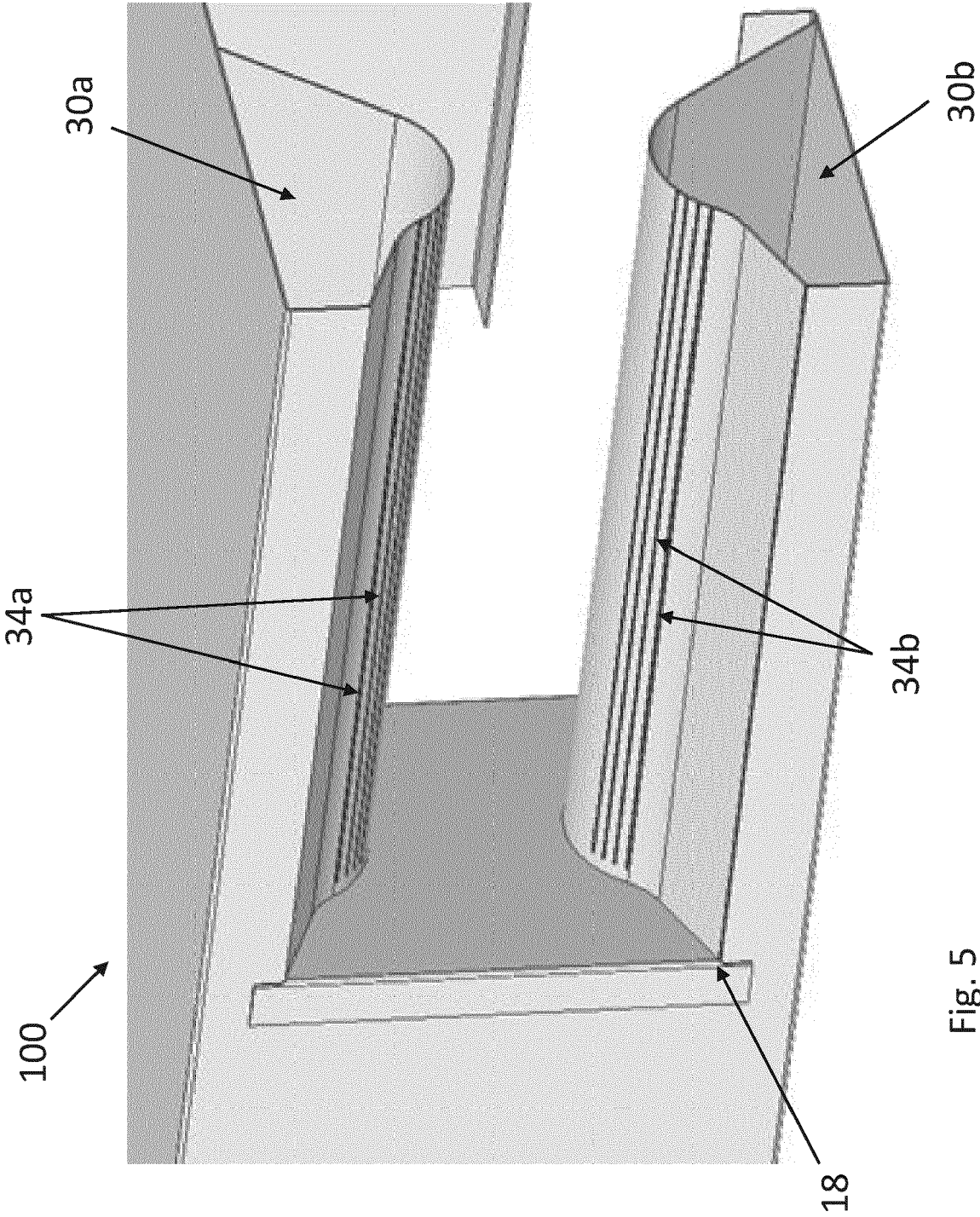


Fig. 5



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 6617

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 657 178 A (MECKLER GERSHON [US]) 14 April 1987 (1987-04-14) * column 3, line 50 - column 9, line 21; claims 1,15; figures 12,13 * -----	1-15	INV. F24F1/0007 F24F1/01 F24F11/77 F24F11/83
X	DE 20 2007 001429 U1 (LTG AG [DE]) 22 March 2007 (2007-03-22) * paragraphs [0023] - [0026]; figures 1,2 *	1,9,12	
X	US 3 263 743 A (WILHELM BAUMGARTEN) 2 August 1966 (1966-08-02) * column 3, line 1 - column 4, line 15; figures 1,2 *	1,9,12	
X	DE 10 2008 007641 A1 (PLUGGIT INTERNAT B V [NL]) 6 August 2009 (2009-08-06) * paragraphs [0029] - [0033]; figures 1,2 *	1,9,12	
A	US 6 213 867 B1 (YAZICI MUAMMER [CA] ET AL) 10 April 2001 (2001-04-10) * the whole document * -----	1,3-8	TECHNICAL FIELDS SEARCHED (IPC) F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 July 2022	Examiner Lienhard, Dominique
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 15 6617

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-07-2022

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4657178 A	14-04-1987	NONE	

DE 202007001429 U1	22-03-2007	NONE	

US 3263743 A	02-08-1966	CH 392016 A	15-05-1965
		DE 1198983 B	19-08-1965
		FR 1322520 A	29-03-1963
		GB 999317 A	21-07-1965
		US 3263743 A	02-08-1966

DE 102008007641 A1	06-08-2009	DE 102008007641 A1	06-08-2009
		WO 2009098041 A1	13-08-2009

US 6213867 B1	10-04-2001	NONE	

15

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25

30

35

40

45

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EPO FORM P0459

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