(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 April 2010 (08.04.2010)

PCT

(10) International Publication Number
WO 2010/039077 A1

(51) International Patent Classification:
E04B 1/68 (2006.01) *E06B 3/62* (2006.01)
F16J 15/02 (2006.01)

(21) International Application Number:
PCT/SE2009/000420

(22) International Filing Date:
23 September 2009 (23.09.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0802064-6 30 September 2008 (30.09.2008) SE

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

WO 2010/039077 A1

(54) Title: ASSEMBLING OF SEAL AND PLATES TO WALL ELEMENT

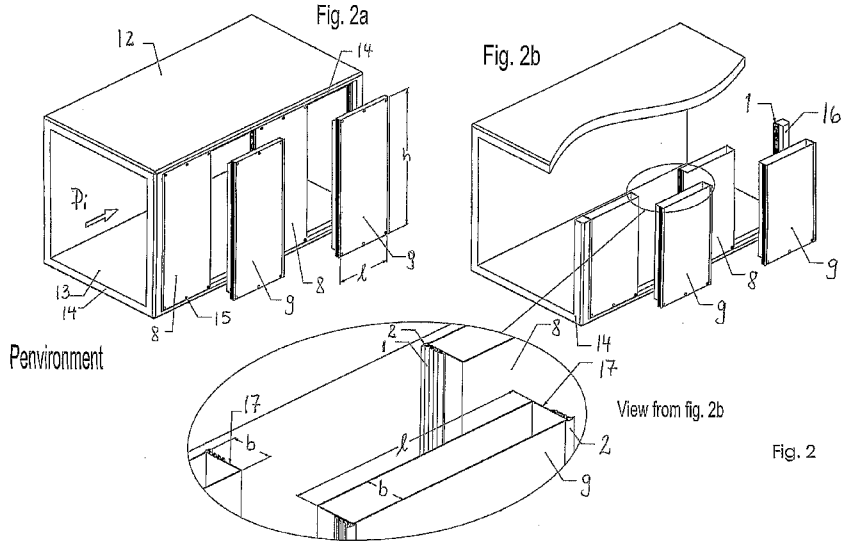


Fig. 2

(57) Abstract: A device, preferably a sealing profile (1) which is assembled on a first wall element (8) and on a second wall element (9) respective, and where the sealing profile is assembled on the gable (17) of the wall elements, i.e. in the extension of the wall elements and where the width of the sealing profile only corresponds to a part of the width of that plate profile or that gable which is included by the wall elements and where the assembling of the movable wall element (9) in a first step is obtained by simply fit in between the fixed assembled wall elements, in order to, by the final assembling, be pressed in to its final position.

Assembling of seal and plates to wall element

Present invention relates to en new design of a sealing and where plates and sealing are assembled together to a wall element in a new way, and this preferably to a blower set, and where the entire blower set, or the entire air duct is build up, or partly build up, by the new wall elements designed according to the preamble of claim1.

The main new characteristics for the new wall elements are that the tightness between the different wall elements, in for example an entire blower set or an entire air duct, is guaranteed, also in those cases when the individual wall elements are produced with higher manufacturing tolerances and where at the same time the requirement of additional stabilization of the wall elements are reduced compared to present current standards, this means that for example supports between the individual wall elements, which usually are included in an entire duct system, can partly be excluded. Reduced requirements of tolerances bring about that the individual elements can be produced at a lower cost, at the same time as the need of support element is reduced and this in spite of the fact that the requirement of tightness for the entire blower set is entirely fulfilled.

The previous known solutions of the problem with leakage were always based on that a sealing or a sealing element were designed to manage the tightness even by some deviation in tolerances in the cooperating construction elements and this by designing the sealing with a big contact surface or with big sealing lips which can be deformed. The wall element itself however is not developed and there are no new solution based on cooperation between a new sealing and a new design of the cooperating wall elements, the cooperating plate parts.

Solutions which are described are evident from among others GB 1 174 093. Other publications which describe the query of sealing in similar applications are evident from DE 199 55 151 A1 and EP 1 306 513 A3 respective.

The object of present invention is to counteract and as far as possible to eliminate the above mentioned problem. Furthermore the invention will bring the state of the art further in different aspects. Those objects are realized according to the present invention in that a device is mainly constituted in a way, which is evident from the characteristic part of claim 1.

Further characteristics of and advantages by the invention are evident from the following description with reference to the attached drawings, showing a preferred, but not limiting example of performance of a entire or a part of a system of fan channels.

In the currently showed and described design of the joining of wall sections or plate sections with associated sealing, is in the following a preferred design described and where this is schematically illustrated in:

Figure 1 showing the design of the sealing profile
Figure 2 showing the principal design of a blower set based on wall elements with the new sealing profile.
Figure 3 showing the assembling of the cooperating wall elements.

Figure 1 shows a preferred design of the sealing profile 1 in a sectional view. The profile has an end surface 2 which is placed perpendicular to the part constituting the sealing section 3 itself. The sealing section 3 is build up of a base part 4 from which sealing lips protrude on one side, below named lips 5. The dimensions of the sealing profile are naturally adapted to the dimensions of the wall element to which it has to cooperate. An example of relations between dimensions in the sealing profile is that the base part 4 has a length of 15-40 and preferably 25 mm, a material thickness of 0.3-1.5 and preferably 1 mm and where the lips protrude 2-6 and preferably 4 mm from the plane surface 6 of the base part.

The lips are designed in a way that they approximately are inclined 45° towards the end surface 2 and have an outer part which is more or less parallel to the base part. The material thickness of the lips is preferably slightly smaller than the base part itself. Advantageous the sealing profile with a base length of approximately 25 mm has 4 lips more or less equally distributed along the length of the base part. The stiffness and slanting of the lips 5 are tested to give a perfect tightness, a tightness which normally is stipulated in functional demands by the line of business, also with a small deformation or a small reduction of the overall dimensions of the sealing part. By the design of the sealing profile it has been made possible to produce the individual plate details with little lower requirements of shape/dimensional accuracy, which means lower manufacturing costs by the plate details. A normal material quality for the sealing profile is an EPDM rubber, but also polymers based on plastic are of course plausible. To assemble the sealing strip on the wall element the strip is preferably provided with a double-stick tape 7, optionally with an

adhesive. The fixing means selected is applied on the base part 4 and its plane surface/side 6.

The end surface has a design which means that it extends approximately twice as far from the base part 4 and its plane surface 6 as the lips 5 extends, whereas the end surface 2 in the other direction only extends approximately as far as the width of the sealing section 3. Accordingly the end surface is totally three times as wide as the sealing section 3 itself and the end surface preferably has a slightly convex form, seen in a sectional view or from an end view, and its inner side, the one who is directed towards the lips, is preferably slightly convex. By this design a sealing is obtained also against the outer interface of the wall element, even if this design/sealing first of all is designed in view of the aesthetics. The end surface 2 gives itself also a form of support and an indication, that the individual wall element is assembled in its correct position relative the cooperating wall element or elements.

By the described design of the sealing profile a profile is created which means that if different wall elements are assembled, with the described sealing profile between the wall elements, the sealing requirements are fulfilled even in cases with big size tolerances in the included wall elements.

The above example of size relations in the sealing profile is naturally dependent on the entire physical size of the duct system, for what reason the size specifications only refer to an example which is variable within the scope of the invention.

Figure 2 shows in the partial figure 2a a section of for instance a blower set with a thinkable air current, with a static pressure named Pi.

The blower set has a top section 12, a bottom section 13 and where the top and bottom sections respective are preferably fixed to a frame section 14. This frame section 14 optionally also extends in the longitudinal direction of the duct system, optionally the top and bottom sections are designed with side sections who are folded or bent in a way that they forms a frame against which the individual wall elements are anchored in their respective (short) ends. Accordingly, the entire blower set is in this design which is described build up of a bottom section 13 and a top section 12 and one or more frame sections 14, which together constitute the framework of the blower set. The side elements or the walls are constituted by the wall elements 8 and 9 respective.

The dimensions of the different components included in the entire duct system vary in nature depending on the size of the individual set, i.e. on the air flow and on other physical quantities determining the overall dimensions required in the individual case. In figure 2 the wall elements 8 and 9 respective are assumed to have a width =l and a height =h even if this only is an example. The individual wall elements can natural be provided with different widths. Preferably the wall elements are fixed to the frame sections 14 or to the folded or bent sides of the lower or top sections.

By the assembling of the wall elements is shown in figure 2 how a first wall element 8 is assembled and fixed, preferably with a screwed joint 15. According to the figures an additional first wall element 8 is assembled. Between those both wall elements there are provided a second wall element 9 which isn't yet assembled.

In figure 2b parts of the top section 12 is cut away and you see in this figure an alternative of design where the duct system has frame sections 14, and where the cut exposed frame section 16 is provided with a sealing profile 1. The sealing profile is assembled in the same way as described below.

In the view from figure 2b the sealing profile 1 is assembled on a first wall element 8 and located in a way that the end surface 2 of the sealing profile is directed inwards against the duct system whereas the sealing profile assembled on a second wall element 9, the wall element which not yet is assembled in its final position, has its end surface 2 directed outwards from the duct system.

Figure 3 shows the assembling of the cooperating wall elements.
In figure 3a a horizontal section is shown of two wall elements 8 and one wall element 9. The wall elements has a width =l and a thickness =b and also a height =h which, as well as b and l, are variable.

The wall elements 8 can represent a fixed assembled part of the sides in an entire duct system. Those wall elements 8 cooperate in this example with another wall element 9 which for example is a part of a dismountable section.in the entire duct system.
In figure 3a the second wall element 9, the one which is movable relative the wall element 8, is only fitted in, or is assembled approximately half the way to its final position.

In figure 3b the both wall elements 8 and the wall elements 9 respective are assembled to their final assembled positions.

According to figure 3a it is evident that there are assembled sealing profiles 1, which are assembled on both of the wall elements 8 and 9 respective. The assembling of the sealing profile on the wall elements is preferably made with bonding. The assembling is made on the gable of the wall element, i.e. in the extension of the wall element and not on the inner side of the wall element which is the previous standard method. By assembling the sealing profile on the gable 17 of the element, the sealing profile will cooperate with a second wall element, which is placed in extension of the first wall element, and not with any separate stop placed inside the wall element, which was the current design in prior constructions.
In the new design of the wall element and the sealing profile, the requirement of a separate stop, to which the sealing profile would have to cooperate, is consequently excluded.

The sealing profiles runs, as is evident from figure 2, the whole way along the sides of the elements, in principle along the whole of the height =h, in this dace along the vertical sides.

Since the length of the sealing profile only corresponds to a part, preferably 50 % of the width of the plate profile or gable 17 from which the wall element is build up or the end gable which is formed when the wall element is produced, the advantages that the movable element in connection with the assembling first is fitted in the opening between the wall elements 8 are obtained, and this without that a higher force hast to be applied. First when the wall element 9 comes to a position where its front corner 10 reach the sealing profile, assembled on the element 8, a counter force appears. In this position the front corner will begin to press against the sealing lips 5. At the same time the second sealing profile, the one which is assembled on the wall element 9, will reach the front corner 11 in the wall element 8.

In this position of assembling a force will be needed to finally move the wall element 9 to its final position, the position according to figure 3b, where both of the wall elements are on the same level.

The assembling force is obvious dependent of the slit "a" between the elements 8 and 9. Because the sealing profile 1 has the selected design with a number of lips, which has a

curved form rear towards the end surface 2 in the sealing profile, both corners 10 and 11 respective of the wall elements will press the lips of both the sealing profiles rearwards and inwards to the base part 4 of the sealing profile. This change in position of the lips occurs without a need of high forces to be applied, which means that the assembling work is simple and therefore cost-efficient. To further facilitate the fitting in of the wall element 9 the sealing profile should be treated with a suitable lubricant or a friction lowering coating.

When both cooperating wall elements 8 and 9 are assembled the sealing profiles and their lips 5 are clamped and in close contact with the cooperating wall element.

By an inner overpressure in the entire duct system the sealing lips will be exposed to a force which attempts to press the lip away from the end surface 2 of the sealing profile and this means that the lip will be pressed harder against the cooperating wall element, which then reinforces the sealing ability of the sealing profile.

Also in the case where an inner negative pressure would arise in the entire duct system the sealing ability is reinforced, since the sealing lips 5 of the sealing profile assembled on the wall element 9 in that case is exposed to a force from the outer surrounding medium, usually air, which attempts to press the lips away from the end surface of the sealing profile an inwards towards the duct system, which means that the lips will be pressed harder against the cooperating wall elements 8.

The sealing profile works consequently in both an overpressure and in a negative pressure =Pi, in the entire duct system relative the surrounding pressure =Penvironment. This requirement is fulfilled by that the length of the sealing profile only constitute a part, preferably 50 % of the thickness =b of the wall element and that the sealing profile 1 is assembled on both of the cooperating wall elements, as is described above.

With the design which the sealing profile has in combination with that the wall elements are given an approved stiffness, no separate supporting profiles are required behind or inside the cooperating wall elements, which is standard in present constructions.

By the design of the sealing profile also a reinforced protection against unintentional disassembling of the movable wall element is obtained. It is simple to assemble the wall elements, but higher forces are required for disassembling. By a disassembling of the movable wall element 9 a sealing lips 5 will "make resist", since they in this case are directed

against the direction of motion that the wall element is given when it is disassembled. This means that by a normal deformation of the sealing profile, a higher force are required to overcome the resistance which the sealing profile creates. Naturally the movable wall element 9 usually also is fixed to the entire duct system by some form of screw joint 15. For a perfect sealing function the distance between the wall elements must of course be chosen depending on the physical dimensions of the entire duct system, which also determine the physical dimensions of the sealing profile. Generally it can be stated that the distance between the wall elements with the new sealing can vary with a measure that imply that the production of the elements can be made with wide, but in workshop practice normal tolerances, without negative affecting the sealing function of the entire duct system.

The described design of the wall elements 8 and 9 and their structure and way of assembling, do not exclude solutions which are based on that also the top section 12 and possible also the bottom section 13 are build up in the same way, i.e. that more than only the wall elements are designed in some form of module thinking with sealing profiles between the cooperating modules.

The described sealing profile can of course be altered only by dimensions so that for example the length is chosen different with a sealing profile which cover 60 % of the thickness of the wall element and the second cooperating one cover the remaining 40 %, or that both cooperating sealing profiles only cover parts of the entire thickness of the wall elements.

By the design of the sealing profile and by that it in the final assembled position of the cooperating wall elements gets an overall width which is made up of two cooperating sealing profiles, following advantages are obtained:

- simple to fit in the movable wall element to the fixed assembled wall elements

-a final fitting in of the movable element with low assembling forces

- a tight joint which is reinforced when a inner overpressure arise in the entire duct system

- a sealing joint which require higher forces in the position where the movable wall element has to be disassembled

- the sealing profile do not need any additional support profiles

- the wall elements can be produced with slightly wider dimensional tolerances owing to that he sealing profile has a high flexibility with maintained sealing ability

- a sealing joint which is based upon that two cooperating and preferably equal sealing profiles constitute the sealing

- that an overpressure in the duct system results in that the sealing profile which is assembled with its end surface inwards to the duct system gives a reinforcing of the sealing ability in the entire sealing joint

- that a negative pressure in the duct system results in that the sealing profile which is assembled with its end surface outwards to the surrounding gives a reinforcing of the sealing ability in the entire sealing joint

- that the end surface of the sealing profile which is assembled on the outer side relative the duct system results in a decorative overlapping of the junction between the cooperating wall elements.

- that the end surface of the sealing profile which is assembled on the outer side relative the duct system gives an indication on that the wall elements are assembled in place

The advantages of the new sealing and the new design of the wall elements gives as a result conditions for low costs of production of, for example, a blower duct system, a decorative/esthetic junction between the cooperating wall elements, with a quality assured sealing function in the entire duct system.

Component list

1 = sealing profile
2 = end surface
3 = sealing section
4 = bas part
5 = sealing lip - named lip
6 = surface
7 = tape
8 = wall element
9 = wall element
10=front corner
11= front corner
12= top section
13= bottom section
14= frame section
15= screw joint
16= frame section
17= gable

Claims

1. Method by assembling a sealing profile (1) on a first wall element (8) and a second sealing profile (1) on a second cooperating wall element (9), **characterized in that** the sealing profiles (1) preferably are assembled on the long side =h of the wall element, and that the sealing profiles which are assembled on the first wall element (8) have an end surface (2) which is directed in one direction and that the sealing profiles which are assembled on the second wall element (9) have its end surface (2) directed in opposite direction, and that the entire sealing element between the cooperating wall elements (8) and (9) respectively is constituted by two sealing profiles (1).

2. Device according to claim 1, **characterized in that** the length of a base portion (4) in a sealing section (3) of the sealing profile (1) only represents a part, preferably 50 % of the thickness =b of an end cover (17) of the wall elements (8) and the wall elements (9) respectively.

3. Device according to claim 1, **characterized in that** the sealing profile is provided with the sealing section (3) which is built up of the base portion (4) from which at one side a number of sealing lips (5) protrude, and that these lips are inclined, preferably by 45°, towards the end surface (2) of the sealing profile and that the base part (4) on the opposite side of the lips (5) is provided with a plane surface or side (6).

4. Device according to claim 1, **characterized in that** the sealing profile (1) is assembled on the wall elements by a double-stick tape (7), optional with an adhesive which is applied on the sealing section (3) and its plane surface or side (6).

5. Device according to claim 1, **characterized in that** the second movable wall element (9), since the element is assembled in the opening provided between the both first, fixed assembled wall elements (8), is initially fitted in the opening between the first wall elements (8) without a need of a force to be applied, and earliest when a front corner (10) of the second element (9) has reached the sealing profile (1) assembled on the first wall element (8), a counter force appears as the corner (10) in this assembling position begins to press against the sealing lips (5) and at the same time the other sealing profile, the one who is assembled on the second wall element (9), will reach a front corner (11) of the first wall element (8), and in this position a force is required to finally move the wall element (9)

to its final position, where the outer surface in both wall elements normally are in the same level.

6. Device according to claim 1, **characterized in that** an inner overpressure in a entire duct system reinforces the sealing ability, since the sealing lips (5) of the sealing profile assembled on the first wall element (8) are subjected to a force which tries to press the lips away from the end surface (2) of the sealing profile, which means that the lips will be pressed harder against the cooperating wall element.

7. Device according to claim 1, **characterized in that** an inner negative pressure in the entire duct system reinforces the sealing ability, since the sealing lips (5) of the sealing profile which is assembled on the second wall element (9) are subjected to a force from the outer surrounding medium, preferably air, which tries to press the lips away from the end surface (2) of the sealing profile and inwards against the duct system, which means that the lips will be pressed harder against the cooperating wall element.

8. Device according to claim 1, **characterized in that** the sealing profile (1) cooperates with the opposite wall element and according to the design of the wall elements and the placement of the sealing profiles, the need of a separate stop behind or inside the wall elements, against which the sealing profile in earlier constructions would have cooperated, is eliminated.

9. Device according to claim 1, **characterized in that** an unintentional removal of the second movable wall element (9) is made difficult by the circumstance that the lips (5) provided on the sealing profiles which are assembled on both the wall elements (8) and (9) respectively make resistance, since they in this case are directed against the direction of motion which the wall element is getting when it is disassembled.

10. Device according to claim 1, **characterized in that** the distance between the individual wall elements, between the first wall element (8) and the second wall element (9), in combination with the sealing profile (1) is variable and that consequently the production of the elements are made with wide, but in production normal tolerances, and this with maintained perfect sealing function in the entire duct system.

Fig. 1

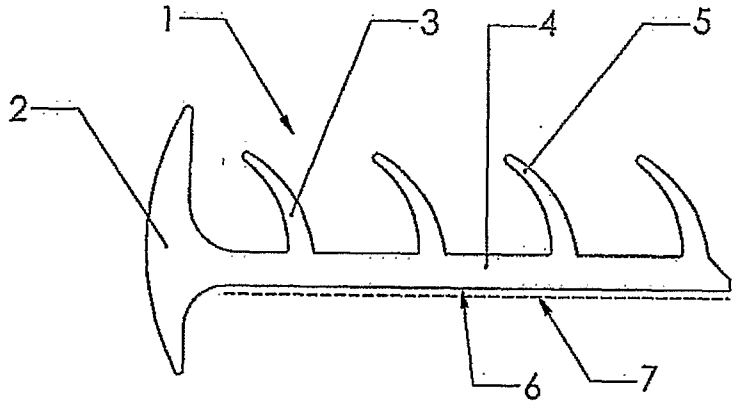
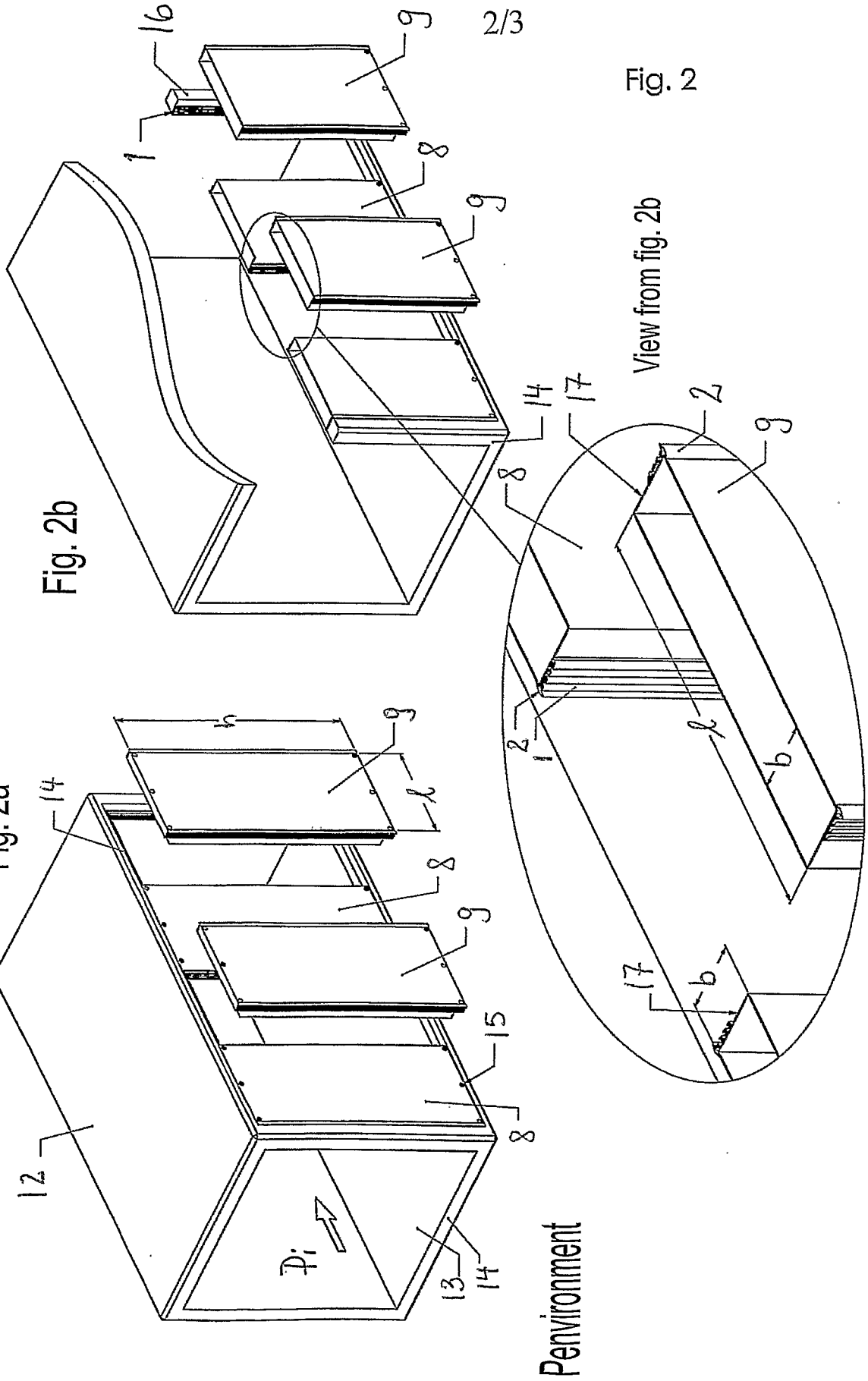


Fig. 2


16
1
9
8
9
14
17
8
View from fig. 2b
2
9
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2
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b
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b
Fig. 2b
Fig. 2a
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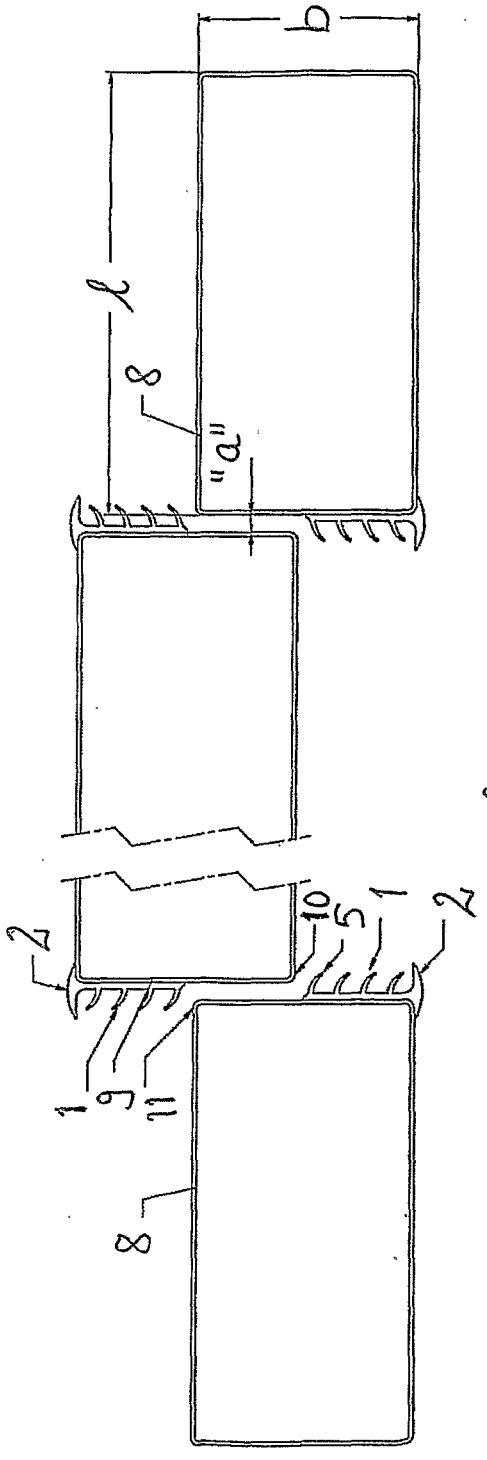


Fig. 3a

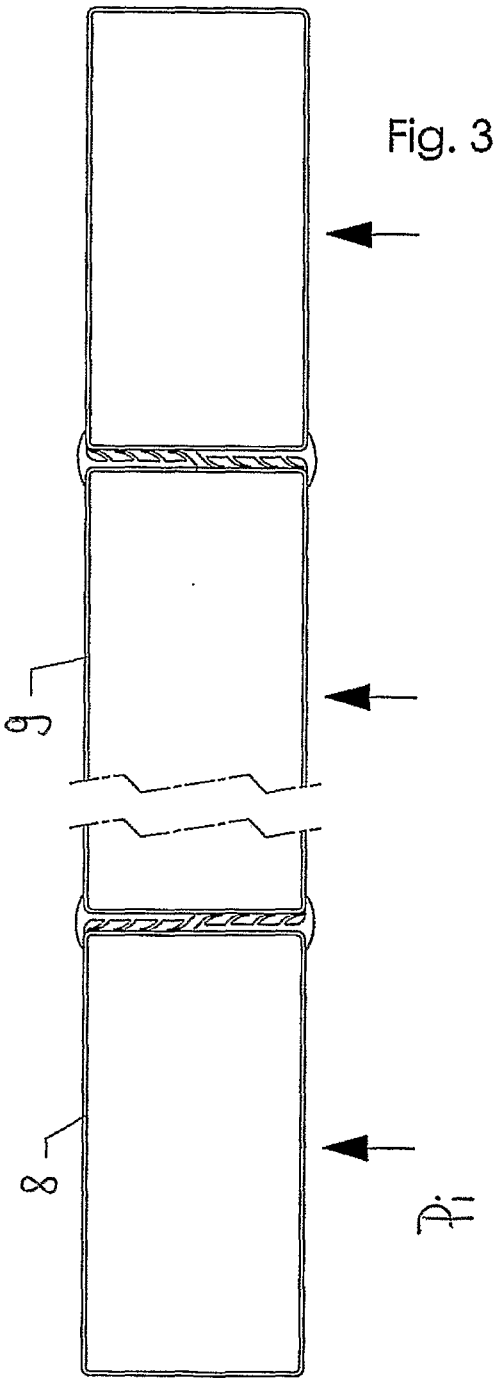


Fig. 3b

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2009/000420

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
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: E04B, E06B, F16J

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0140338 A2 (METELER KAUTSCHUK GMBH), 8 May 1985 (08.05.1985), figure 1, abstract --	1-10
A	FR 2747172 A1 (HEURTEAUX SA SOCIETE ANONYME), 10 October 1997 (10.10.1997), page 1, line 5 - page 2, line 24, figures 1-3, abstract --	1-10
A	EP 1306513 A2 (SORLIN, B.), 2 May 2003 (02.05.2003), figures 2-6, abstract -- --------	1-10

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

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Date of the actual completion of the international search	Date of mailing of the international search report
18 December 2009	21-12-2009
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Ingemar Hedlund / MRo Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2009/000420

International patent classification (IPC)

E04B 1/68 (2006.01)
F16J 15/02 (2006.01)
E06B 3/62 (2006.01)

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Cited literature, if any, will be enclosed in paper form.

EP	0140338	A2	08/05/1985	DE	3339249 A	15/05/1985
FR	2747172	A1	10/10/1997	NONE		
EP	1306513	A2	02/05/2003	FR	2831594 A,B	10/03/2006