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Datasheet for the decision of 3 May 2023

Case Number: T 0722/21 - 3.2.03

Application Number: 15776087.7

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Language of the proceedings: EN

Title of invention:
DEVICE AND METHOD FOR CONTROLLING A SUPPLY AIR FLOW AT AN AIR TREATMENT SYSTEM

Patent Proprietor:
FläktGroup Sweden AB

Opponents:
Swegon Operations AB
Lindab AB

Headword:

Relevant legal provisions:
EPC Art. 54, 56
RPBA 2020 Art. 13(2)

Keyword:
Novelty - (yes)
Inventive step - (yes)
Late-filed objection - circumstances of appeal case justify admittance (no)
Late-filed argument - admitted (no) - amendments after arrangement of oral proceedings

Decisions cited:

Catchword:

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Case Number: T 0722/21 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 3 May 2023

Appellant: (Patent Proprietor)	FläktGroup Sweden AB Fläktgatan 1 551 84 Jönköping (SE)
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Representative:	Zacco Sweden AB P.O. Box 5581 Löjtnantsgatan 21 114 85 Stockholm (SE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 March 2021 revoking European patent No. 3117155 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	B. Miller
Members:	B. Goers
	N. Obrovski

Summary of Facts and Submissions

I. European patent 3 117 155 concerns an air treatment device and a method for control of supply air flow to a premises - and for conditioning of the same - by means of an air treatment device.

II. Two oppositions were filed against the patent based on the grounds under Article 100(c) EPC, Article 100(b) EPC and Article 100(a) EPC in conjunction with Articles 54 and 56 EPC. The Opposition Division decided to revoke the patent. This decision was appealed by the patent proprietor ("appellant").

III. At the end of the oral proceedings before the Board, the parties confirmed the following requests.

The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted, alternatively that the patent be maintained in amended form on the basis of one of auxiliary requests 1 to 4 filed with the statement of grounds of appeal.

In addition, the appellant requested that the objection based on the prior use "Plexus" and in combination with document D18 not be admitted under Article 13(2) RPBA 2020.

Both opponents ("respondents") requested that the appeal be dismissed.

IV. The following evidence is relevant to this decision.

D1: IT 102010901820895 A1
D3: WO 2010/005386 A1

D4: WO 2010/090592 A2 (annex 1 of D5)
D5: Declaration of Mr. Göran Hultmark, 9 September 2019
D6: "Plexus Service & maintenance", dated "3 May 2013" (annex 2 of D5)
D7: "Plexus Operation & Maintenance", Frenger Systems, dated "October 2011" (annex 3 of D5)
D8: "Plexus Installation, commissioning-instruction and maintenance", dated "28 August 2013" (annex 4 of D5)
D9: "Plexus active chilled beam", Frenger Systems, dated "January 2011"
D10: WO 2012/123552 A1
D11: WO 2008/115138 A1
D13: "Supply air beam Plexus", Lindab Ventilation A/S, extract of catalogue "Comfort Waterborne indoor climate systems", dated "08.2012",
D14: WO 2007/079434 A2
D16: WO 2013/013334 A2
D17: WO 2005/053975 A1
D18: EP 1 188 992 A2
D19: "Injusteringshandbok", FläktWoods, dated "2012.02", and translation
D20: "Husbyggaren" Nr 2, 2012 "Flexibel kylbaffel" and translation
D21: STRA-14 Rumsregulator: Monterings och skötselinstruktion, 2014-02
D22: US 2008/294291 A1
D24: US 5,705,734 A
D25: WO 2010/010230 A2
D27: "Commissioning manual Lindab Pascal", Lindab, dated "13042012"
D28: Brochure "Measurement VAV boxes", Belimo, dated "2005" (concerning use of a VAV actuator in D27)
D29: EP 2 281 131 B1

V. Independent claims 1 and 5 of the main request (patent as granted) read as follows (feature numbering added in "[]"):

(a) Claim 1:

"[a] *Air treatment device (1) for control of supply air flow (L1) to a premises (A) and for conditioning of the same, and which air treatment device (1) comprises a chilled beam (2) connected to a supply air duct (3) in an air treatment system (4), and*
[b] *which chilled beam (2) comprises a pressure box (5) with at least one inlet (6) for inflow of supply air flow (L1) from the supply air duct (3) to the pressure box (5) and a plurality of outlets (7) for outflow of the supply air flow (L1) out of the pressure box (5) to a mixing chamber (8), and*
[c] *the outlets (7) are arranged according to a configuration which is changeable by that at least one cover member (9) is displaceably arranged in relation to the outlets (7),*
[d] *further the chilled beam (2) comprises at least one liquidly coupled heat exchanger (10) alternatively arranged to cool or heat a through-flowing air stream by heat exchange, and through which heat exchanger (10) a circulation air flow (L2) is arranged to flow from the premises (A) due to induction effect driven by the passage of supply airflow (L1) out of the outlets (7) to the mixing chamber (8), and*
[e] *the mixing chamber (8) is arranged to unite the supply airflow (L1) and the, by the heat exchanger (10) conditioned, circulation airflow (L2) to a common air stream (L1+L2) and guide the air stream (L1+L2) to at least one outlet opening (11) for outflow to the premises (A), and further*

[f] *the air treatment device (1) comprises at least one actuator (12) for control of the volume flow of supply airflow (L1), and*
[g] *the pressure box (5) comprises at least one pressure measuring socket (13), useful for representative control* of static pressure (p_s) in the pressure box (5), and
[h] *the air treatment system (4) comprises at least one room sensor (14), which is arranged to register the room conditions in the premises (A) and communicate this to the air treatment system (4) for control of the air treatment device (1),*
[i] *characterized by that the air treatment device (1) is arranged to register the static pressure (p_s) in the pressure box (5)*
[j] *and the position of the actuator (12) and*
[k] *based on these calculate the real supply airflow (L1) in the chilled beam (2), and*
[l] *the actuator (12) is, at identified need, arranged to change the configuration of the outlets (7)*
[m] *by a linear motion of the cover member (9), by which motion the open area of the outlets (7) is changed, for change of supply air flow (L1), by displacement of the cover member (9).*"

(b) Claim 5:

"[a5] *Method for control of supply air flow (L1) to a premises (A) and for conditioning of the same, by means of an air treatment device (1) which comprises a chilled beam (2) connected to a supply air duct (3) in an air treatment system (4), and*
[b5] *which chilled beam (2) comprises a pressure box (5) with at least one inlet (6) for inflow of supply air flow (L1) from the supply air duct (3) to the pressure box (5) and a plurality of outlets (7) for*

outflow of the supply air flow (L1) out of the pressure box (5) to a mixing chamber (8), and
[c5] *the outlets (7) are arranged according to a configuration which is changeable by that at least one cover member (9) is displaceably arranged in relation to the outlets (7),*
[d5] *further the chilled beam (2) comprises at least one liquidly coupled heat exchanger (10) alternatively arranged to cool or heat a through-flowing air stream by heat exchange, and through which heat exchanger (10) a circulation air flow (L2) is arranged to flow from the premises (A) due to induction effect driven by the passage of supply airflow (L1) out of the outlets (7) to the mixing chamber (8), and*
[e5] *the mixing chamber (8) is arranged to unite the supply airflow (L1) and the, by the heat exchanger (10) conditioned, circulation airflow (L2) to a common air stream (L1+L2) and guide the air stream (L1+L2) to at least one outlet opening (11) for outflow to the premises (A), and*
[f5] *further the air treatment device (1) comprises at least one actuator (12) for control of the volume flow of supply airflow (L1),*
[g5] *and the pressure box (5) comprises at least one pressure measuring socket (13), useful for representative control of static pressure (p_s) in the pressure box (5), and*
[h5] *the air treatment system (4) comprises at least one room sensor (14), which is arranged to register the room conditions in the premises (A) and communicate this to the air treatment system (4) for control of the air treatment device (1),*
characterized by the following steps:
[i5] *- measure the static pressure (p_s) in the pressure box (5),*
[j5] *- register the position of the actuator (12) for*

determining of actual configuration of the outlets (7) which gives the actual k-factor,

[k5] - *calculate the real supply air flow (L1) for the chilled beam (2) based on the static pressure (p_s) in the pressure box (5) and the position of the actuator (12),*

[n5] - *measure/register actual status of the room conditions in the premises (A) by means of the room sensor (14),*

[o5] - *compare the real supply air flow (L1) with a set point for the actual room condition,*

[l5] - *at detected need change the configuration of the outlets (7),*

[m5] *by that the actuator (12) by a linear motion of the cover member (9), moves the cover member (9) in relation to the outlets (7), for change of the supply air flow (L1), by which motion the open area of the outlets (7) changes for outflow of supply air flow (L1).*"

VI. The appellant's arguments relevant to the present decision can be summarised as follows.

(a) Main request - novelty

The prior uses "Plexus" and "Wega" were not novelty-destroying for the subject-matter of claims 1 and 5.
First, the public availability of the prior use "Plexus" was not sufficiently demonstrated.
Second, the documents D6 to D9 and D13 cited in support of the prior use related to different Plexus devices and their disclosures could not be considered in combination.
Third, the subject-matter of claims 1 and 5 was novel over the Plexus and the Wega devices. These devices only disclosed simple manual adjustment of the supply

airflow by a user. Claims 1 and 5 did not encompass such a manual adjustment. In addition, the prior use devices did not apply the calculated real supply airflow as a set-point in a feedback controller.

(b) Main request - inventive step

The subject-matter of claims 1 and 5 involved an inventive step.

The distinguishing features over the Plexus device were not the result of mere automation. Furthermore, no common general knowledge was established regarding the use of the calculated supply airflow as input to a supply airflow feedback control. D14 did not teach towards such a control scheme either.

The objection based on the combination of the Plexus device with D18 had been submitted late without exceptional circumstances being established. It therefore did not have to be admitted.

D18 disclosed an alternative feedback control scheme with a room condition as the controlled variable. None of D11, D19 (prior use "Wega") or D22 provided a motivation to change the controlled variable to be the supply airflow.

VII. The respondents' arguments relevant to the present decision can be summarised as follows.

(a) Main request - novelty

Claims 1 and 5 were not novel over the prior uses "Plexus" and "Wega". The prior use of the Plexus devices was evidenced by D4 to D9 and D13. All these

documents referred - with respect to the features claimed - to the same devices. The Plexus devices included means for determining the static pressure and the position of the actuator as well as a room condition. The claims encompassed the calculation of the supply airflow and the adjustment of the airflow to a set-point being performed manually by a user and not continuously. Furthermore D4 disclosed the possibility of performing the steps automatically.
Also the prior use "Wega" disclosed such a device. As was apparent from D20 automatic control of the airflow was part of the Wega device.

(b) Main request - inventive step

The subject-matter of claims 1 and 5 did not involve an inventive step in view of the Plexus devices or D18 as the starting point.

The same problem-solution approach applied to the subject-matter of both claims 1 and 5. The distinguishing features over the Plexus devices were not inventive, since they resulted only in a mere automation of the prior art system previously operated manually. According to established case law, mere automation could not establish an inventive step. The components of the control system claimed (pressure sensor, position sensor of the actuator, calculation of the supply airflow) were all known from common general knowledge, which was, *inter alia*, represented by documents D1, D3, D10, D16, D17, D24, D25, D27, D28 or D29. Furthermore, D4, D14 and also D18 each made obvious the distinguishing features.

The distinguishing features over D18 were not inventive either, and were made obvious by any of D11, prior use "Wega" (in particular D19 and D20) and D22.

Reasons for the Decision

1. Main request - novelty

The subject-matter of claims 1 and 5 is novel.

1.1 The respondents challenged the novelty of the subject-matter of independent claims 1 and 5 based on each of the following disclosures:

- prior use "Plexus" (the devices put to this prior use are referred hereinafter as a "Plexus device")
- prior use "Wega" (the devices put to this prior use are referred to hereinafter as a "Wega device")

The prior uses "Plexus" and "Wega" concern two different commercial products (air conditioning devices) sold and distributed before the filing date of the patent.

1.2 Non-admittance of new argument with respect to lack of public availability of prior uses "Plexus" and "Wega"

The appellant's line of argument that the public availability of prior uses "Plexus" and "Wega" and the corresponding evidence was not sufficiently established is not admitted into the proceedings.

1.2.1 During the opposition proceedings, the appellant did not contest the public availability of the prior uses "Plexus" and "Wega" nor of the supporting documentary evidence provided by the respondents and the declaration by Mr Hultmark. This is explicitly noted in

the decision under appeal under points 3.1.1 and 3.1.4.2.

1.2.2 It was during the oral proceedings before the Board that the appellant questioned for the first time the public availability of the Plexus and the Wega device as well as whether the documents submitted by the respondents used to establish the alleged features of the prior use "Plexus" all showed the same device. With regard to the latter, the appellant additionally argued that the documents submitted as evidence for the Plexus device referred to different versions with different sizes (Plexus 600/1200, see e.g. D7, page 2: "2.0 Product Details" or D8, front page).

This line of argument constitutes an amendment of the appellant's appeal case under Article 13(2) RPBA 2020. Any such amendments shall, in principle, not be taken into account unless there are exceptional circumstances which have been justified with cogent reasons.

In the present case, any objection of lack of public availability of the prior uses "Plexus" and "Wega" should have been submitted by the appellant with its statement setting out the grounds of appeal. As to the late submission of this argument, no reasons were provided by the appellant. Since no exceptional circumstances under Article 13(2) RPBA 2020 justify the admittance of this line of argument, it is not taken into account in the appeal proceedings.

1.3 Novelty of the subject-matter of claim 1 in view of the prior use "Plexus"

1.3.1 The respondents submitted that a chilled beam air treatment device had been commercially available before

the filing date of the patent under the trade name "Plexus". Evidence in this respect was provided in the form of documents D4 to D9 and D13. Among these documents, only documents D6 to D9 and D13 are suitable for establishing the technical features of the Plexus devices put to the prior use.

The declaration by Mr G. Hultmark (D5) demonstrates that, besides the sold Plexus device itself, at least documents D6 to D8 have also been publicly available - e.g. to the contractors installing the devices - before the filing date of the patent. It is further stated herein that between 2010 and 2014 more than 10,000 devices were sold and installed. The Board has thus no reason to question the conclusion in the appealed decision that the Plexus device as shown in documents D6 to D9 and D13 forms part of the prior art under Article 54(2) EPC.

Contrary to the respondents' arguments, D4 cannot contribute to establishing the features of the devices of the prior use "Plexus". D4 is a patent publication which makes no reference to the commercial product Plexus. While the disclosure of D4 might be technically related to the Plexus device, it does not form part of the technical documentation of the commercial product which was actually sold.

1.3.2 It is undisputed that the Plexus device encompasses features [a] to [e].

1.3.3 Features [f], [l] and [m] are also disclosed by the Plexus devices. The devices provide a number of outlets ("nozzles") which can be partially blocked with cover members ("JetCone adjustment pins") adjustable in a linear motion with respect to their position in the

openings, see e.g. D7, Figure 14 and chapters 6.2, 6.3 and 6.4; D8, pages 16 and 17 and D9, Figure 21. For a given static pressure this position then results in a corresponding airflow rate. Therefore, the pins are suitable for adjusting the airflow and are considered actuators in the sense of features [f] and [m] even though only manual adjustment of the pins is disclosed for the Plexus device. The determination of an "identified need" according to functional feature [l] is not restricted to identification by means of a controller, in particular does not imply any set-point defined in a controller (in contradiction to method claim 5, see point 1.4). In other words the user can use the pin to adjust the airflow when the need for doing so has been identified. Therefore, the adjustable pins of the Plexus devices are also suitable for fulfilling the function of feature [l].

1.3.4 The Plexus device further comprises a pressure measuring socket in accordance with feature [g]. A user is able to manually connect a pressure sensor for registering the static supply air pressure to the outlets of the pressure box (see e.g. D6, paragraphs 2.2 and 2.2.1 on pages 7 and 8 and D7, Figure 17). One of the outlets thus acts as the socket for the measuring probe.

1.3.5 The Plexus device also encompasses feature [h]. According to D13 a control device "Regular Combi" can be connected to the Plexus device. This control device can - in response to a selected set-point - control the room temperature by adjusting the water supply valves of the Plexus device ("to control and regulate both the heating and cooling valves within Plexus", see page 103, left column, first paragraph).

1.3.6 Contrary to the respondent's arguments the Plexus device does not encompass features [i], [j] and [k].

The respondents' understanding of features [i] and [j] is that they merely define the suitability of the device for functions to be performed by a user (i.e. to register position and static pressure). In their view, a user is further capable of performing the mental act of calculating the real supply airflow from the registered values. However, this understanding is not persuasive.

It is true that the selected position of the pins is visible to a user (see e.g. Figures in D8, page 16) and the static pressure can also be determined via the measuring socket. However, features [i] to [k] define that "the air treatment device is arranged to" "calculate the real supply airflow" "based on" the registered static pressure and position of the actuator. In other words, according to claim 1 the measurements ("registration") and the calculation are both performed by the air treatment device itself (i.e. a respective calculation unit) and not by a user of the device. This understanding is further in line with the patent specification as a whole. Therefore, features [i] to [k] in combination require that the device encompasses:

- a (permanent) static pressure sensor and
- a (permanent) actuator position sensor
- both in data communication with
- a calculation unit for (continuously) calculating the airflow

These technical features are thus at least implicitly part of claim 1. However, none of these features is disclosed by the Plexus device.

1.4 Novelty of the subject-matter of claim 5 over the prior use "Plexus"

Features [a5] to [h5] of method claim 5 correspond to the device features [a] to [h] of claim 1.

Features [i5] to [m5] define a number of method steps carried out with this device.

1.4.1 The respondents argue that all of method steps [i5] to [m5] define functions a user of the Plexus devices could perform manually, as described in D6 to D9 and D13.

1.4.2 This is not persuasive since claim 5 explicitly requires the method steps to be performed "by means of an air treatment device (1)".

Moreover, feature [o5] defines that a comparison between the (calculated) "real air flow" and the "set-point" (for the supply air flow) is made. According to its usual technical meaning, the term "set-point" does not relate to manual steps or mental acts performed by a user of a device. Instead, "set-point" is a common technical term defining the target value of a controlled variable in a feedback control loop. According to feature [o5], the supply air-flow is the controlled variable and the result of the comparison (the "detected need" according to feature [n5]) is considered the input to the controller which determines a control response, this control response being, according to feature [n5], to "change the configuration

of the outlets", which then affects the real supply airflow.

1.4.3 In addition, feature [n5] defines a "set-point for the actual room condition". This wording implies that the set-point **depends** on the actual room condition. As an illustrative example, the set-point is switched between two or more different supply airflow rate set-points by the controller, for example depending on the signal obtained from a CO_2 room sensor (a measure e.g. corresponding to the number of people present in the room). Despite this dependency, it is nevertheless the supply airflow which is the controlled variable of the feedback controller. Without a feedback comparison, the measured room condition is only indirectly controlled and is not controlled to a set-point.

1.4.4 Such a feedback controller is undisputedly not disclosed as part of the Plexus device. The "Regula Combi" control feature described in D13, page 105, links the measured room condition (temperature) with a control of the heating and cooling fluids of the air conditioning device. It does not control the supply airflow to a predefined set-point as required by claim 5.

Hence the subject-matter of claim 5 differs from the Plexus device by the feedback control defined in features [i5] to [m5].

1.5 Novelty of claims 1 and 5 over the prior use "Wega"

The respondents submitted that also a chilled beam air treatment device under the trade name "Wega" had been commercially available before the filing date of the

patent. The prior use "Wega" is based on evidence D19, D20 and D21.

1.5.1 D19 discloses on pages 56 to 58 a number of different air treatment devices having the same fundamental structure in accordance with features [a] to [g]. These devices are also configured manually, wherein slidable cover members can be adjusted in order to control the airflow, similar to the Plexus device. The Wega device thus includes a socket for (manual) measurement of the static pressure (see figures on pages 56 to 58). A user can select a desired supply airflow, measure the static pressure and, on this basis, calculate the position of the cover member. The slidable cover member can then be (manually) adjusted via the actuator (which is the grip portion of the slidable cover member).

1.5.2 As also established for the Plexus device, D19 does not disclose any means for calculating airflow based on measured pressure and actuator position (features [i] to [k] and [i5] to [k5]) for the Wega device.

Contrary to the respondents' view, such features are not disclosed in D20 or D21 either. The English translation of the relevant paragraph in D20 reads:

"If you provide the Wega with a motor, Motorized Energy Control, it will be transformed into a cooling beam with VAV operation. The cooling beam can be combined with the room regulator STRA-14 which can be set to different positions as regards temperature, presence and CO_2 control in order to control the airflow."

This paragraph does not permit any conclusion as to whether feedback control of the airflow is addressed here. It also neither explicitly nor implicitly

discloses that a real supply airflow is calculated based on static pressure and actuator position data. Further, this paragraph does not directly and unambiguously refer to a drive actuating the cover members. Alternatively, is possible that a damper located further upstream is addressed here as the control means.

1.5.3 Therefore, the subject-matter of claims 1 and 5 has the same distinguishing features over the Wega device as over the Plexus device.

2. Main request - inventive step

The respondents argue that the invention defined in claims 1 and 5 does not involve an inventive step in view of the following combinations of prior art:

- prior use "Plexus" in combination with document D14 or D4
- prior use "Plexus" in combination with common general knowledge
- prior use "Plexus" in combination with document D18
- D18 in combination with D11, prior use "Wega" (D19 and D20) or D22

2.1 Non-admittance of the objection based on the prior use "Plexus" in combination with document D18

The additional objection of lack of inventive step based on the Plexus device in combination with the teaching of D18 was submitted by the respondents for the first time during the oral proceedings before the Board.

This is an amendment of the respondents' appeal cases under Article 13(2) RPBA 2020, according to which such an amendment shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned. The respondents have presented no such reasons.

Therefore, the new objection is not admitted into the proceedings.

2.2 Inventive step of the subject-matter of **claim 5** in view of the prior use "Plexus" as the starting point

2.2.1 The Plexus device is undisputedly a suitable starting point for the assessment of the requirements of Article 56 EPC.

2.2.2 Distinguishing features

As set out above in point 1.4, the Plexus device does not include feedback control for the supply airflow in which the position of the cover members acts as the manipulated variable. The Plexus device is not capable of calculating the real supply airflow from a measured ("registered") static pressure and position of the actuator either. Consequently, it provides no set-point in dependence on ("for") the actual room condition.

2.2.3 Effect and technical problem

First, these distinguishing features have the effect that the airflow is (within the constraints of the possible actuator positions) kept constant at a predetermined set-point directly at the point of emission of the airstream to the room independent of

pressure or temperature variations in the incoming air stream. In a branched system supplying various rooms, disturbances in airflow supply to the room due to changing air supply requirements in other rooms are thereby avoided. Second, the set-point can be adapted automatically in response to a measured room condition.

In view of these effects, the objective technical problem is that of delivering the correct airflow to the individual premises (rooms) regardless of pressure variations within the system (see paragraphs [0005] and [0006] of the patent).

The respondents argued that the objective technical problem was the "mere automation" of the operation of the Plexus device to "avoid human interaction". This is not persuasive.

While the Plexus device only allows for an initial calibration of the supply airflow, it is not foreseen to monitor and adapt the airflow in operation in response to changing static pressure during operation. Furthermore, the problem suggested by the respondents does not consider measurement of the room condition in order to adapt the set-point for the supply airflow.

2.2.4 Combination with D14

The distinguishing features are not made obvious by D14.

D14 discloses a damper assembly for an air treatment device, the assembly comprising an actuator capable of adjusting the position of the damper members and sensors for static pressure and actuator position.

However, D14 neither suggests calculating the airflow from pressure and actuator position measurements, nor discloses that airflow is the controlled variable. On the contrary, the passage on page 10, first paragraph teaches controlling the operation of the damper "responsive" to "a signal from a thermostat or room sensor", i.e. this signal being the controlled variable while airflow is only the manipulated variable.

2.2.5 Combination with D4

The respondents argued that D4 suggests to the skilled person that adjustment of the position of the actuator could be automated.

This is not convincing. D4 mentions on page 13, lines 20 and 21 that, for the adjustment of the cover members ("level control means"), an alternative is "to provide an automatic device which makes it possible for the adjustment to be automated". However, no further explanations are given, in particular not with regard to what the controlled variable might be (e.g. any of measured supply airflow, calculated supply airflow, position of the actuator, static pressure). D4 is also silent about any room sensor in communication with the air treatment system control, in particular the adaptive set-point solution defined in features [n5] and [k5].

To conclude, D4 does not teach feedback control of the supply airflow and it does not point towards adaptation of the set-point based on a room parameter either.

2.2.6 Combination with common general knowledge

As explained above, the problem starting from the Plexus device is - in view of the distinguishing features - not merely the automation of the operation thereof. Therefore, common general knowledge for mere automation, even if supported by reference to a number of documents (D1, D3, D10, D16, D17, D24, D25, D27, D28 or D29), cannot be successfully invoked. In addition, none of these documents discloses feedback control of the supply airflow.

2.3 Inventive step of the subject-matter of **claim 1** in view of the prior use "Plexus" as the starting point

2.3.1 With regard to whether the subject-matter of claim 1 involved an inventive step, the parties agreed that the objective technical problem should, when starting from the prior use "Plexus", be the same as for assessing claim 5. The Board concurs.

2.3.2 In particular, although claim 1 - contrary to claim 5 - does not define a closed feedback control loop, the explicit and implicit technical features of claim 1 which enable the device to calculate the real supply airflow (see point 1.3.6) provide at least the necessary pre-condition for the implementation of a feedback control loop like that according to method claim 5.

2.3.3 As the same objective technical problem applies to claims 1 and 5, the conclusions under Article 56 EPC for claim 5 apply *mutatis mutandis* to claim 1. Claim 1 thus also involves an inventive step in view of the Plexus devices as the starting point.

2.4 Inventive step of the subject-matter of claims 1 and 5 in view of D18 as the starting point

The respondents argue that the subject-matter of claims 1 and 5 does not involve an inventive step starting from the disclosure of D18 and considering the teaching of any of D11, the prior use "Wega" or D22.

2.4.1 Common and distinguishing features between D18 and claims 1 and 5

It is undisputed that D18 discloses a device and method for controlling supply airflow to a premises and for conditioning of the same, by means of an air treatment device with features [a]/[a5] to [e]/[e5]. D18 further discloses features [f]/[f5]. The size of the openings ("discharge holes") can be adjusted by actuators ("control panels", paragraphs [0013] and [0014]) in order to control "the desired flow of supply air" (paragraph [0009] and claim 1).

In addition, the actuators are disclosed to be "displaceable by means of motors" to enable automatic control "in response to a sensed air parameter in the room" (paragraph [0014]). D18 therefore also discloses features [h]/[h5], [l]/[l5] and [m]/[m5].

In D18, the "room condition" and not the real supply airflow is the controlled variable in the control loop disclosed. The calculation means for the real supply airflow and the respective sensors (pressure, position) are also not disclosed in D18. The real supply airflow is thus only the manipulated variable in D18 (via the position of the actuator).

Therefore, the distinguishing features of claim 1 and 5 are [g]/[g5], [i]/[i5] to [k]/[k5], [o5] and [n5].

These distinguishing features define an alternative control concept compared to that disclosed in D18. Instead of directly controlling the room parameter (as disclosed in D18), claim 5 requires the real supply airflow to be controlled while the set-point of this control is selected by the controller dependent on a room parameter.

2.4.2 Technical effect and objective technical problem

The effect "to obtain a correct calculation of the supply airflow" identified in the appealed decision is not persuasive. Since the real supply airflow is used only as the manipulated variable, no calculation of the supply airflow is necessary. As a consequence, the technical problem "to improve the reliability of the airflow control of the known air treatment device" identified here is not applicable.

The technical problem identified by the appellant "to make the known air treatment device of D18 independent from pressure fluctuations in the supply air duct system" is not applicable either, since static pressure variations also do not affect the control of the room parameter in D18.

Instead, the objective technical problem is that of providing an alternative pressure independent control concept for air supply to a room while avoiding the need for using VAV dampers in the flow ducts (cf. also patent, paragraphs [0005] and [0006]).

2.4.3 Solution is not obvious from D11, prior use "Wega" or D22

The Board agrees that methods for calculating the supply airflow based on the measurement of the static pressure and the opening size (see e.g. D11, page 2 or D19, translation of pages 6 and 7) and for continuously measuring the static pressure (see e.g. D11, claim 5) are common general knowledge.

However, none of D11, the prior use "Wega" or D22 include a pointer towards:

- the device calculating the real supply airflow via measurement of the static pressure and the actuator position
- controlling the real supply airflow as the controlled variable to a set-point with a feedback control loop, wherein this set-point depends on a measured room parameter

D11 discloses the *in situ* determination of airflow, e.g. via a pressure sensor and a predetermined k-factor. However, D11 does not suggest adjusting the size outlets of the pressure box by an actuator, but instead discloses the use of an upstream damper. D11 also does not disclose registration of the position of the actuator. Furthermore, the measured airflow is not used in a feedback control cycle.

While the Wega device discloses some sort of automatic adjustment ("control") of the airflow (D20), it does not disclose feedback control of the airflow based on a calculation of the real supply airflow by means of static pressure and actuator position measurements by the Wega devices (see point 1.5). It thus does not

point towards the adaptation of a set-point in response to a room condition either.

D22 discloses, as D18, only room condition set-points (see paragraph [0037]: "temperature setpoint, humidity setpoint, etc.") and the airflow is varied by dampers only as the manipulated variable.

2.4.4 The respondents further argue that airflow as the manipulated variable in D19 needs to be operated within certain feasible constraints. This would also require determining the real supply airflow, thereby at least anticipating the subject-matter of claim 1.

This is not persuasive either. The airflow is already practically limited due to the range of opening sizes for the outlets of the pressure box adjusted via the actuator. But even if the skilled person were to consider determining the real supply airflow, a plurality of alternative solutions compared to the calculation method of claims 1 and 5 would be possible (see e.g. D11, page 2: "flow sensor ... of the hot wire type"). A measurement method including a sensor for the position of the actuator for firstly determining the correct k-factor is disclosed neither in D11 nor for the Wega device.

2.4.5 In view of the above, the subject-matter of claims 1 and 5 involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

The Registrar: The Chairman:

C. Spira B. Miller

Decision electronically authenticated