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(54) VENT ASSEMBLY FOR VENTILATION AND MAKING METHOD THEREFOR

ENTLÜFTUNGSBAUEINHEIT UND HERSTELLUNGSVERFAHREN DAFÜR

ENSEMBLE DE VENTILATION ET SON PROCÉDÉ DE FABRICATION

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Description

Field of the invention

[0001] The present invention relates to a diffuser panel that is invisible, or otherwise hardly visible, for delivering air in a room or other environment to be ventilated, heated or cooled, or for drawing it out from such an environment.

State of the art

[0002] Whilst it is relatively simple to completely hide from view the air delivery conduits of a ventilation, heating or air conditioning system for homes, offices or other closed environments, recessing them in walls, partitions or false ceilings, it has proven very difficult to hide the vents with which these conduits terminate and introduce air in the environments to be ventilated, heated or cooled.

[0003] Some examples of such attempts to make vents that are hardly visible are described in publications US5107755 or US4135441.

[0004] Actually, however, these two examples, like many others of known vents, have not proven to be particularly effective, and the vents known in the past, according to the authors of the present invention, are clearly visible and recognisable even at a not particularly careful or expert glance.

[0005] To overcome the latter drawback and to provide a vent for wall-embedded air conduits of ventilation, heating or air conditioning systems, which during operation is less visible than known vents and hides better than these in the surrounding environment, the author of the present invention had devised the method and the vent assembly described in the Italian patent applications no. MI2014A000328, MI2015A000308 and in the European Patent Application EP15425063.

[0006] The latter vent assemblies are provided with one or more spacers **11** which position the diffuser panel **9** bearing against the box-shaped body **5** of the air casing **3,** as shown for example in Figures **1, 3** of application no. MI2014A000328.

[0007] The author of the present invention has further observed that at times installers embed the air casing **3** too deeply in the plaster of the wall P, in particular causing the flange **13** of the wall opening of the air casing to be not flush but rather below the surface of the plaster and hence the diffuser panel **9** to be too close to the surface of the plaster (Figure **1**) .

[0008] The same drawback occurs if the wall P is coated with a thick layer of additional plaster or of another additional coating as a result of renovation or restoration.

[0009] Patent document DE8703921U1 describes another example of vent assembly that comprises: an air casing comprising a box-shaped body in which a wall opening is obtained, a diffuser panel, and at least one fixing spacer.

[0010] A purpose of the present invention is therefore to provide a vent for wall-embedded air conduits of ventilation, heating or air conditioning systems, which overcomes the drawbacks of the vent assemblies described in the Italian patent applications no. MI2014A000328, MI2015A000308 and in the European patent application EP15425063, making it possible in particular to position the diffuser panel at a correct distance from the surface of a wall, even if the air casing is walled into said wall at a depth that differs from the design specification or in any case is incorrect.

Summary of the invention

[0011] Such a purpose is achieved, in a first aspect of the present invention, with a method having the features according to claim **1.**

[0012] In a particular embodiment of a method according to the invention, the diffuser panel (**9**) is substantially shaped as a flat plate.

[0013] In a particular embodiment of a method according to the invention, the diffuser panel (**9**) has a substantially rectangular shape.

[0014] In a particular embodiment of the invention, the method comprises the steps of:

- recessing and concealing a box-shaped body (**5**) in a wall (P) which delimits an environment (A) to be ventilated, heated or cooled, where in the box-shaped body the wall opening (**7**) is obtained;
- introducing air into the environment (A) to be ventilated, heated or cooled, through a chamber that is empty or otherwise permeable to air flows (**6**) and obtained within the box-shaped body (**5**), where the box-shaped body lacks grids, fins and deflectors projecting inside the empty chamber (**6**) or through the wall opening (**7**) and arranged to deflect and direct the air flow that traverses the empty chamber (**6**) and/or the wall opening (**7**).

[0015] Such a purpose is achieved, in a second aspect of the present invention, with a vent assembly having the features according to claim **6.**

[0016] In a particular embodiment of a vent assembly according to the invention, the box-shaped body (**5**) is provided with a flange (13) which surrounds the wall opening (7) and is arranged to be mounted flush with the wall (P) that delimits the environment (A).

[0017] In a particular embodiment of a vent assembly according to the invention, the box-shaped body (5) forms in its own interior a simple empty chamber lacking grids, fins and deflectors projecting inside it to deflect and direct the air flow, or however a chamber that is permeable to the air flow.

[0018] In a particular embodiment of the invention, the vent assembly comprises one or more tubular conduits (**150**) arranged to introduce air into the air casing (**3**) possibly being joined thereto by means of respective pipe union fittings (**17**), and in which the section available for the passage of air in the air casing (**3**) is equal to or greater

than **1.5** times the total air passage section through all tubular conduits (**150**) or pipe union fittings (**17**).

[0019] In a particular embodiment of the invention, the vent assembly comprises one or more tubular conduits (**150**) arranged to introduce air into the air casing (**3**) possibly being joined thereto by means of respective pipe union fittings (**17**), and in which the total section available for the passage of air at or in proximity to the delivery opening or openings of the air casing (**3**) is equal to or greater than **1.5** times the total air passage section through all tubular conduits (**150**) or pipe union fittings (**17**).

[0020] In a particular embodiment of the invention, in the vent assembly the at least one fixing spacer (**11**) is provided to fix the diffuser panel (**9**) to the box-shaped body (**5**) maintaining it in front of the wall opening (**7**) and at a maximum distance (D) from the edges of such opening (**7**) comprised between **0.2** and **0.9** centimetres.

[0021] Further features of the invention are the subject of the dependent claims.

[0022] The advantages achievable with the present invention shall become more readily apparent, to the person skilled in the art, from the following detailed description of a non-limiting particular embodiment, illustrated with reference to the following schematic figures.

List of Figures

[0023]

Figure **1** shows a side view, partially sectioned according to a plane perpendicular to the direction I, of an air casing according to the prior art;

Figure **2** shows a side view, partially sectioned according to a plane perpendicular to the direction I, of an air casing according to a first particular embodiment of the invention, inserted so as to be concealed in a wall;

Figure **3** shows a first perspective view of the air casing of Figure **1;**

Figure **4** shows a second, partially exploded, perspective view of the air casing of Figure **1;**

Figures **5, 6** respectively show a third and a fourth perspective view of the air casing of Figure **1;**

Figure **7** shows a side view of an air casing according to a second particular embodiment of the invention, sectioned according to a plane perpendicular to the air casing itself and inserted so as to be concealed in a wall.

Detailed description

[0024] Figures **2-6** relate to a vent assembly according to a first particular embodiment of the invention, which can be used to make a concealed vent.

[0025] The vent assembly is indicated with the overall reference numeral **1'**, can be used in systems for ventilating, heating or air conditioning homes, offices, places of work or other environments, and preferably comprises an air casing **3** in turn comprising:

- a box-shaped body **5** in which the wall opening **7** is obtained, which can be a simple opening without grids, fins and deflectors to deflect the exiting airflow; in this case, the box-shaped body **5** can form in its interior a simple vacuum chamber **6,** approximately shaped as a parallelepiped and without grids, fins and deflectors projecting inside it to deflect and direct the airflow; the vacuum chamber **6** is in fluid communication with the wall opening **7;**
- a diffuser panel **9** arranged for fixing to the box-shaped body **5;** and
- one or more fixing spacers **11'** arranged for fixing the diffuser panel **9** to the wall opening **7.**

[0026] The air casing **3** can for example be approximately overall parallelepiped, cylindrical, funnel shaped or even shaped like a bag or tank that is more or less swollen up or widened with respect to the tubular conduits that supply it, and can thus also be called *"plenum"* in the current technical jargon.

[0027] The air casing **3** can for example be oblong and the tubular conduits **150** can connect for example transversally to it (Figures **2, 6, 7**).

[0028] The air casing **3** and one or more tubular conduits **150** form a possible example of what is indicated in the present description as ventilation conduit **15.**

[0029] Such shapes cause the airflow coming from the tubular conduits **150** to expand and slow down in the casing **3,** reducing the noisiness of the flow that laps the diffusers **9** and making such a flow more even between various vents.

[0030] The box-shaped body **5** can for example be made of sheet metal or plastic.

[0031] Preferably, the box-shaped body **5** is provided with a flange **13** that surrounds the wall opening **7,** facilitating the mounting of the opening flush with the wall P, which can for example be made from masonry, plasterboard or wood and delimits the room or other environment in which the vent assembly **1** is to be installed.

[0032] The flange **13** in fact is provided to be flush-mounted on the wall P of the room.

[0033] According to one aspect of the invention, on each fixing spacer **11'** are obtained:

C.1) at least one spacer-fixing zone **21** arranged to fix the spacer **11'** to the air casing **3;** and

C.**2**) at least one spacer-supporting zone **110** arranged to support the fixing spacer **11'** against the outer surface of the wall P which delimits the environment A and in which the air casing **3** can be walled or in any case inserted.

[0034] At least one, and preferably all the fixing spacers **11'** are arranged to fix the diffuser panel **9** to the box-shaped body **5** maintaining it in front of the wall opening

7 and at a predetermined maximum distance D from the edges of such opening **7** and/or from the wall P in which the air casing **3** can be inserted.

[0035] At least one, and preferably all the fixing spacers **11'** allow the mutual position between the at least one spacer-fixing zone **21** and the at least one spacer-supporting zone **110** to be reversibly adjusted.

[0036] Advantageously, at least one fixing spacer **11',** and more preferably all spacers **11',** are arranged to fix the diffuser panel **9** to the box-shaped body **5** maintaining it in front of the wall opening **7** and at a predetermined maximum distance D comprised between **0.1** and **1.2** centimetres from the edges of the opening **7** and/or from the wall P.

[0037] For example at least one, and preferably all the fixing spacers **11'** comprise, each, one fixing bracket **112** in turn comprising at least one arm **114** on which the at least one spacer-fixing zone **21** is obtained.

[0038] As shown in Figures **2-5,** the fixing bracket **112** can form for example two arms **114** and be substantially U-shaped overall.

[0039] As shown in Figures **2-5,** each spacer-fixing zone **21** can be constructed for example as a leaf spring, appropriately folded or shaped and fixed on a respective arm **114,** e.g. at or in proximity to the free end of the arm **114.**

[0040] Each spring **21** is fixed for example by friction pressing against the interior of the box-shaped body **5** or snap-fastening thereto, and more specifically to the edges or to the inner flanks of the wall opening **7** (Figures **2-5**).

[0041] The springs **21** make it possible to reversibly remove and reinstall the diffuser panel **9** to the air casing **3.**

[0042] As shown in Figures **2-4,** each fixing spacer **11'** can comprise a plate **116** which forms at least one tab, which is a possible way to make the aforesaid spacer-supporting zone **110.**

[0043] In fact each tab **110** is arranged to rest against the air casing **3** and/or the wall **P** which delimits the environment A and in which the air casing **3** can be inserted so as to arrange the diffuser panel **9** at a predetermined distance D from such wall P which delimits the environment (A).

[0044] Advantageously each tab **110** is bent so as to protrude and project away from the surface on which the diffuser panel **9** all in all lies.

[0045] For this purpose, as shown in Figures **2-4** the plate **116** can have substantially H shaped plan development so as to form four tabs **110**; it can be obtained for example by shearing or cutting a flat piece of sheet metal, subsequently bending the tabs with an appropriate inclination relative to the lying plane of the diffuser panel **9** in such a way as to position the latter at the desired distance D from the surface of the wall P.

[0046] The plate **116** or in any case the tabs **110** can be supplied by the manufacturer to the installers or end users already permanently fixed - e.g. welded or riveted - to the diffuser panel **9.**

[0047] To be able to change easily and reversibly the mutual position between the spacer fixing zones **21** and the space supporting zones **110**, each spacer **11'** can advantageously be provided with one or more pins **118**, each of which extends in one or more of the following directions:

- a direction substantially perpendicular to the plane in which the diffuser panel **9** and/or any plate **116** all in all lie (direction X according to the triad of Cartesian axes of Figure **4**); and/or
- a direction substantially longitudinal to the at least one arm **114** of the fixing bracket **112** (direction X according to the triad of Cartesian axes of Figure **4**).

[0048] The fixing bracket **112** can be provided with one or more through holes or openings **120** through which the pins **118** pass.

[0049] Each pin **118** can be for example fixed to the diffuser panel **9** and/or to any plate **116** for example by means of one or more of the following processes: welding, soldering, brazing, hot or cold plastic deformation, riveting, crushing.

[0050] As in the embodiment of Figures **2-4**, the pins **118** can be threaded and the bracket **112** can be locked in a fixed, specific position along the pins **118** for example by means of the threaded nuts **122** positioned so as to form nut and lock nut systems, for example arranging by screwing a nut **122** in front of the wall of the bracket **112** and another nut behind said wall.

[0051] The fixing bracket **112** too can be obtained for example from a sheared metal plate and then appropriately bent, possibly by cond-bending or forging, die casting or casting if it is made of a metallic material or by injection moulding if it is made of a plastic material.

[0052] Each fixing spacer **11'** is arranged to fix and maintain the diffuser panel **9** in front of the wall opening **7** concealing it and allowing the air coming from the ventilation conduit **15** to come out from the wall opening and be introduced in the environment, also ensuring that at least the perimeter edges of the diffuser panel **9** project from the surface of the wall which delimits the environment for a maximum distance D comprised between **0.1** centimetres and ten centimetres.

[0053] The distance D by which at least the perimeter edges, and more preferably the entire surface of the diffuser panel **9,** project from the wall P is understood to be measured point by point moving ideally along the perimeter of the opening **7** according to a direction perpendicular to the wall P itself.

[0054] A possible manner of utilising the vent assembly **1'** described above shall now be described.

After walling, or however recessing in the wall P of the destination building the box-shaped body **5** of the air casing **3,** the installer varies, by hand or with simple tools, the inclination of the tabs **110** so as to regulate very precisely the position of the diffuser panel **9** relative to the

wall P, easily offsetting any errors of the thickness of the plaster of the wall P or of the positioning of the air casing **3** in the wall P when it had been walled therein.

[0055] To facilitate the bending of the tabs **110,** they and the plate **116** are preferably obtained from a sheet of aluminium, steel or other ferrous metal with thickness comprised between **0.4** and **4** millimetres, more preferably with thickness equal to or smaller than **3** millimetres, or for example smaller than **1** millimetre, and for example between **0.5** and **1.5** millimetres or **0.8** and **1** millimetre.

[0056] The installer then fixes the fixing bracket **112** in an appropriate axial position on the pins **118** so that, when the fixing spacers **11'** are inserted into the mouth **7** of the box-shaped body **5,** the tabs **110** bearing against the wall P position the diffuser panel **9** at an appropriate distance from the wall P itself, and at the same time the springs **21** engaging against the inner walls - or other inner zones - of the box-shaped body **5** fix the diffuser panel **9** to the box-shaped body **5.**

[0057] As has been mentioned already, the installer can lock the bracket **112** in the desired position on the pins **118** for example by means of the nuts **21** or the aforementioned bushings.

[0058] Resuming the description of the vent assembly **1'**, preferably each fixing spacer **11'** is shaped so as to cause the distance D not to exceed four centimetres, more preferably not to exceed **1.2** centimetres, not to exceed **0.9** centimetres, or to be comprised between **0.2** and **0.8** centimetres and more preferably between **0.4** and **0.6** centimetres.

[0059] The values of the distance D within the range of **0.6-0.8** centimetres have proven particularly optimal as a compromise between avoiding excessive load losses and noisiness and making the vent hardly visible for example if located in a room at a height of about **2-3.5** metres from the floor.

[0060] Higher values of the distance D, for example **10** centimetres, are particularly useful for vents positioned at great heights.

[0061] Each spacer **11'** also prevents the panel **9** from coming too close to the wall P when the vent operates in suction, with consequent throttling of the airflow.

[0062] Reference number **12** in Figure **2** indicates an opening obtained in the fixing spacer **11'** that allows the air to come out from the air casing **3** or to flow into it.

[0063] The spacers **11'** can rest on the wall P to maintain the diffuser panel at a distance D comprised in the aforementioned ranges of values from the flange **13** if the latter is present, or at the aforementioned distance D from the perimeter edges of the wall opening **7** in the absence of the flange **13.** Like in the embodiment of the accompanying Figures, the perimeter edges of the wall opening **7** can lie substantially in a plane.

[0064] The perimeter of the diffuser panel **9** ideally contains the outer perimeter of the wall opening **7.**

[0065] The diffuser panel **9** can be shaped like a flat panel, for example rectangular: such a shape has proven particularly suitable for masking the presence of the diffusor panel **9** when mounted on flat walls P of rooms or other parts of buildings or environments, making it invisible or in any case hardly visible.

[0066] In this case, preferably the wall opening **7** also has a rectangular perimeter. The diffuser panel **9** can for example be made from sheet metal or plastic material.

[0067] The wall opening **7** and the diffuser panel **9** can for example have a length comprised between **20-180** cm, or between **40-70** cm, and a height comprised between **5-50** cm or between **20-40** cm; clearly, in order to conceal the opening **7,** the length and the height of the latter will be lower, even if only by a few centimetres, with respect to the length and height of the panel **9,** respectively.

[0068] Advantageously, the diffuser panel **9,** in order to be better concealed into the surrounding environment, is configured to be able to be painted with the same paint - for example water-based paint- that covers the wall P of the building.

[0069] For this purpose, the diffusor panel **9** can be subjected to suitable surface treatments in order to facilitate the adhesion of the wall paint.

[0070] The air casing **3** is fluidically connected to the rest of the ventilation, heating or air conditioning system through the tubular conduits **150** which, as stated, preferably are not visible as they are recessed into a wall, partition or other part of the building in which the air casing **3** is also recessed in a concealed manner.

[0071] The air casing **3** can connect to the tubular conduits **150** through suitable pipe union fittings **17,** inside each of which there can possibly be butterfly valves **19** to adjust the incoming airflow in the casing **3.**

[0072] The air coming from upstream through the pipe union fittings **17** or however through the tubular conduits **150** fills the vacuum chamber **6** inside the box-shaped body **5** and thence it comes out from the wall opening **7.**

[0073] The previous values of the distance D whereby the diffuser panel projects from the installation wall P have proven optimal to conceal the panel itself from sight, or otherwise to make it hardly visible, whilst allowing an adequate outflow of air without excessive load losses and noise.

[0074] Advantageously, each tubular conduit **150** inserts in the box-shaped body with an inclination α, with respect to the surface of the diffuser panel **9,** equal to or less than **45°** (Figures **5-7**).

[0075] More preferably the inclination α is equal to or less than **30°,** even more preferably it is equal to or less than **15°** and even more preferably equal to or less than **5°.** In the case of Figure **2** it is α = **0°.**

[0076] Such inclination values considerably reduce the noisiness of the airflow coming out from the vents and that contacts the various diffuser panels **9,** making the vent assembly **1** particularly suitable for installation in homes, offices, hospitals, shops and other residential buildings.

[0077] Again to reduce the noisiness of the airflow coming out from the vents, advantageously the section

available for the passage of air in the intermediate sections of the air casing **3,** for example the through section at the ideal plane B-B (Figure **2**) is equal to or greater than **1.5** times, preferably equal to or greater than two times, more preferably equal to or greater than three times and even more preferably equal to or greater than four times the overall passage section of the air through all of the tubular conduits **150** or the connecting vents **17.**

[0078] Such passage sections through the tubular conduits **150** or the vents **17** can be determined for example at the ideal section plane A-A.

[0079] Again to reduce the noisiness of the airflow coming out from the vents, advantageously the overall section available for the passage of air at or close to the outlet section of the air casing **3,** a section obtained at or close to the ideal plane C-C, is equal to or greater than **1.5** times, and preferably equal to or greater than two times the overall passage section of the air through all of the tubular conduits **150** or the connecting vents **17.**

[0080] The ideal plane C-C can for example contain the delivery opening of the air casing **3.**

[0081] A sufficiently gradual expansion in the casing **3** of the air coming from the tubular conduits **150** also contributes to decreasing the noisiness of the vent.

[0082] For this purpose, the outlet of the conduits **150** and of the vents **17** in the air casing **3** is located at a distance DM from the closest edge of the wall opening **7** (Figure **2**).

[0083] Bearing on the wall P and not on the air casing **5,** the spacers **11'** determine the distance D of the diffuser panel **9** from said wall P correcting the positioning errors of the air casing **3** in the wall P or errors due to the fact that the plaster or other coating of the wall P are too thick, specifically allowing the distance D to return to the previously described optimal design values and also correcting also any errors of planarity and of relative orientation between the air casing **3** and the layer of plaster of the wall P.

[0084] The system too, described above, for adjusting the mutual position between the springs **21** and the supporting tabs **110** makes it possible to correct the aforesaid positioning errors of the air casing or of plastering errors of the wall P.

[0085] The embodiments described above can undergo different modifications and variations without departing from the scope of protection of the present invention.

[0086] For example, the pins **118** can be not threaded but smooth and the bracket **112** can be locked in a fixed and precise position along the pins **118** for example not by means of the threaded nuts **122** but by means of bushings, in turn locked along the pins **118** with appropriate threaded grub screws screwed in the side of each bushing; or else, to enhance the grip of the threaded grub screws, the pins **118** can be threaded, the bracket **112** can be locked in position along the pins **118** for example by means of the aforesaid bushings which in turn can be locked along the pins **118** by means of the aforesaid threaded grub screws.

[0087] Such bushings can be positioned and fixed along the pins **118** more quickly than the threaded nuts **122.**

[0088] The diffuser panel **9** and the wall opening **7** can also have non-rectangular perimeters, and can also be non-planar in shape, for example concave, convex or corrugated, although preferably highly bevelled.

[0089] Instead of fixing or bearing directly against the wall P of the room or other environment to be ventilated, heated or air conditioned, the spacers **11'** can bear on the flange **13** or other portion of the box-shaped body **5,** or in any case engage with the box-shaped body to fix the distance D.

[0090] The tabs **110** can be replaced by other types of spacers, for example by pins or other buffers fixed directly to the diffuser panel **9** and that bear directly against the wall P that delimits the environment to be ventilated.

[0091] Moreover, all of the details can be replaced by technically equivalent elements. For example, the materials used, as well as their dimensions, can be any according to the technical requirements. It should be understood that an expression of the type "A *comprises* B, C, D" or "A *is formed from* B, C, D" also comprises and describes the particular case in which "A *consists of* B, C, D". The examples and lists of possible variants of the present application should be considered as non-exhaustive lists.

Claims

1. Method for making a concealed vent for ventilation, heating or air conditioning systems, comprising the following steps, not necessarily in sequence:

S.**1**) providing a ventilation conduit (**15**) for feeding or drawing air in an environment (A) to be ventilated, heated or cooled, wherein the ventilation conduit (**15**) is concealed inside a wall (P) which delimits the environment (A) and exits outside the same through a wall opening (**7**);
S.**2**) providing at least one fixing spacer (**11'**) on which the following are obtained:

- at least one spacer-fixing zone (**21**) arranged to fix the spacer (**11'**) to the ventilation conduit (**15**); and
- at least one spacer-supporting zone (**110**) arranged to support the fixing spacer (11') against the outer surface of the wall (P);

S.**3**) fixing a diffuser panel (**9**) to the at least one fixing spacer (**11'**);
S.**4**) fixing the at least one fixing spacer (**11'**) to one or more zones of the ventilation conduit (**15**) and at the same time supporting the fixing spacer (**11'**) against the outer surface of the wall (P), so that the diffuser panel (**9**) comes to be located

in front of the wall opening (**7**) concealing the same and allowing the air coming from the ventilation conduit (**15**) to come out from the wall opening (**7**) and be fed in the environment (A), where the perimeter of the diffuser panel (**9**) ideally contains the outer perimeter of the wall opening (**7**), and at least the perimeter edges of the diffuser panel (**9**) project from the surface of the wall (P) which delimits the environment (A) for a predetermined maximum distance (D), where the at least one fixing spacer (**11'**) allows the mutual position between the at least one spacer-fixing zone (**21**) and the at least one spacer-supporting zone (**110**) to be reversibly adjusted.

2. Method according to claim **1,** wherein at least the perimeter edges of the diffuser panel (**9**) project from the surface of the wall (P) which delimits the environment (A) by a maximum distance (D) comprised between **0.1** centimetres and ten centimetres.

3. Method according to claim **1,** wherein at least the perimeter edges of the diffuser panel (**9**) project from the surface of the wall (P) which delimits the environment (A) by a maximum distance (D) equal to or less than **1.2** centimetres.

4. Method according to claim **3,** wherein at least the perimeter edges of the diffuser panel (**9**) project from the surface of the wall (P) which delimits the environment (A) by a distance comprised between **0.2** and **0.9** centimetres.

5. Method according to claim **1,** comprising the steps of:

- recessing and concealing a box-shaped body (**5**) in a wall (P) which delimits an environment (A) to be ventilated, heated or cooled, where in the box-shaped body the wall opening (**7**) is obtained;
- introducing air into the environment (A) to be ventilated, heated or cooled, through a tubular conduit (**150**) and thus through the box-shaped body (**5**), expanding and slowing down the airflow passing from the tubular conduit (**150**) in the box-shaped body, where:

  - the tubular conduit (**150**) inserts in the box-shaped body with an inclination (α), with respect to the surface of the diffuser panel (**9**), equal to or less than **45**°; and
  - the ventilation conduit (**15**) comprises the box-shaped body (**5**) and the tubular conduit (**150**).

6. Vent assembly (**1'**) for carrying out the method according to claim **1,** wherein the vent assembly comprises an air casing (**3**) in turn comprising:

A) a box-shaped body (**5**) in which a wall opening (**7**) is obtained;
B) a diffuser panel (**9**); and
C) at least one fixing spacer (**11'**) on which the following are obtained:

C.**1**) at least one spacer-fixing zone (**21**) arranged to fix the spacer (11') to the air casing (**3**); and
C.**2**) at least one spacer-supporting zone (**110**) arranged to support the fixing spacer (11') against the outer surface of the wall (P) which delimits the environment (A) and in which the air casing (**3**) can be inserted;

and wherein:

- the at least one fixing spacer (**11'**) is arranged to fix the diffuser panel (**9**) to the box-shaped body (**5**) maintaining it in front of the wall opening (**7**) and at a predetermined maximum distance (D) from the edges of such opening (**7**) and/or from the wall (P) in which the air casing (**3**) can be inserted;
- the at least one fixing spacer (**11'**) allows the mutual position between the at least one spacer-fixing zone (**21**) and the at least one spacer-supporting zone (**110**) to be reversibly adjusted.

7. Vent assembly (**1'**) according to claim **6,** wherein the at least one fixing spacer (**11'**) is provided to fix the diffuser panel (**9**) to the box-shaped body (**5**) maintaining it in front of the wall opening (**7**) and at a predetermined maximum distance (D) comprised between **0.1** and **1.2** centimetres from the edges of such opening (**7**) and/or from the wall (P) in which the air casing (**3**) can be inserted.

8. Vent assembly (**1'**) according to claim **6,** wherein the at least one fixing spacer (**11'**) comprises a fixing bracket (**112**) in turn comprising at least one arm (**114**) on which the at least one spacer-fixing zone (**21**) is obtained.

9. Vent assembly (**1'**) according to claim **8**, wherein the fixing bracket (**112**) comprises in turn at least two arms and substantially has the overall shape of a U.

10. Vent assembly (**1'**) according to claim **6,** wherein the at least one fixing spacer (**11'**) comprises a plate (**116**) which forms at least one tab forming the at least one spacer-supporting zone (**110**).

11. Vent assembly (**1'**) according to claim **10**, wherein the at least one tab **(110)** is arranged to rest against the air casing **(3)** and/or the wall (P) which delimits

the environment (A) and in which wall (P) the air casing (**3**) can be inserted so as to maintain the diffuser panel (**9**) at a distance (D) from such wall (P) which delimits the environment (A).

12. Vent assembly (**1'**) according to claim **10**, wherein the at least one tab (**110**) of the plate (**116**) is bent so as to project from the surface of the diffuser panel (**9**).

13. Vent assembly (**1'**) according to claim **6,** wherein the at least one fixing spacer (**11'**) comprises at least one pin (**118**) that extends in one or more of the following directions:

- a direction substantially perpendicular to the plane in which the diffuser panel (**9**) and/or possibly the plate (**116**) from which the one or more tabs (**110**) are obtained all in all lie;
- a direction substantially longitudinal to the at least one arm (**114**) of the fixing bracket (**112**).

14. Vent assembly (**1'**) according to claim **13**, wherein the at least one pin (**118**) is threaded so as to allow the possible fixing bracket (**112**) to be locked thereon for example with a nut and lock nut system.

15. Vent assembly according to claim **6**, also comprising a tubular conduit (**150**) arranged to carry the air to be introduced in the environment (A) to be ventilated to the box-shaped body (**5**), wherein the tubular conduit (**150**) inserts in the box-shaped body (**5**) with an inclination (α), with respect to the surface of the diffuser panel (**9**), equal to or less than **45**°.

Patentansprüche

1. Methode zur Herstellung einer verdeckten Entlüftung für Lüftungs-, Heizungs- oder Klimasysteme, aufweisend folgende, nicht unbedingt der Reihe nach ablaufende Schritte:

S.**1**) Vorsehen einer Entlüftungsleitung (**15**), um Luft in eine zu entlüftende, zu erhitzende oder zu kühlende Umgebung (A) zu leiten oder zu ziehen, wobei die Entlüftungsleitung (**15**) im Inneren einer Wand (P) verdeckt ist, welche die Umgebung (A) begrenzt, und aus derselben durch eine Wandöffnung (**7**) heraustritt;
S.**2**) Vorsehen zumindest eines Befestigungsdistanzstücks (**11'**), auf dem Folgendes bereitgestellt wird:

- zumindest einen Distanzstück-Befestigungsbereich (**21**), der dazu eingerichtet ist, das Distanzstück (**11'**) an der Entlüftungsleitung (**15**) zu befestigen; und
- zumindest einen Distanzstück-Haltebereich (**110**), der dazu eingerichtet ist das Befestigungsdistanzstück (**11'**) gegen die Außenoberfläche der Wand (P) zu halten;

S.**3**) Befestigen eines Diffusionspaneels (**9**) an dem zumindest einem Befestigungsdistanzstück (**11'**);
S.**4**) Befestigen des zumindest einem Befestigungsdistanzstücks (**11'**) an einem oder mehreren Bereichen der Entlüftungsleitung (**15**) und gleichzeitiges Halten des Befestigungsdistanzstücks (**11'**) gegen die Außenoberfläche der Wand (P), derart, dass das Diffusionspaneel (**9**) vor der Wandöffnung (**7**) angeordnet wird, so dass diese verdeckt wird und die aus der Entlüftungsleitung (**15**) kommende Luft aus der Wandöffnung (**7**) heraustreten und in die Umgebung (A) geleitet werden kann, wobei der Umfang des Diffusionspaneels (**9**) idealerweise den Außenumfang der Wandöffnung (**7**) umschließt, und zumindest die Umfangskanten des Diffusionspaneels (**9**) aus der Oberfläche der Wand (P) herausragen, welche die Umgebung (A) auf einen vorgegebenen maximalen Abstand (D) begrenzt, wobei das zumindest eine Befestigungsdistanzstück (**11'**) erlaubt, die gegenseitige Position zwischen dem zumindest einen Distanzstück-Befestigungsbereich (**21**) und dem zumindest einen Distanzstück-Haltebereich (**110**) reversibel einzustellen.

2. Methode nach Anspruch **1**, wobei zumindest die Umfangskanten des Diffusionspaneels (**9**) aus der Oberfläche der Wand (P) herausragen, welche die Umgebung (A) auf einen maximalen Abstand (D) zwischen **0.1** Zentimetern und zehn Zentimetern begrenzt.

3. Methode nach Anspruch **1**, wobei zumindest die Umfangskanten des Diffusionspaneels (**9**) aus der Oberfläche der Wand (P) herausragen, welche die Umgebung (A) auf einen maximalen Abstand (D) gleich oder weniger als **1,2** Zentimeter begrenzt.

4. Methode nach Anspruch **3**, wobei zumindest die Umfangskanten des Diffusionspaneels (**9**) aus der Oberfläche der Wand (P) herausragen, welche die Umgebung (A) auf einen Abstand (D) zwischen **0,2** und **0,9** Zentimetern begrenzt.

5. Verfahren nach Anspruch **1**, umfassend die Schritte:

- Einlassen und Verdecken eines kastenförmigen Körpers (**5**) in eine Wand (P), welche eine zu entlüftende, zu erhitzende oder zu kühlende Umgebung (A) begrenzt, wobei im kastenförmigen Körper die Wandöffnung (**7**) bereitgestellt

wird;
- Einleiten von Luft durch eine Rohrleitung (**150**) und somit durch den kastenförmigen Körper (**5**) in die zu entlüftende, zu erhitzende oder zu kühlende Umgebung (A), indem der von der Rohrleitung (**150**) in den kastenförmigen Körper fließende Luftstrom expandiert und verlangsamt wird, wobei:
- die Rohrleitung (**150**) mit einer Neigung (α) gleich oder weniger als **45**° bezüglich der Oberfläche des Diffusionspaneels (**9**), in den kastenförmigen Körper eingelegt wird; und
- die Entlüftungsleitung (**15**) den kastenförmigen Körper (**5**) und die Rohrleitung (**150**) umfasst.

6. Entlüftungsanordnung (**1'**) zur Ausführung der Methode nach Anspruch **1**, wobei die Entlüftungsanordnung ein Luftgehäuse (**3**) umfasst, dieses wiederum umfassend:

A) einen kastenförmigen Körper (**5**), in welchem eine Wandöffnung (**7**) bereitgestellt wird;
B) ein Diffusionspaneel (**9**); und
C) zumindest ein Befestigungsdistanzstück (**11'**), auf dem Folgendes bereitgestellt wird:

C.**1**) zumindest einen Distanzstück-Befestigungsbereich (**21**), der dazu eingerichtet ist das Distanzstück (**11'**) an das Luftgehäuse (**3**) zu befestigen; und
C.**2**) zumindest einen Distanzstück-Haltebereich (**110**), der dazu eingerichtet ist das Befestigungsdistanzstück (**11'**) gegen die Außenoberfläche der Wand (P) zu halten, welche die Umgebung (A) begrenzt und in welche das Luftgehäuse (**3**) eingelegt werden kann; und wobei:

- das zumindest eine Befestigungsdistanzstück (**11'**) dazu eingerichtet ist das Diffusionspaneel (**9**) an den kastenförmigen Körper (**5**) zu befestigen und vor der Wandöffnung (**7**) auf einen vorgegebenen maximalen Abstand (D) von den Kanten dieser Öffnung (**7**) und/oder von der Wand (P) zu halten, in welche das Luftgehäuse (**3**) eingelegt werden kann;
- das zumindest eine Befestigungsdistanzstück (**11'**) erlaubt, die gegenseitige Position zwischen dem zumindest einen Distanzstück-Befestigungsbereich (**21**) und dem zumindest einen Distanzstück-Haltebereich (**110**) reversibel einzustellen.

7. Entlüftungsanordnung (**1'**) nach Anspruch 6, wobei das zumindest eine Befestigungsdistanzstück (**11'**) dazu vorgesehen ist das Diffusionspaneel (**9**) an den kastenförmigen Körper (**5**) zu befestigen und vor der Wandöffnung (**7**) auf einen vorgegebenen maximalen Abstand (D) zwischen **0.1** und **1.2** Zentimetern von den Kanten dieser Öffnung (7) und/oder von der Wand (P) zu halten, in welche das Luftgehäuse (3) eingelegt werden kann.

8. Entlüftungsanordnung (1') nach Anspruch 6, wobei das zumindest eine Befestigungsdistanzstück (11') einen Befestigungsbügel (112) umfasst, dieser wiederum umfassend zumindest einen Arm (114), auf welchem der zumindest eine Distanzstück-Befestigungsbereich (21) bereitgestellt wird.

9. Entlüftungsanordnung (1') nach Anspruch 8, wobei der Befestigungsbügel (112) wiederum zumindest zwei Arme umfasst und eine im wesentlichen U-förmige Gesamtform aufweist.

10. Entlüftungsanordnung (**1'**) nach Anspruch **6**, wobei das zumindest eine Befestigungsdistanzstück (**11'**) eine Platte (**116**) umfasst, welche zumindest eine Lasche unter Ausbildung des zumindest einen Distanzstück-Haltebereichs (**110**) ausbildet.

11. Entlüftungsanordnung (**1'**) nach Anspruch **10**, wobei die zumindest eine Lasche (**110**) zur Anlage am Luftgehäuse (**3**) und/oder an der Wand (P) eingerichtet ist, welche die Umgebung (A) begrenzt und in welche Wand (P) das Luftgehäuse (**3**) eingelegt werden kann, um das Diffusionspaneel (**9**) auf einem Abstand (D) von dieser Wand (P) zu halten, welche die Umgebung (A) begrenzt.

12. Entlüftungsanordnung (**1'**) nach Anspruch **10**, wobei die zumindest eine Lasche (**110**) der Platte (**116**) so gebogen ist, dass sie aus der Oberfläche des Diffusionspaneels (**9**) herausragt.

13. Entlüftungsanordnung (**1'**) nach Anspruch **6**, wobei das zumindest eine Befestigungsdistanzstück (**11'**) zumindest einen Stift (**118**) umfasst, der sich in eine oder mehrere der folgenden Richtungen erstreckt:

- eine im Wesentlichen senkrecht zur Ebene liegende Richtung, in welche das Diffusionspaneel (**9**) und/oder eventuell die Platte (**116**) liegt, aus denen die eine oder mehrere Laschen (**110**) insgesamt bereitgestellt werden;
- eine im Wesentlichen längs des zumindest einen Arms (**114**) des Befestigungsbügels (**112**) liegende Richtung.

14. Entlüftungsanordnung (**1'**) nach Anspruch **13**, wobei der zumindest eine Stift (**118**) so geschraubt ist, dass der mögliche Befestigungsbügel (**112**) darauf verriegelt werden kann, zum Beispiel mit einer Mutter und

einem Sperrmuttersystem.

15. Entlüftungsanordnung nach Anspruch **6**, umfassend auch eine Rohrleitung (**150**), die dazu eingerichtet ist, die in die zu entlüftende Umgebung (A) einzuleitende Luft in den kastenförmigen Körper (**5**) zu führen, wobei die Rohrleitung (**150**) mit einer Neigung (α) gleich oder weniger als **45**° bezüglich der Oberfläche des Diffusionspaneels (**9**), in den kastenförmigen Körper (**5**) eingelegt wird.

Revendications

1. Procédé de fabrication d'une bouche d'aération dissimulée pour des systèmes de ventilation, de chauffage ou de climatisation, comprenant les étapes suivantes, pas nécessairement en séquence :

S.**1**) se procurer un conduit de ventilation (**15**) pour alimenter ou aspirer de l'air dans un environnement (A) à ventiler, chauffer ou refroidir, dans lequel le conduit de ventilation (**15**) est dissimulé à l'intérieur d'un paroi (P) qui délimite l'environnement (A) et sort à l'extérieur de celle-ci à travers une ouverture de paroi (**7**) ;
S.**2**) se procurer au moins un espaceur de fixation (**11'**) sur lequel les éléments suivants sont obtenus :

- au moins une zone de fixation d'espaceur (**21**) conçue pour fixer l'espaceur (**11'**) au conduit de ventilation (**15**) ; et
- au moins une zone de support d'espaceur (**110**) conçue pour porter l'espaceur de fixation (**11'**) sur la surface externe de la paroi (P) ;

S.**3**) fixer un panneau diffuseur (**9**) sur ledit au moins un espaceur de fixation (**11'**) ;
S.**4**) fixer ledit au moins un espaceur de fixation (**11'**) sur une ou plusieurs zones du conduit de ventilation (**15**) et porter en même temps l'espaceur de fixation (**11'**) sur la surface externe de la paroi (P), de telle sorte que le panneau diffuseur (**9**) vient se placer à l'avant de l'ouverture de paroi (**7**) en dissimulant celle-ci et en permettant à l'air provenant du conduit de ventilation (**15**) de sortir de l'ouverture de paroi (**7**) et d'être alimenté dans l'environnement (A), le périmètre du panneau diffuseur (**9**) contenant idéalement le périmètre externe de l'ouverture de paroi (**7**), et au moins les bords de périmètre du panneau diffuseur (**9**) font saillie à partir de la surface de la paroi (P) qui délimite l'environnement (A) sur une distance maximale prédéterminée (D), ledit au moins un espaceur de fixation (**11'**) permettant à la position mutuelle entre ladite au moins une zone de fixation d'espaceur (**21**) et ladite au moins une zone de support d'espaceur (**110**) d'être ajustée de manière réversible.

2. Procédé selon la revendication **1**, dans lequel au moins les bords de périmètre du panneau diffuseur (**9**) font saillie à partir de la surface de la paroi (P) qui délimite l'environnement (A) d'une distance maximale (D) comprise entre **0,1** centimètres et dix centimètres.

3. Procédé selon la revendication **1**, dans lequel au moins les bords de périmètre du panneau diffuseur (**9**) font saillie à partir de la surface de la paroi (P) qui délimite l'environnement (A) d'une distance maximale (D) égale ou inférieure à **1,2** centimètres.

4. Procédé selon la revendication **3**, dans lequel au moins les bords de périmètre du panneau diffuseur (**9**) font saillie à partir de la surface de la paroi (P) qui délimite l'environnement (A) d'une distance comprise entre **0,2** et **0,9** centimètres.

5. Procédé selon la revendication **1**, comprenant les étapes consistant à :

- encastrer et dissimuler un corps en forme de boîte (5) dans une paroi (P) qui délimite un environnement (A) à ventiler, chauffer ou refroidir, l'ouverture de paroi (7) étant obtenue dans le corps en forme de boîte ;
- introduire de l'air dans l'environnement (A) à ventiler, chauffer ou refroidir, à travers un conduit tubulaire (150) et donc à travers le corps en forme de boîte (5), dilater et ralentir le flux d'air passant du conduit tubulaire (150) au corps en forme de boîte, dans lequel :
- le conduit tubulaire (**150**) s'insère dans le corps en forme de boîte avec une inclinaison (α), par rapport à la surface du panneau diffuseur (**9**), égale ou inférieure à **45**° ; et
- le conduit de ventilation (**15**) comprend le corps en forme de boîte (**5**) et le conduit tubulaire (**150**).

6. Ensemble bouche d'aération (**1'**) pour mettre en oeuvre le procédé selon la revendication **1**, dans lequel l'ensemble bouche d'aération comprend un carter à air (**3**) comprenant à son tour :

A) un corps en forme de boîte (**5**) dans lequel une ouverture de paroi (**7**) est obtenue ;
B) un panneau diffuseur (**9**) ; et
C) au moins un espaceur de fixation (**11'**) sur lequel les éléments suivants sont obtenus :

C.**1**) au moins une zone de fixation d'espa-

ceur (**21**) conçue pour fixer l'espaceur (**11'**) sur le carter à air (**3**) ; et
C.**2**) au moins une zone de support d'espaceur (**110**) conçue pour porter l'espaceur de fixation (**11'**) sur la surface externe de la paroi (P) qui délimite l'environnement (A) et dans laquelle le carter à air (**3**) peut être inséré ; et dans lequel :

- ledit au moins un espaceur de fixation (**11'**) est conçu pour fixer le panneau diffuseur (**9**) sur le corps en forme de boîte (**5**) en le maintenant à l'avant de l'ouverture de paroi (**7**) et à une distance maximale prédéterminée (D) des bords de cette ouverture (**7**) et/ou de la paroi (P) dans laquelle le carter à air (**3**) peut être inséré ;
- ledit au moins un espaceur de fixation (**11'**) permet à la position mutuelle entre ladite au moins une zone de fixation d'espaceur (**21**) et ladite au moins une zone de support d'espaceur (**110**) d'être ajustée de manière réversible.

7. Ensemble bouche d'aération (**1'**) selon la revendication **6**, dans lequel ledit au moins une espaceur de fixation (**11'**) est fourni pour fixer le panneau diffuseur (**9**) sur le corps en forme de boîte (**5**) en le maintenant à l'avant de l'ouverture de paroi (**7**) et à une distance maximale prédéterminée (D) comprise entre **0,1** et **1,2** centimètres des bords de cette ouverture (**7**) et/ou de la paroi (P) dans laquelle le carter à air (**3**) peut être inséré.

8. Ensemble bouche d'aération (**1'**) selon la revendication **6**, dans lequel ledit au moins un espaceur de fixation (**11'**) comprend une ferrure de fixation (**112**) comprenant à son tour au moins un bras (**114**) sur lequel ladite au moins une zone de fixation d'espaceur (**21**) est obtenue.

9. Ensemble bouche d'aération (**1'**) selon la revendication **8**, dans lequel la ferrure de fixation (**112**) comprend à son tour au moins deux bras et a sensiblement la forme générale d'un U.

10. Ensemble bouche d'aération (**1'**) selon la revendication **6**, dans lequel ledit au moins un espaceur de fixation (**11'**) comprend une plaque (**116**) qui forme au moins une languette formant ladite au moins une zone de support d'espaceur (**110**).

11. Ensemble bouche d'aération (**1'**) selon la revendication **10**, dans lequel ladite au moins une languette (**110**) est conçue pour prendre appui contre le carter à air (**3**) et/ou la paroi (P) qui délimite l'environnement (A) et dans laquelle paroi (P) le carter à air (**3**) peut être inséré afin de maintenir le panneau diffuseur (**9**) à une distance (D) de cette paroi (P) qui délimite l'environnement (A).

12. Ensemble bouche d'aération (**1'**) selon la revendication **10**, dans lequel ladite au moins une languette (**110**) de la plaque (**116**) est pliée afin de faire saillie à partir de la surface du panneau diffuseur (**9**).

13. Ensemble bouche d'aération (**1'**) selon la revendication **6**, dans lequel ledit au moins un espaceur de fixation (**11'**) comprend au moins une broche (**118**) qui s'étend dans l'une ou plusieurs des directions suivantes :

- une direction sensiblement perpendiculaire au plan dans lequel le panneau diffuseur (**9**) et/ou éventuellement la plaque (**116**) à partir de laquelle lesdites une ou plusieurs languettes (**110**) sont obtenues se situent globalement ;
- une direction sensiblement longitudinale audit au moins un bras (**114**) de la ferrure de fixation (**112**).

14. Ensemble bouche d'aération (**1'**) selon la revendication **13**, dans lequel ladite au moins une broche (**118**) est filetée afin de permettre à la ferrure de fixation éventuelle (**112**) d'être fixée sur celle-ci par exemple avec un système d'écrou et d'écrou de blocage.

15. Ensemble bouche d'aération selon la revendication **6**, comprenant également un conduit tubulaire (**150**) conçu pour transporter l'air à introduire dans l'environnement (A) à ventiler dans le corps en forme de boîte (**5**), dans lequel le conduit tubulaire (**150**) s'insère dans le corps en forme de boîte (**5**) avec une inclinaison (α), par rapport à la surface du panneau diffuseur (**9**), égale ou inférieure à **45**°.

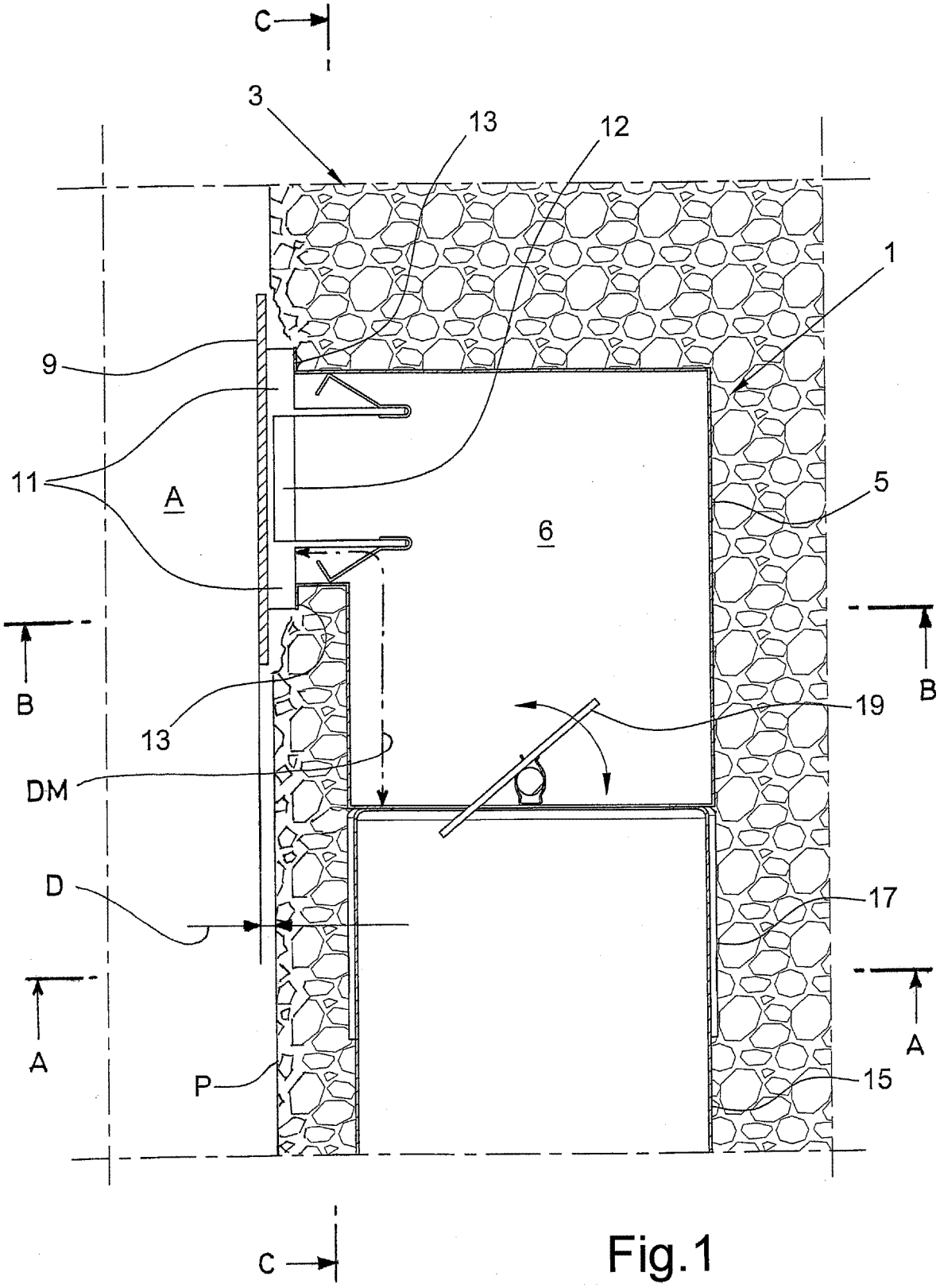

Fig.1
(PRIOR ART)

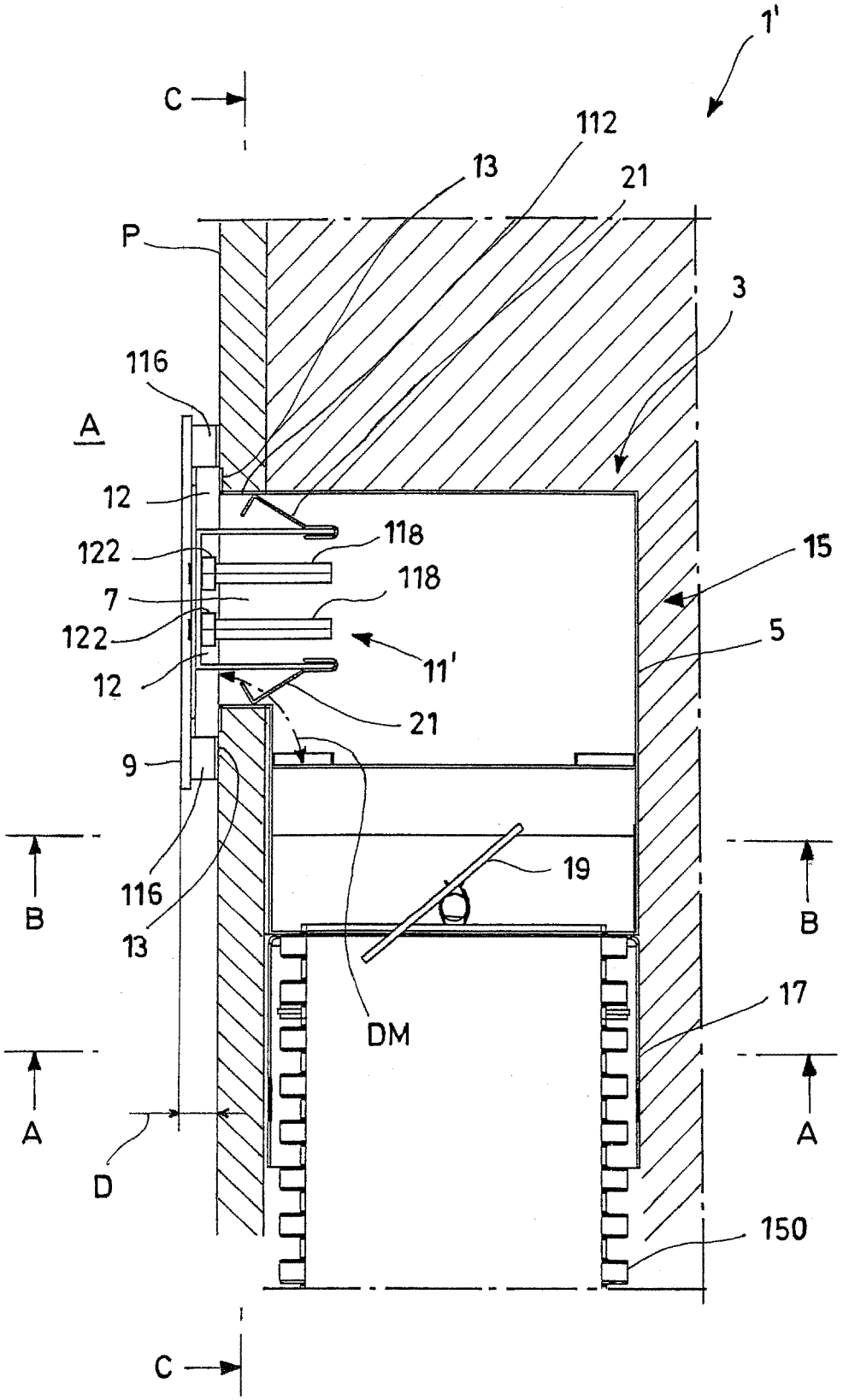
1'
C
112
13
21
P
3
116
A
12
118
122
118
15
7
5
122
11'
12
21
9
19
116
B
B
13
DM
17
A
A
D
150
C

Fig.2

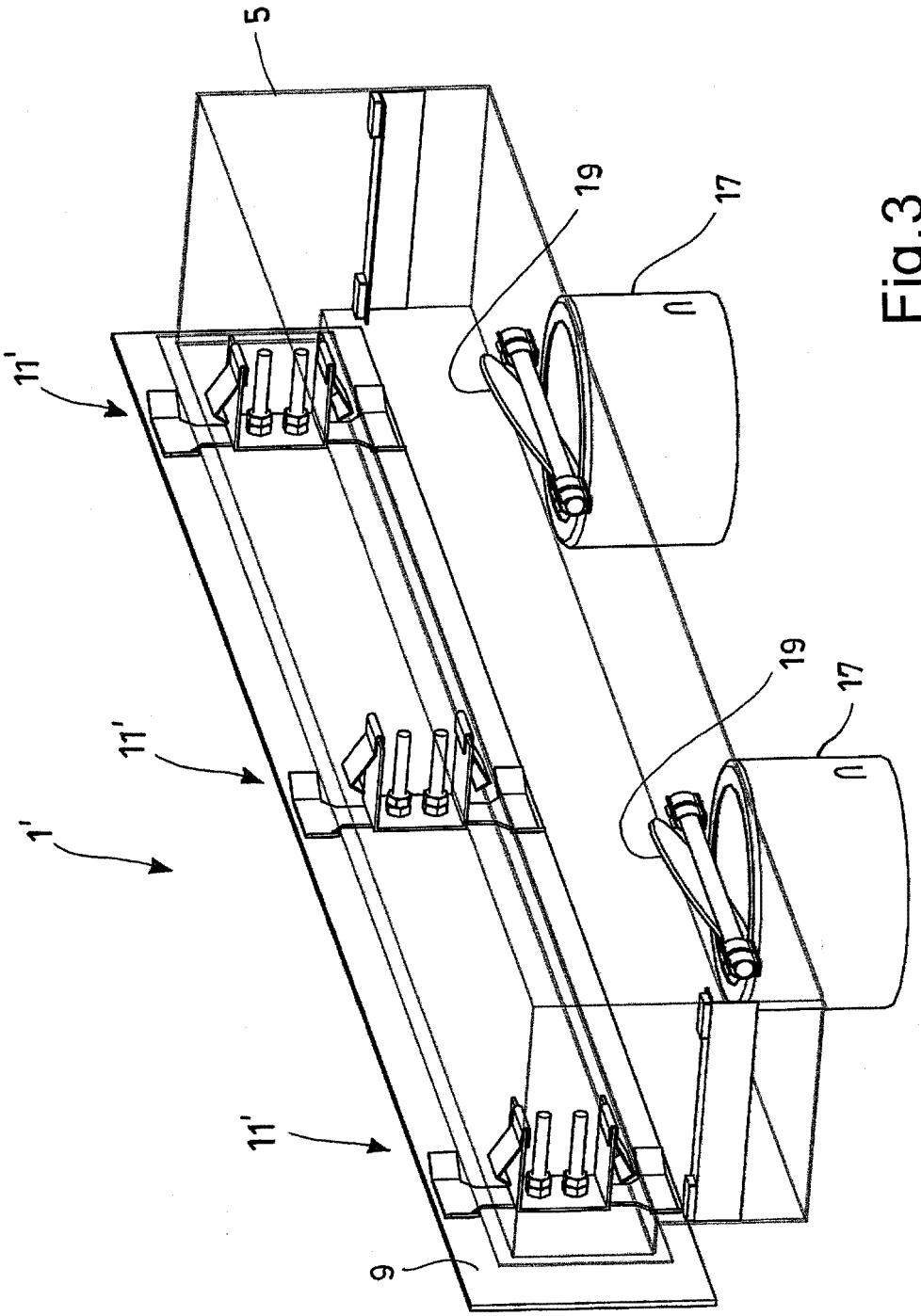

Fig.3

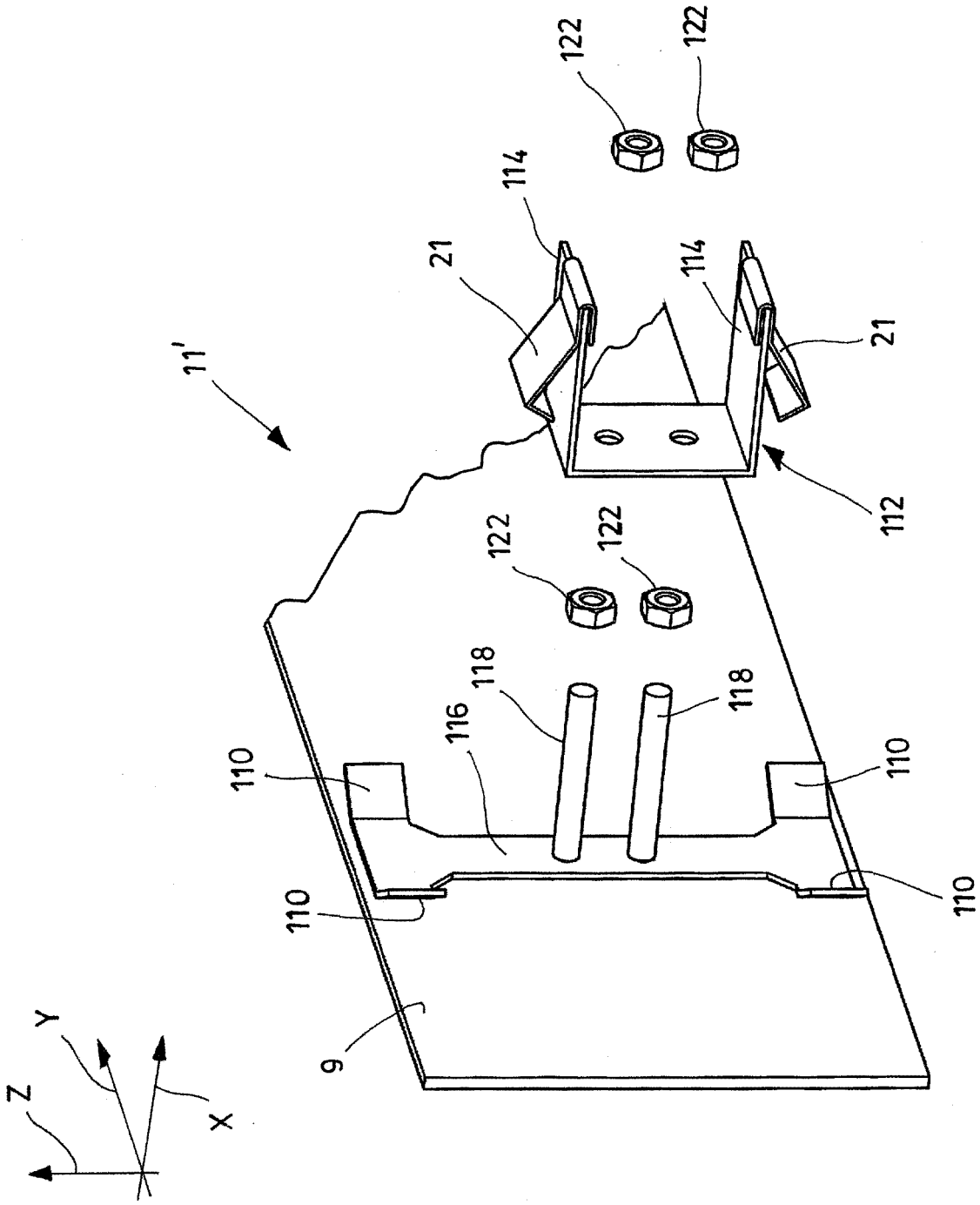
122
122
114
21
114
21
11'
112
122
122
118
116
118
110
110
110
110
9
Y
Z
X

Fig.4

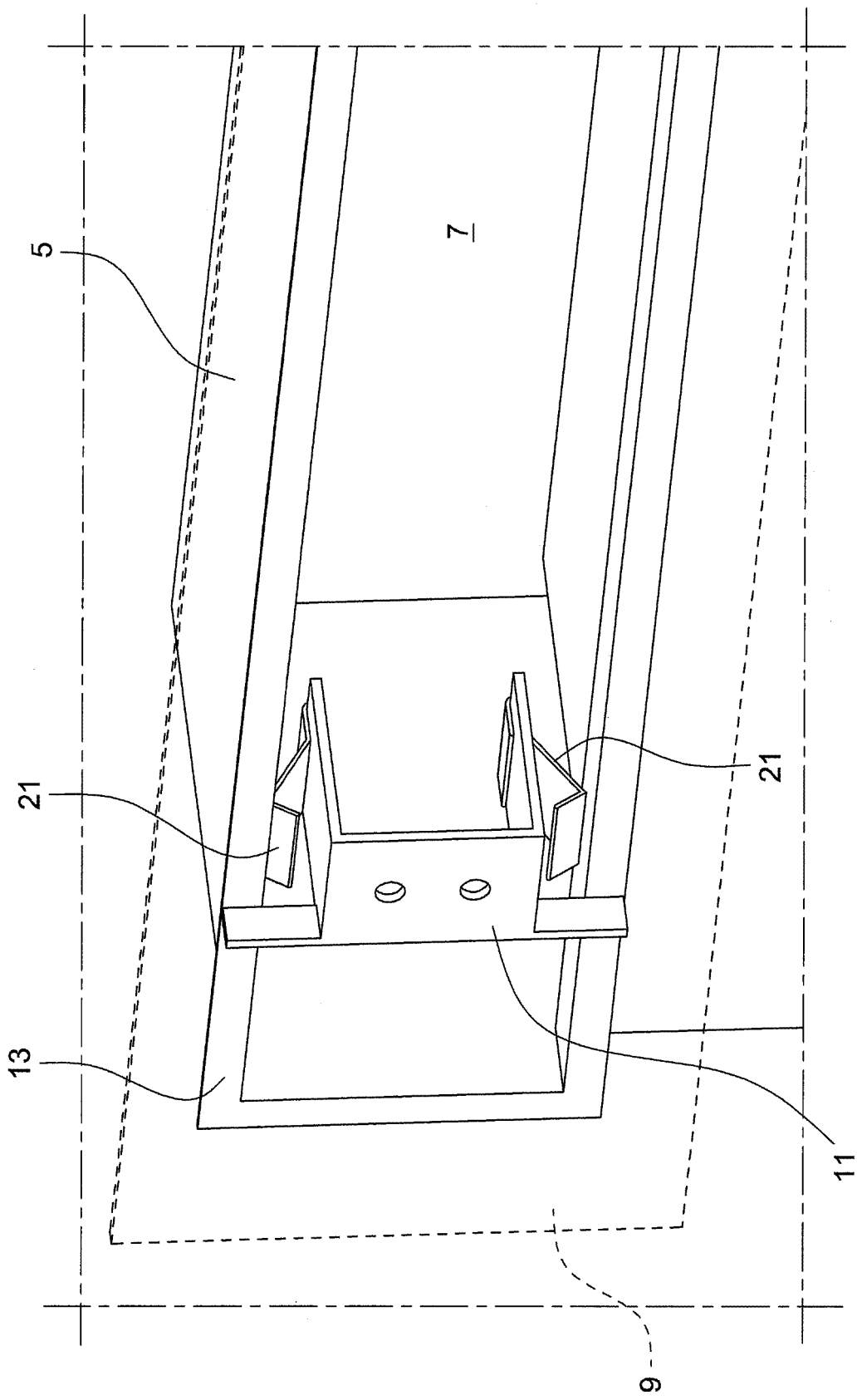

Fig.5

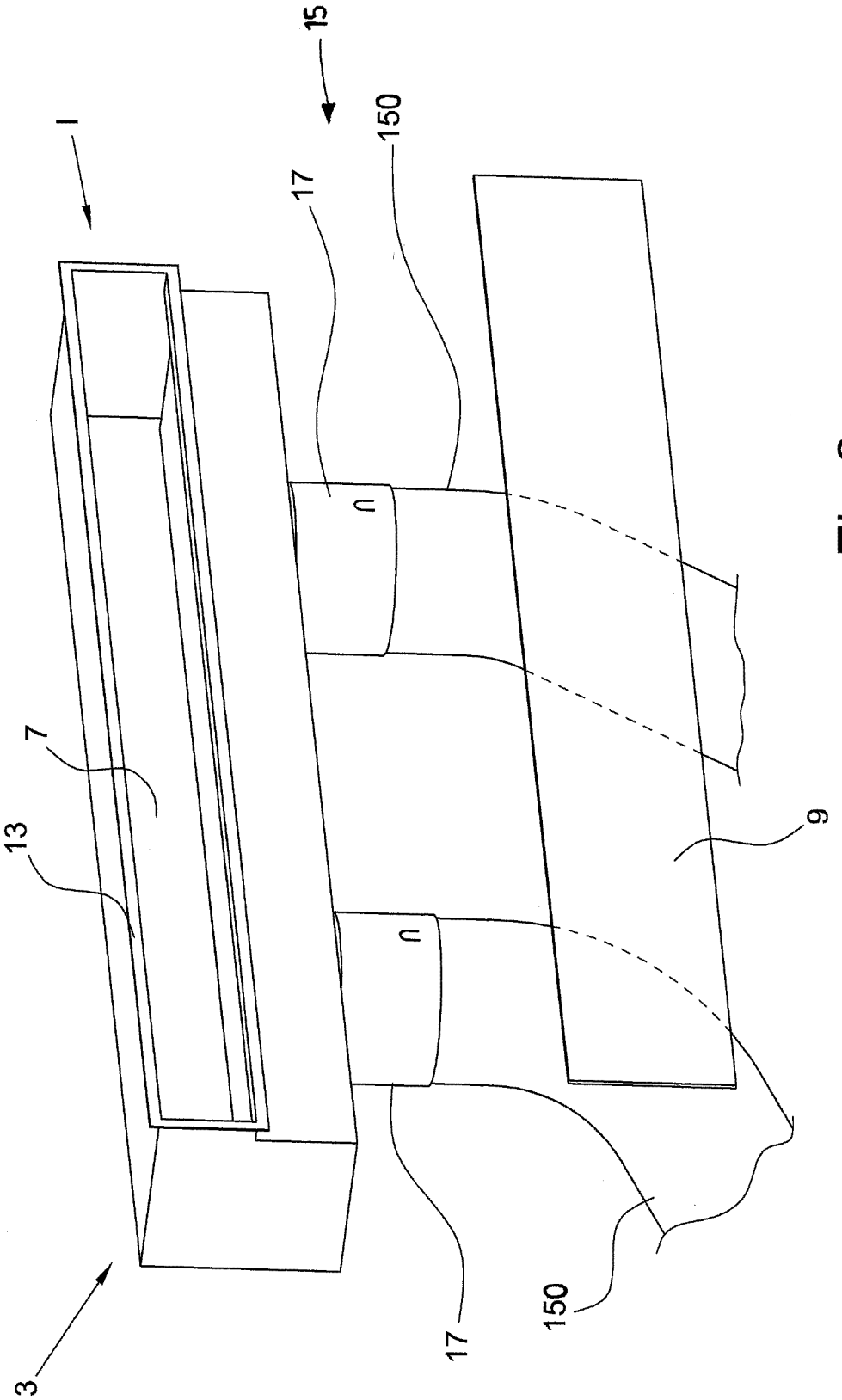

Fig.6

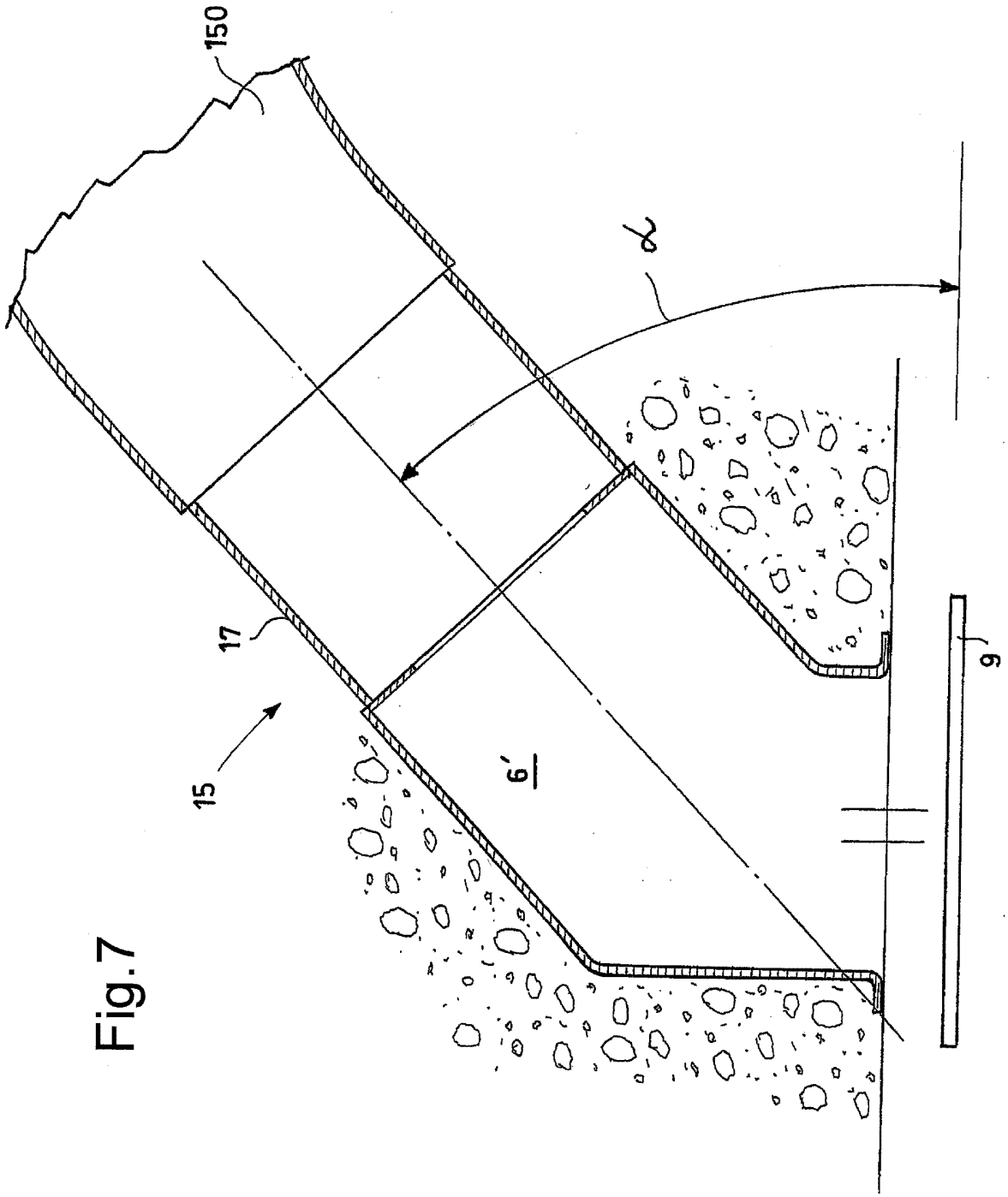

Fig.7

REFERENCES CITED IN THE DESCRIPTION

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