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(54) Prefabricated building panel

(57) The present invention relates to a prefabricated panel suitable for use as a wall, a floor or a roof panel for a building or a vehicle body, characterised in that the said panel comprises an inner skin (12) and an outer (13) skin defining a central space (11), and at least one pultrusion attached to the inner (12) and outer (13) skins at an edge of the panel for interfitting with an opposing pultrusion unattached to the inner (12) and outer (13) skins.

FIG. 2a

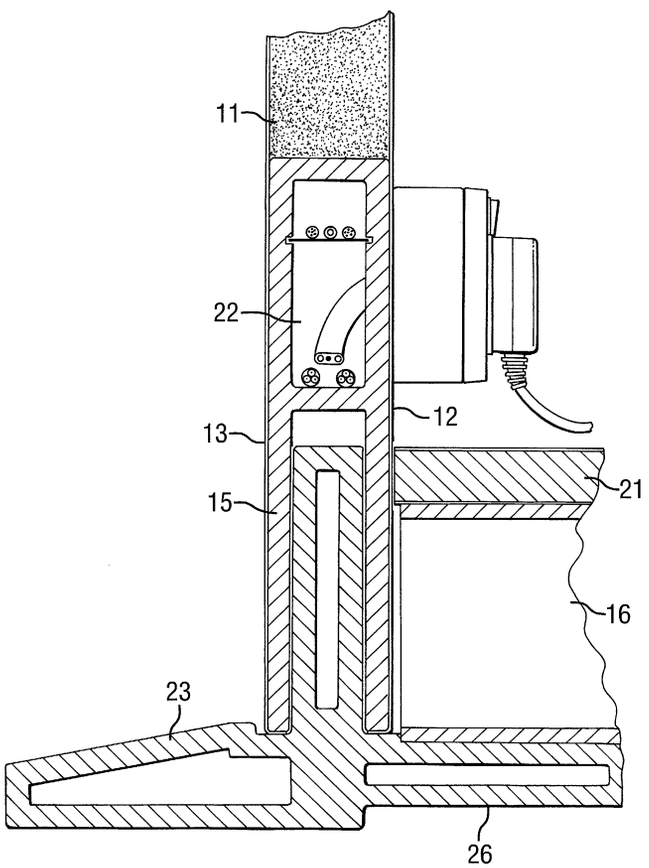

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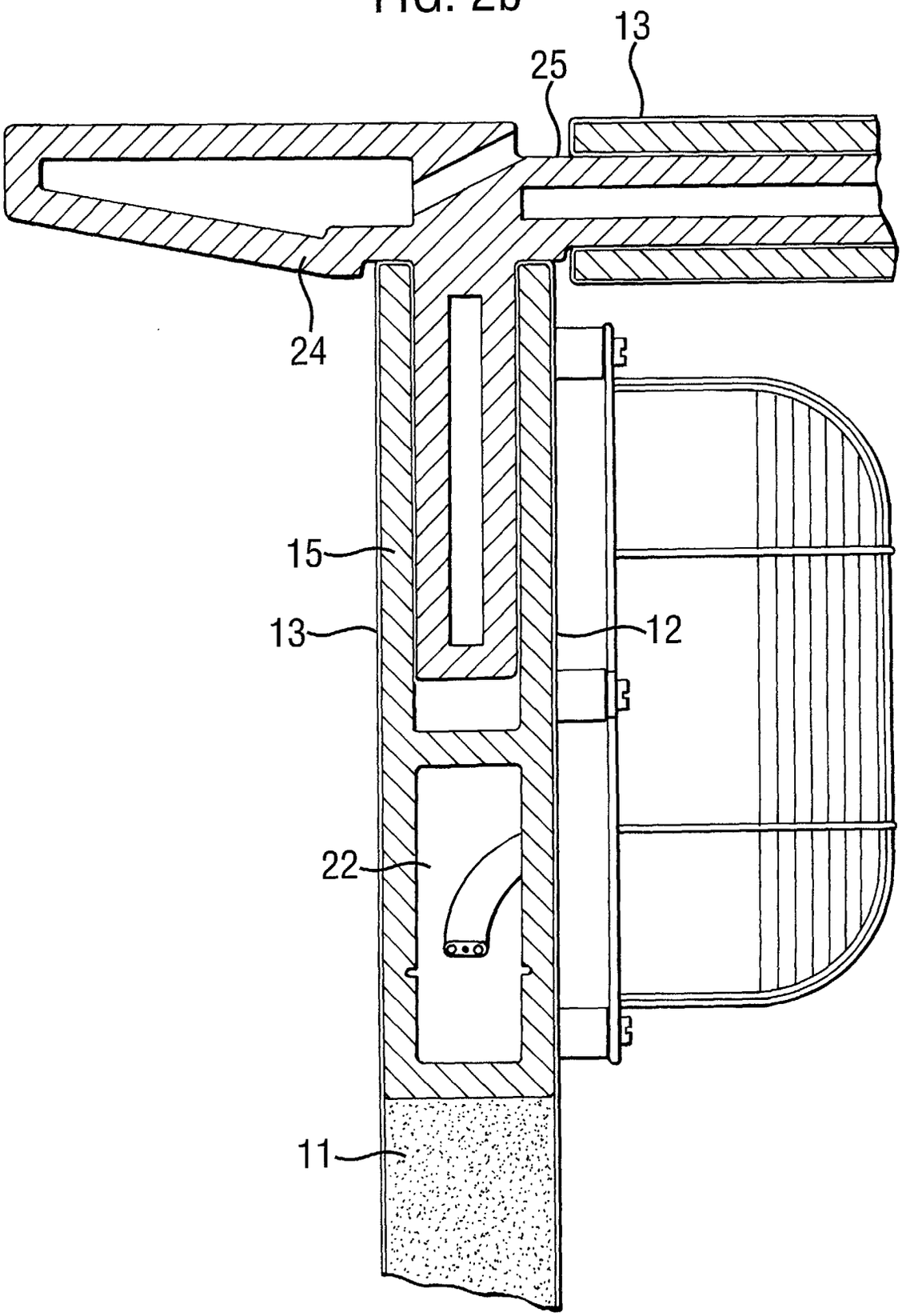
FIG. 2b



Description

[0001] The present invention relates to a prefabricated building panel and buildings comprising the said panels. Such buildings are known in the art and utilised for domestic and commercial purposes for housing persons, plant and other equipment. Construction of such buildings is typically based on a steel framework to which twin skinned steel panels with a loose fill of insulation, polymeric foamboard or injected foam are welded or fixed with self-drilling screws, rivets or nuts and bolts.

[0002] US 4 837 999 (Stayner) discloses a prefabricated building panel suitable for use as a wall or a roof panel for buildings comprising a central thermally insulating core with metal inner and outer skins coupled thereto by means of pultrusions. A pultrusion is a composite profile of curable resin, such as a polyester, and fibre reinforcement, such as glass fibre, formed and cured in a continuous process. The panel described by Stayner further comprises an envelope of air between the central core and the two metal skins which, it is claimed, substantially reduces heat transfer between the two metal skins. Thermal transfer between the two skins ('cold bridging') is further reduced by the pultrusions which act as a thermal break.

[0003] In US 5 403 062 (Sjostedt et al.) discloses a vehicle body, such as a trailer, truck body or container, comprising a plurality of modular panel members adjoining one another in series relationship. Each panel member is an integral pultrusion including a pair of spaced apart sheet members, a pair of spaced apart webs interconnecting the sheet members and wedge-shaped male and female members which interfit with the male and female members of adjoining panel members. Adjacent panel members are bonded together using adhesive. Thermally insulating material is provided in the volume defined by the two sheet members and the two webs.

[0004] An object of the present invention is the provision of a double skinned prefabricated panel for use in the construction of buildings and vehicle bodies which substantially reduces heat losses by thermal transfer between the inner and outer skins whilst possessing the structural qualities of a load bearing steel framework.

Summary of the Invention

[0005] In a first aspect of the invention, a prefabricated panel suitable for use as a wall, a floor or a roof panel for a building or a vehicle body is provided, characterised in that the said panel comprises an inner skin and an outer skin defining a central space, and at least one pultrusion attached to the inner and outer skins at an edge of the panel for interfitting with an opposing pultrusion unattached to the inner and outer skins. The panel preferably comprises two or more pultrusions, located in particular around the periphery of the panel. The inner and/or outer skins preferably comprise metal and the central space may be at least partially filled with a thermally insulating material. The panel is suitable for structural load bearing applications.

[0006] At least one pultrusion comprises one of a lengthwise extending female member and a lengthwise extending wedge shaped male member. The opposing pultrusion likewise comprises one of a lengthwise extending female member and a lengthwise extending wedge shaped male member. The opposing pultrusion can furthermore comprise a component part of an adjacent prefabricated panel. Optionally the at least one pultrusion comprises a cable tray.

[0007] The at least one pultrusion is secured to the opposing pultrusion with adhesive and/or by at least one mechanical fastener such as a nut and bolt, a screw or a rivet . Alternatively, the panel can comprise at least one releasable lock for releasably securing the panel to the opposing pultrusion.

[0008] In another aspect, the present invention provides a building or vehicle body comprising at least one prefabricated panel as described hereinabove.

Brief Description of the Figures

[0009] For the purposes of exemplification, some embodiments of the main aspects of the invention are now described with reference to the following Figures in which:

- Figure 1a shows an exploded view of a building comprising a plurality of a first embodiment of a prefabricated panel;
- Figure 1b shows detail A of Figure 1a;
- Figure 1c shows detail B of Figure 1a;
- Figure 1d shows detail C of Figure 1a;
- Figure 2a shows a cross-section of the bottom part of a second embodiment of a prefabricated panel; and
- Figure 2b shows a cross-section of the top part of a second embodiment of a prefabricated panel.

Detailed Description of Embodiments

[0010] Figure 1 a shows an exploded view of a building comprising a plurality of a first embodiment of prefabricated building panel and corner panels (111). As shown in Figure 1b, which is a detailed view of A in Figure 1a, each building panel comprises a central space (11) filled with thermal insulation defined by a metal inner (12) and outer (13) skin. Around the periphery of the central space (11) and joined to the inner (12) and outer (13) skins are four mitre cut pultrusions joined together by a combination of metal spigots (not shown) and epoxy or toughened acrylic adhesive. The pultrusions can comprise one of a lengthwise extending female member (15) and a lengthwise extending wedge shaped male member (14).

[0011] Figure 1b shows a roof panel being fitted onto a wall panel by interfitting of the male pultrusion (14) on the wall panel with the female pultrusion (15) on the roof panel. Figure 1c shows the bottom of a wall panel comprising a male pultrusion (14) being fitted to a female pultrusion (15) by interfitting, the female pultrusion (15) joined by bolts and/or adhesive orthogonal to an I-beam pultrusion (16). The I-beam pultrusion supports an insulation board (17) sandwiched between two hot dipped galvanised steel skins (18).

[0012] In Figure 1d, a first wall panel can be seen being fitted to an adjacent second wall panel by interfitting of the male pultrusion (14) on the first wall panel with the female pultrusion (15) on the second wall panel. The first and second wall panels are held together by engagement of a hook (19) provided in the seat of the female pultrusion (15) with a catch located within the central core of the first wall panel, the two components comprising a 'camlock' locking device.

[0013] The corner panels (111) are framed with female or wedge shaped male pultrusion members for engagement with pultrusions on adjacent wall and roof panels and pultrusions on the base.

[0014] Figures 2a and 2b show a second embodiment of prefabricated building panel. The wall panel also comprises a central space (11) filled with thermal insulation defined by inner (12) and outer (13) metal skins. Once again, around the periphery of the central space (11) and joined to the inner (12) and outer (13) skins are four mitre cut pultrusions joined together by four mitre cut pultrusions joined by a combination of metal spigots (not shown) and epoxy or toughened acrylic adhesive. The pultrusions at the top and bottom of the wall panel comprise lengthwise extending female members (15). The remaining pultrusions (not shown) comprise one of a lengthwise extending female member and a lengthwise extending wedge shaped male member. The top and bottom pultrusions additionally comprise a cable tray (22).

[0015] The top and bottom pultrusions interfit with respectively a male gutter spigot pultrusion (24) and a male foot spigot pultrusion (23). The male foot spigot pultrusion (23) supports an I-beam pultrusion upon a base spigot (26), which is bolted and/or adhesively bonded thereto, orientated orthogonal to the wall panel, which in turn supports the floor (21) comprising chipboard laminated on both sides. The male gutter spigot pultrusion (24) additionally comprises a second spigot (25) orientated orthogonal to the wall panel which interfits with a female pultrusion (13) of a roof panel.

Claims

1. A prefabricated panel suitable for use as a wall, a floor or a roof panel for a building or a vehicle body, **characterised in that** the said panel comprises an inner skin (12) and an outer (13) skin defining a central space (11), and at least one pultrusion attached to the inner (12) and outer (13) skins at an edge of the panel for interfitting with an opposing pultrusion unattached to the inner (12) and outer (13) skins.

2. A panel according to claim 1 wherein the at least one pultrusion comprises one of a lengthwise extending female member (15) and a lengthwise extending wedge shaped male member (14).

3. A panel according to claims 1 or 2 wherein the opposing pultrusion comprises one of a lengthwise extending female member (15) and a lengthwise extending wedge shaped male member (14).

4. A panel according to any one of the preceding claims wherein the opposing pultrusion is a component part of an adjacent prefabricated panel.

5. A panel according to any one of the preceding claims wherein the at least one pultrusion comprises a cable tray (22).

6. A panel according to any one of the preceding claims comprising at least one releasable lock for releasably securing the panel to the opposing pultrusion.

7. A panel according to any one of the preceding claims comprising at least two opposing pultrusions attached to the inner (12) and outer (13) skins.

8. A panel according to any one of the preceding claims comprising a plurality of pultrusions around the periphery of the panel.

9. A panel according to any one of the preceding claims wherein at least one of the inner (12) and outer (13) skin is metal.

10. A panel according to any one of the preceding claims wherein the central space (11) is at least partially filled with a thermal insulator.

11. A panel according to any one of the preceding claims wherein the at least one pultrusion is secured to the opposing pultrusion with adhesive.

12. A panel according to any one of the preceding claims wherein the at least one pultrusion is secured to the opposing pultrusion by at least one mechanical fastener such as a nut and bolt, a screw or a rivet.

13. A building or vehicle body comprising at least one prefabricated panel according to any one of the preceding claims.

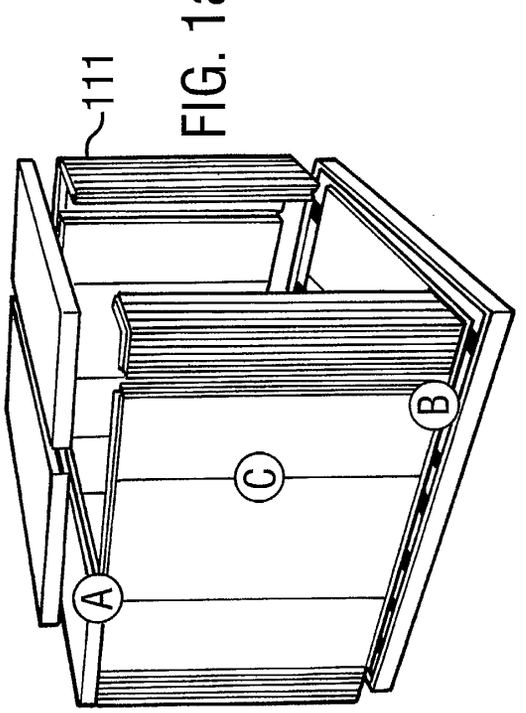


FIG. 1a

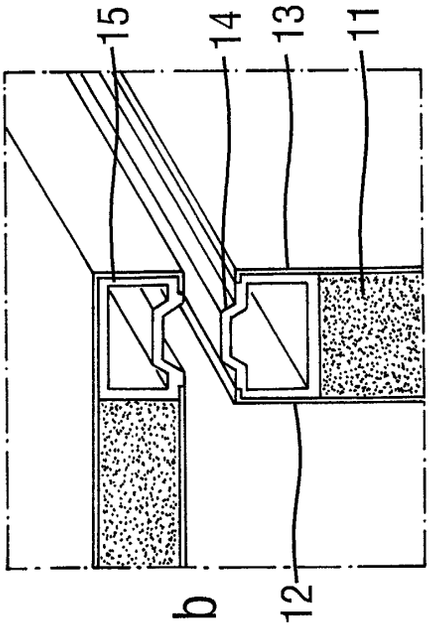


FIG. 1b

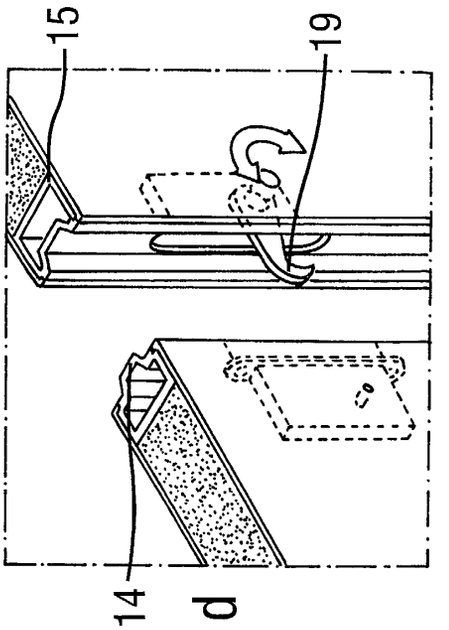


FIG. 1d

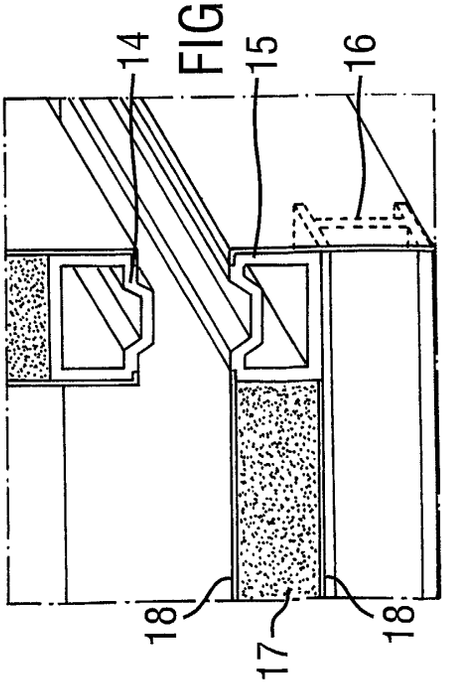


FIG. 1c

FIG. 2a

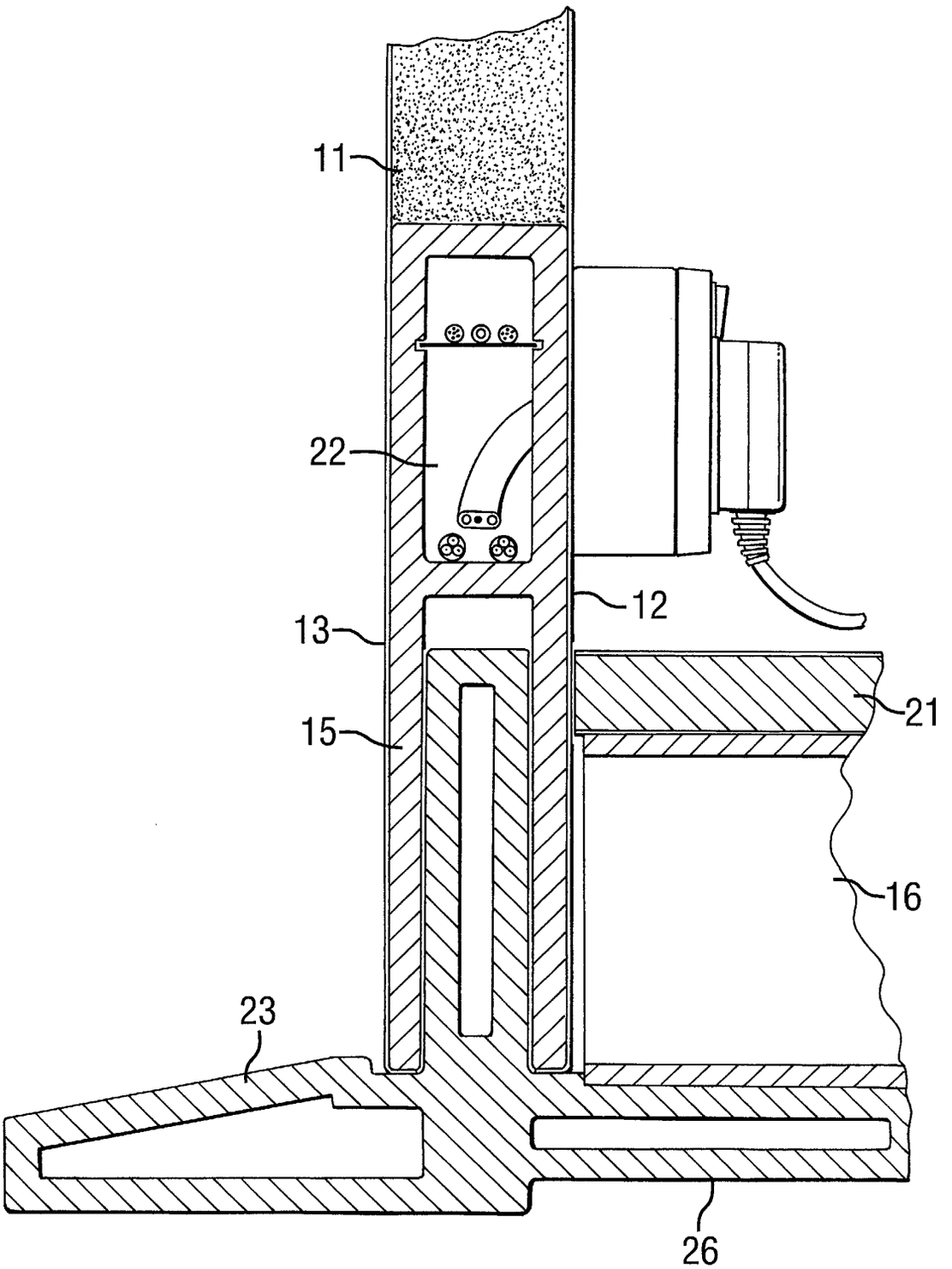
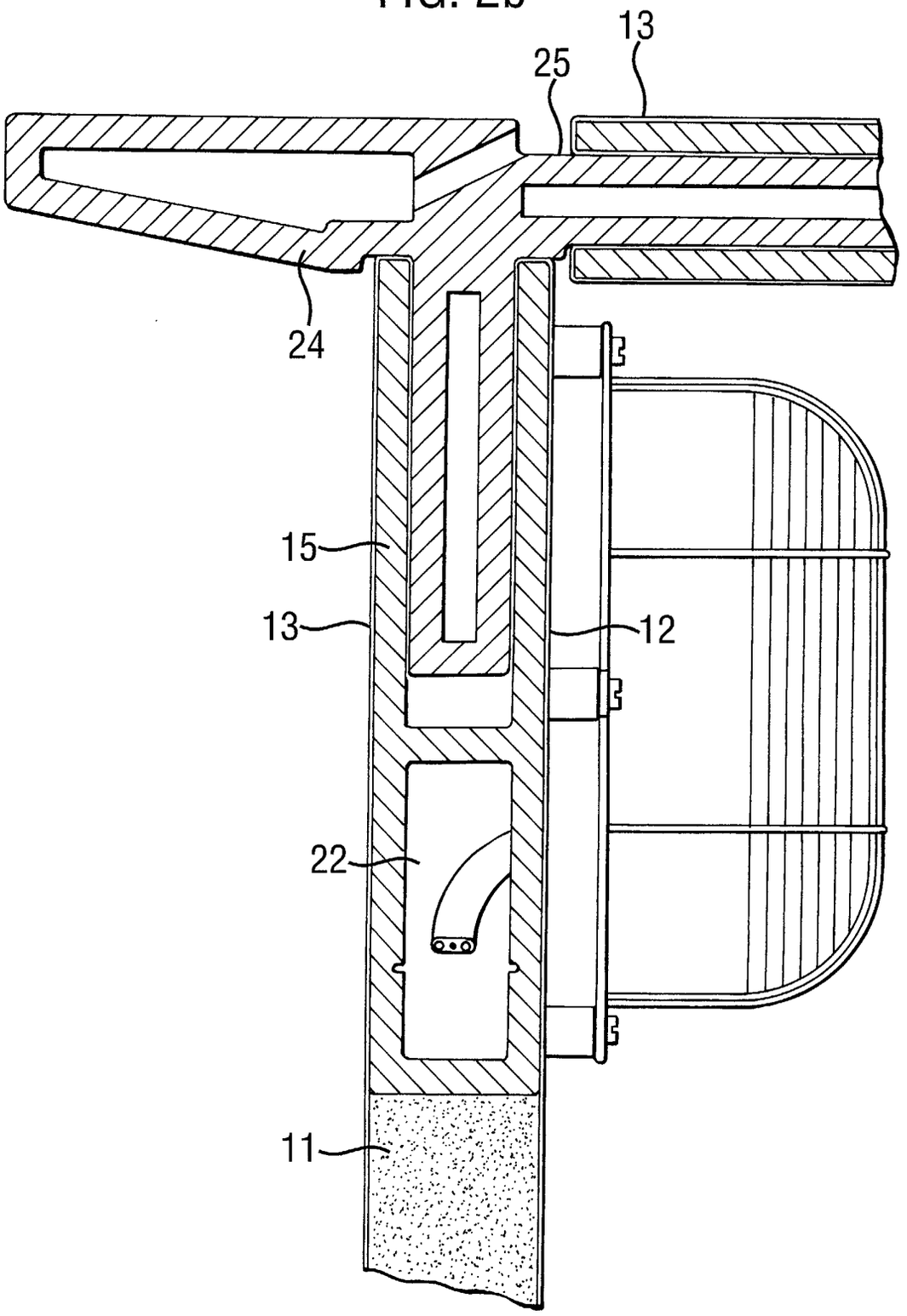


FIG. 2b



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EUROPEAN SEARCH REPORT

Application Number
EP 02 25 0705

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	FR 2 769 649 A (OPIFEX SOCIETE ANONYME) 16 April 1999 (1999-04-16) * page 9, line 8 - page 10, line 19; claims 1-3,5,6,10; figures 1,2 *	1,4,7,8, 11,13 2,3,6,9, 10	E04C2/38 E04C2/292
Y A	US 3 400 958 A (HAIMES) 10 September 1968 (1968-09-10) * column 2, line 33 - column 3, line 61; figures 1-4 *	2,3,6,9, 10 12	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E04C
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 June 2002	Mysliwetz, W

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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12-06-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 3400958 A	10-09-1968	NONE	

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