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(54) **METHOD FOR MAKING A CONCEALED VENT FOR VENTILATION, HEATING OR CONDITIONING SYSTEMS, AND VENT ASSEMBLY FOR CARRYING OUT SUCH METHOD**

(57) The method according to the invention, for making a concealed vent for ventilation, heating or air conditioning systems, comprises the following operations: A) providing a ventilation conduit (15) for introducing or drawing air in an environment (A) to be ventilated, heated or cooled; the ventilation conduit (15) is concealed in a wall (P) which delimits the environment (A) and opens outside of it through a wall opening (7); B) providing a diffuser panel (9) located in front of the wall opening (7) so as to conceal it allowing the air coming from the ventilation conduit (15) to come out from the opening (7) and be introduced in the environment (A); the perimeter of the diffuser panel (9) ideally contains the outer parameter 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 maximum distance (D) comprised between 0.1 centimetres and ten centimetres.

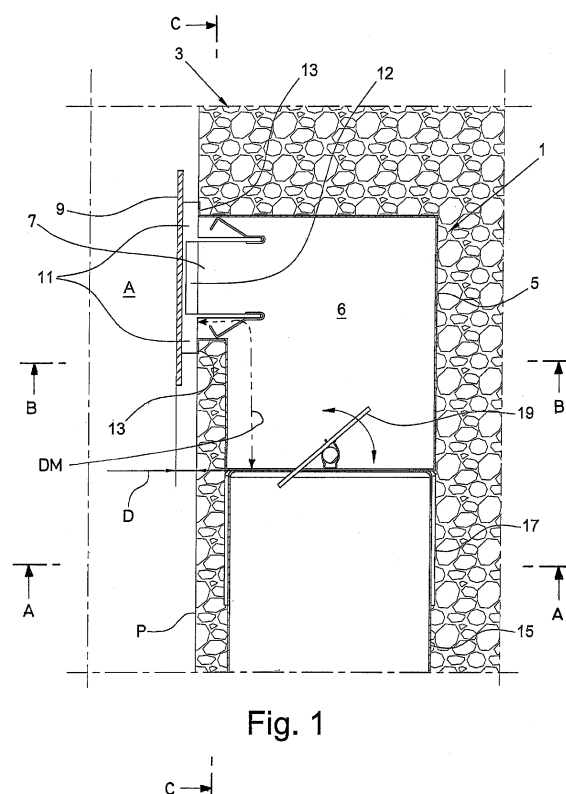


Fig. 1

Description

Field of the invention

[0001] The present invention concerns a diffusor panel that is invisible, or in any case 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. Actually, however, these two examples, like many others of known vents, have not proven to be particularly effective, and the vents currently known, according to the authors of the present invention, are clearly visible and recognisable even at a not particularly careful or expert glance.

[0004] A purpose of the present invention is therefore to provide a vent for wall-mounted 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.

Summary of the invention

[0005] Such a purpose is achieved, in a first aspect of the present invention, with a method having the features according to claim 1.

In a second aspect of the invention, such a purpose is accomplished with a vent assembly having the features according to claim 8.

Further features of the invention are the object of the dependent claims.

[0006] The advantages that can be obtained with the present invention will become clearer, to those skilled in the art, from the following detailed description of a particular non-limiting embodiment, illustrated with reference to the following schematic figures.

List of Figures

[0007]

Figure 1 shows a side view, partially in section 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 2 shows a first partially exploded perspective

view of the air casing of Figure 1;

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

Figure 4 shows a side view of an air casing according to a second particular embodiment of the invention, in section according to a plane perpendicular to the air casing itself and inserted so as to be concealed in a wall.

10 Detailed description

[0008] Figures 1-3 relate to a vent assembly according to a first particular embodiment of the invention, which can be used to make a concealed vent. 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 diverge the exiting airflow; in this case, the box-shaped body 5 can form therewithin a simple vacuum chamber 6, approximately shaped as a parallelepiped and without grids, fins and deflectors projecting inside it to diverge and direct the airflow; the vacuum chamber 6 is in fluid communication with the wall opening 7;
- a diffusor panel 9 arranged for fixing to the box-shaped body 5; and
- one or more fixing brackets or spacers 11 arranged for fixing the diffusor panel 9 to the wall opening 7.

[0009] 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 inflated or widened with respect to the ventilation conduits that supply it, and can thus also be called "*plenum*" in the current technical jargon. The air casing can for example be oblong and the ventilation conduits 15 can connect for example transversally to it (Figures 2, 4).

[0010] Such shapes ensure that the airflow coming from the conduits 15 expands and slows down in the casing 3, reducing the noisiness of the flow that contacts the distributors 9 and making such a flow more even between various vents.

[0011] The box-shaped body 5 can for example be made from sheet metal or plastic.

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 must be installed. The flange 13 is indeed provided to be flush-mounted on the wall P of the room.

[0012] The fixing spacers 11 can be obtained, for ex-

ample, from a suitably bent metal sheet (Figure 3) or through injection moulding if made from plastic material. The spacers 11 can be provided with suitable springs 21 through which they snap-fasten to the box-shaped body 5, and more specifically to the edges of the wall opening 7.

[0013] According to an aspect of the invention, the fixing spacers 11 are provided 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 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.

[0014] 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 intended 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. Preferably, the distance D is no more than four centimetres; more preferably, the distance D is no more than 1.2 centimetres; more preferably, it is no more than 0.9 centimetres; even more preferably it is comprised between 0.2-0.8 centimetres and even more preferably between 0.4-0.6 centimetres.

[0015] 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.

[0016] Higher values of the distance D, for example 10 centimetres, are particularly useful for vents positioned at great heights.

[0017] The spacers 11 also prevent the panel 9 from coming too close to the wall P when the vent operates in suction, with consequent throttling of the airflow. Reference numeral 12 in Figure 1 indicates an opening obtained in the fixing bracket 11 that allows the air to come out from the air casing 3 or to flow into it. Like in the embodiment of the attached Figures, the spacers 11 can rest on the flange 13, or in any case refer to it to set the distance D.

[0018] The spacers 11 can fix to the box-shaped body 5 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 attached Figures, the perimeter edges of the wall opening 7 can lie substantially in a plane.

[0019] The perimeter of the diffuser panel 9 ideally contains the outer parameter of the wall opening 7. The diffuser panel 9 can advantageously be shaped like a flat panel, for example rectangular: such a shape has proven particularly suitable for masking the presence of the diffuser 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. 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.

[0020] 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.

[0021] Advantageously, the diffuser panel 9, in order to better blend into the surrounding environment, is configured to be able to be painted with the same paint - for example water-based - that covers the wall P of the building. For this purpose, the diffuser panel 9 can be subjected to suitable surface treatments in order to facilitate the adhesion of the wall paint.

[0022] The air casing 3 is fluidically connected to the rest of the ventilation, heating or air conditioning system through the conduits 15 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. The air casing 3 can connect to the conduits 15 through suitable connecting unions 17, inside each of which there can possibly be butterfly valves 19 to adjust the airflow in the casing 3. The air coming from upstream through the conduits 17 fills the vacuum chamber 6 inside the box-shaped body 5 and from here comes out from the wall opening 7.

[0023] The above values of the distance D with which the diffuser panel protrudes from the installation wall P have proven optimal to conceal the panel itself from view, or in any case make it hardly visible, at the same time allowing a suitable outflow of air without excessive load losses and noisiness.

[0024] Advantageously, each ventilation conduit 15 inserts into 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 3, 4). 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 1 $\alpha = 0^\circ$. 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 buildings used as homes.

[0025] 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, like for example the through section at the ideal plane B-B (Figure 1) 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 conduits 15 or the connecting unions 17.

[0026] Such passage sections through the conduits 15 or the unions 17 can be obtained for example at the ideal section plane A-A.

[0027] 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 conduits 15 or the connecting unions 17. The ideal plane C-C can for example contain the delivery opening of the air casing 3.

[0028] A sufficient gradualness of the expansion in the casing 3 of the air coming from the conduits 15 also contributes to decreasing the noisiness of the vent. For this purpose, the outlet of the conduits 15 and of the vents 17 in the air casing is located at a distance DM from the closest edge of the wall opening 7 (Figure 1).

[0029] The embodiments described above can undergo different modifications and variations without departing from the scope of protection of the present invention. For example, 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, even if highly preferably bevelled.

[0030] Instead of fixing to the flange 13 or other portion of the box-shaped body 5, the fixing brackets/spacers can fix or rest directly against the wall P of the room or other environment to be ventilated, heated or air conditioned. Moreover, all of the details can be replaced by technically equivalent elements. For example, the materials used, as well as the sizes, can be whatever 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:

- providing a ventilation conduit (15) for introducing or drawing air in an environment (A) to be ventilated, heated or cooled, where 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);
- providing a diffuser panel (9) located in front of the wall opening (7) so as to conceal it allowing

the air coming from the ventilation conduit (15) to exit from the wall opening (7) and be introduced in the environment (A), where the perimeter of the diffuser panel (9) ideally contains the outer parameter 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) by a maximum distance (D) comprised between 0,1 centimetres and ten centimetres.

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) equal to or less than 1.2 centimetres.

3. Method according to claim 2, 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 0.2-0.9 centimetres.

4. Method according to claim 1, wherein the diffuser panel (9) substantially has the shape of a flat panel.

5. Method according to claim 1, wherein the diffuser panel (9) is substantially rectangular shaped.

6. Method according to claim 1, comprising the operations 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 vacuum chamber (6) obtained in the box-shaped body (5), where the box-shaped body is without grids, fins and deflectors projecting into the vacuum chamber (6) or through the wall opening (7) and arranged for deviating and directing the airflow passing through the vacuum chamber (6) and/or the wall opening (7).

7. Method according to claim 1, comprising the operations 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 the ventilation conduit (15) and thus through the box-

- shaped body (5), expanding and slowing down the airflow passing from the ventilation conduit (15) in the box-shaped body, where the ventilation conduit (15) inserts in the box-shaped body with an inclination (α), with respect to the surface of the diffusor panel (9), equal to or less than 45°. 5
8. Vent assembly (1) for obtaining the method according to claim 1, wherein the vent assembly comprises an air casing (3) in turn comprising: 10
- a box-shaped body (5) in which the wall opening (7) is obtained;
 - a diffusor panel (9); and 15
- one or more fixing brackets or spacers (11) arranged for fixing the diffusor 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 0.1-1.2 centimetres. 20
9. Vent assembly according to claim 8, wherein the one or more fixing brackets or spacers (11) are arranged for fixing the distributor 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 0.2-0.9 centimetres. 25
10. Vent assembly according to claim 8, wherein the box-shaped body (5) is provided with a flange which surrounds the wall opening (7) and is provided to be flush-mounted on the wall (P) which delimits the environment (A). 30
11. Vent assembly according to claim 8, wherein the box-shaped body (5) forms therewithin a simple vacuum chamber without grids, fins and deflectors projecting thereinto to diverge and direct the airflow. 35
12. Vent assembly according to claim 8, also comprising a ventilation conduit (15) arranged for carrying the air to be introduced in the environment (A) to be ventilated to the box-shaped body (5), wherein the ventilation conduit (15) inserts in the box-shaped body with an inclination (α), with respect to the surface of the diffusor panel (9), equal to or less than 45°. 40
13. Vent assembly according to claim 8, comprising one or more supply conduits (15) provided to introduce air in the air casing (3) possibly joining thereto through respective connecting unions (17), and wherein the section available for the passage of air in the air casing (3) is equal to or greater than 1.5 times the overall passage section of the air through all of the conduits (15) or the connecting unions (17). 45
14. Vent assembly according to claim 8, comprising one or more supply conduits (15) provided to introduce air in the air casing (3) possibly joining thereto through respective connecting unions (17), and wherein the section available for the passage of air at or close to the delivery opening(s) of the air casing (3) is equal to or greater than 1.5 times the overall passage section of the air through all of the conduits (15) or the connecting unions (17). 50

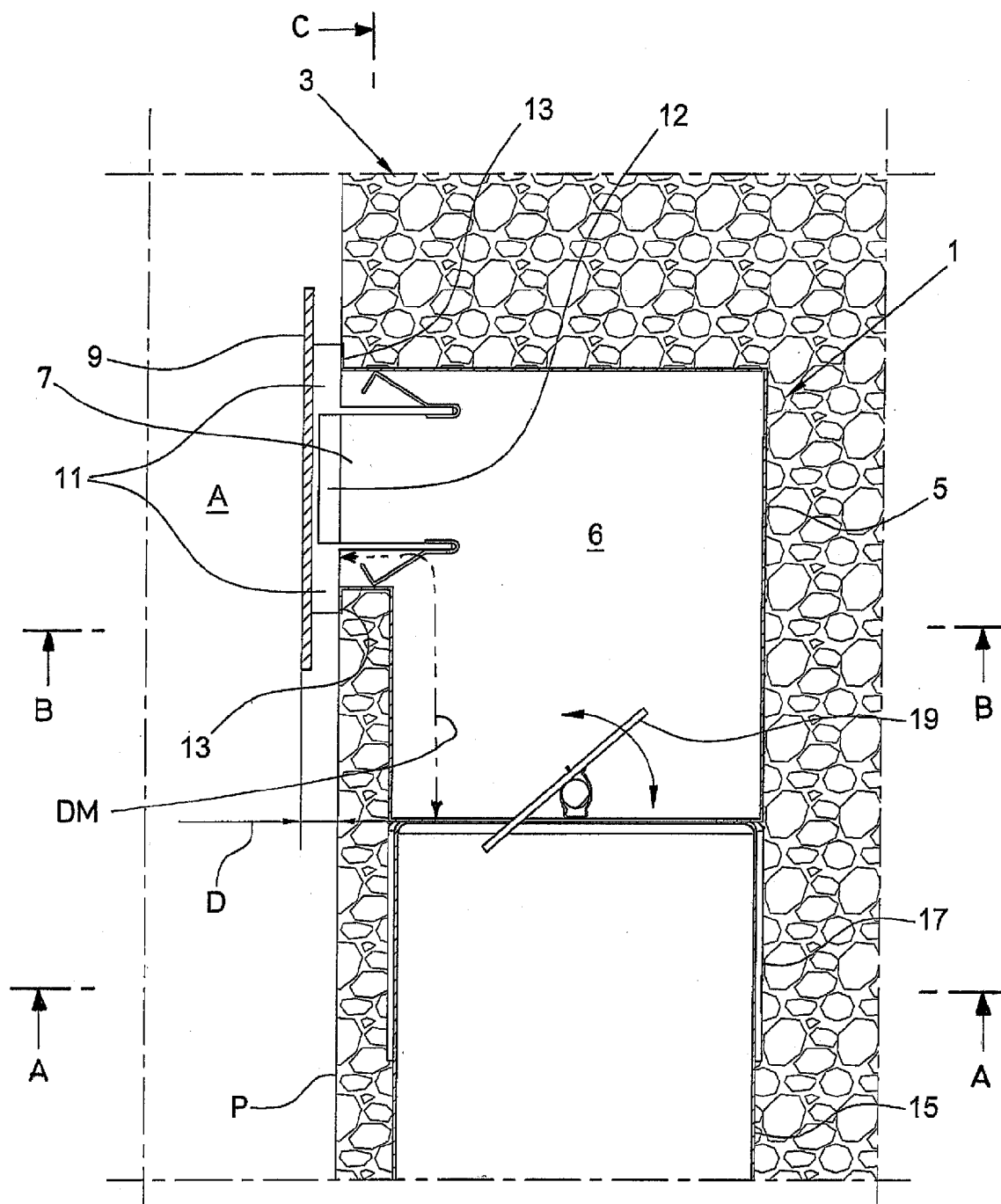


Fig. 1

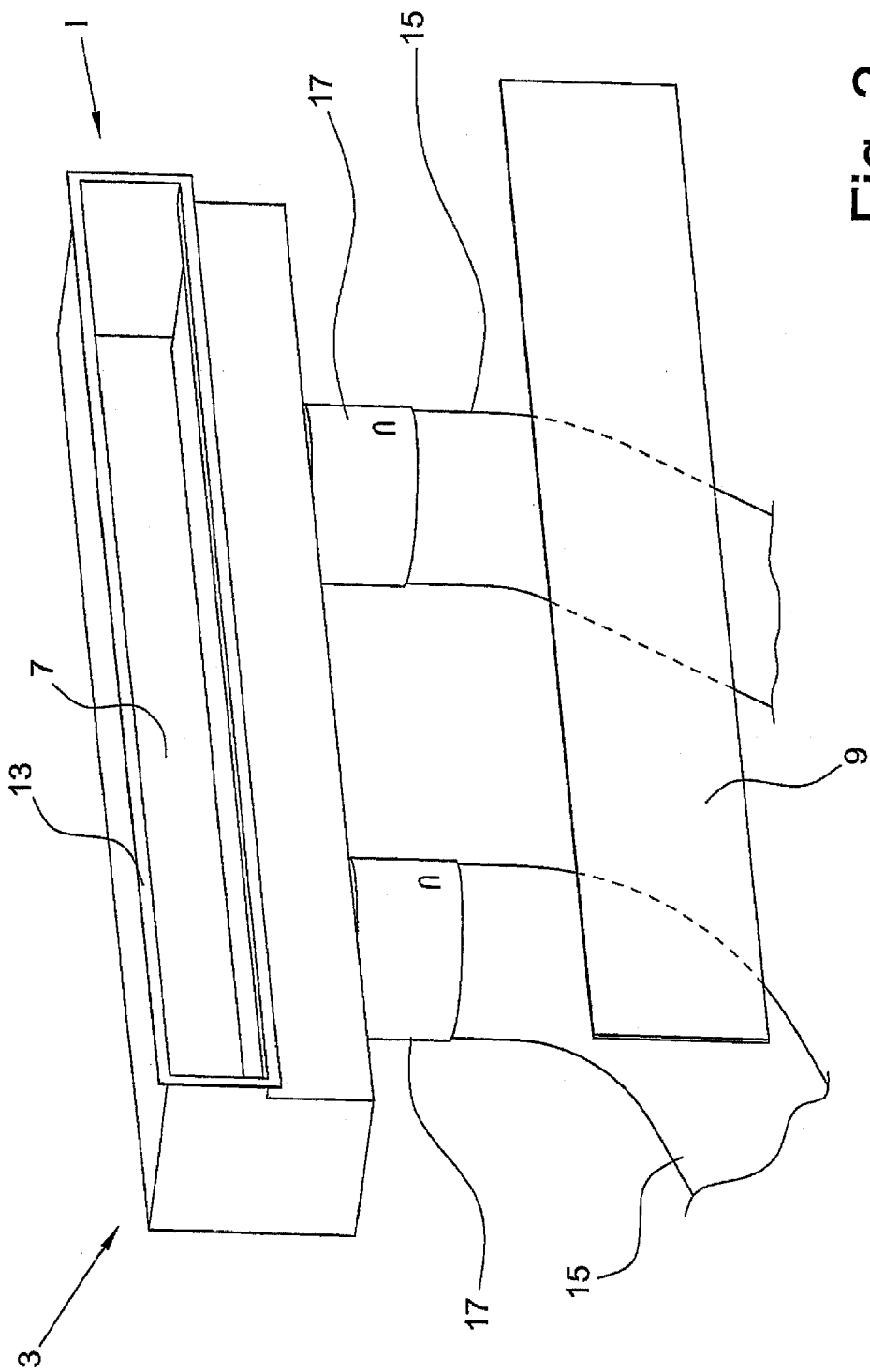


Fig. 2

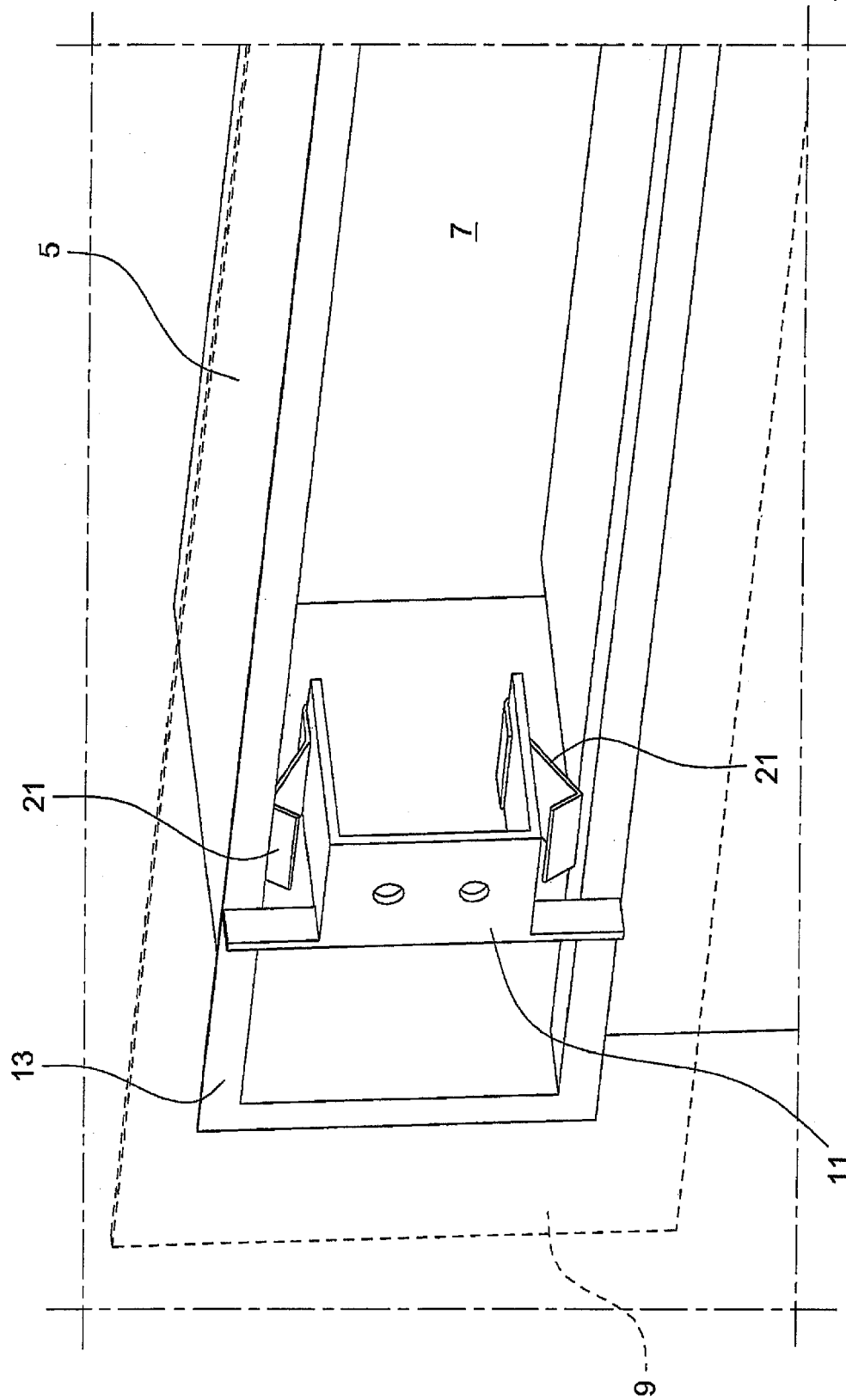
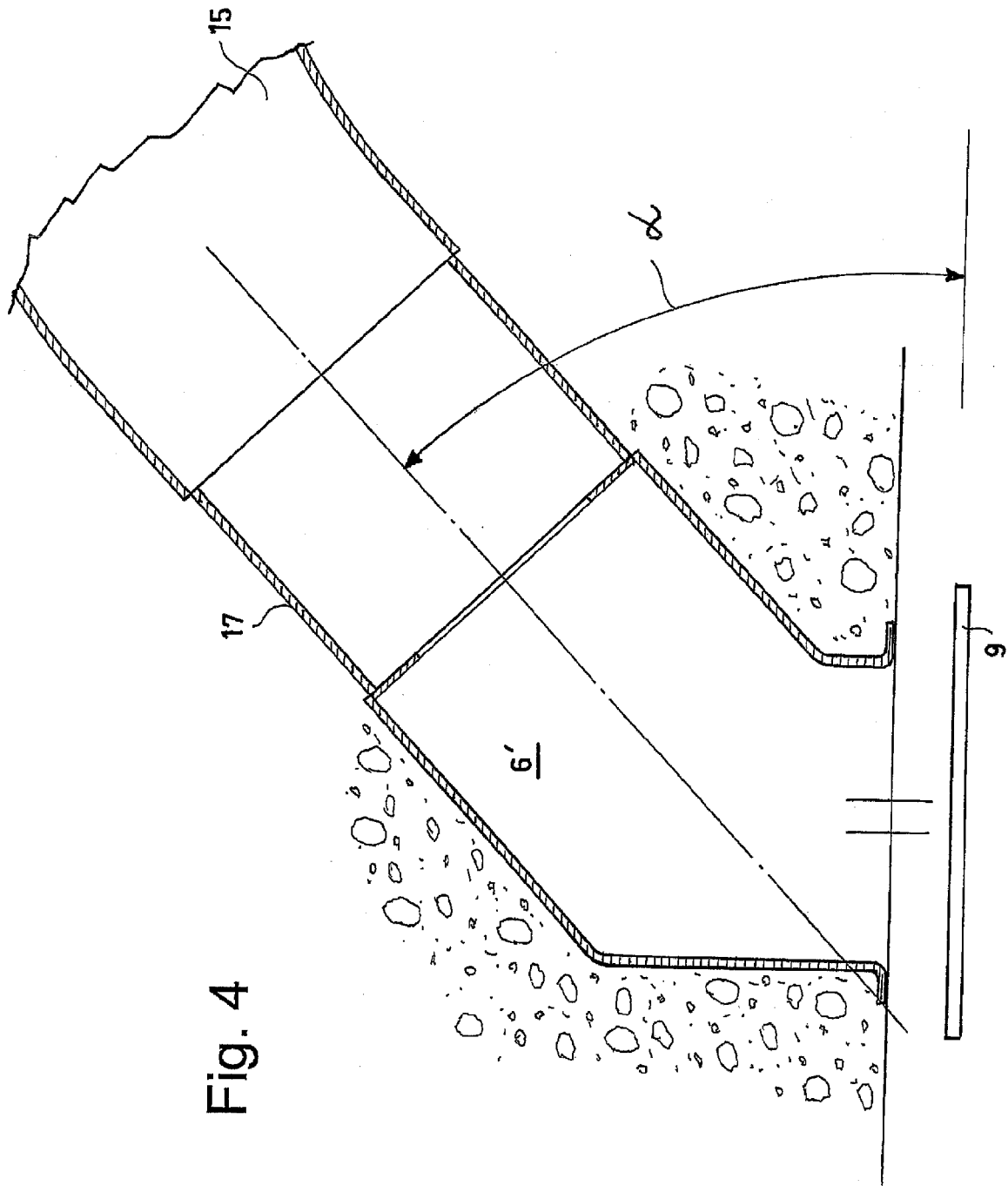


Fig. 3



REFERENCES CITED IN THE DESCRIPTION

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