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(54) FIREPROOF WALL

(57) A fireproof wall (100), comprising sandwich panels (1) having a first and a second face skins (2, 3) of sheet metal, and a first and second attachment edges (4, 5) arranged on opposite edges of the sandwich panel (1). The attachment edge (4, 5) comprises an attachment profile (6) being formed from at least one of said face skins (2, 3) and shaped for a tongue-and-groove attachment. The fireproof wall (100) further comprises a joint (7) in where two sandwich panels (1) are adapted to be connected to each other by at least one tongue-and-groove attachment by their attachment profiles (6), and a fastener (12) in the joint (7) arranged through a tongue (13) of one of said two sandwich panels (1) and a groove (14) of another of said two sandwich panels (1). A resilient fitting plate (8) is adapted to be attached on the joint (7), the resilient fitting plate (8) comprising a first fitting edge (9) adapted to be attached to a first of said two sandwich panels (1) and a second fitting edge (10) adapted to be attached to a second of said two sandwich panels (1), and at least one bulge (11) arranged between said first and second fitting edges (9, 10) in parallel to the edges of said sandwich panels (1) arranged in the joint (6). The bulge (11) is configured to extend outwards away from the panels (1).

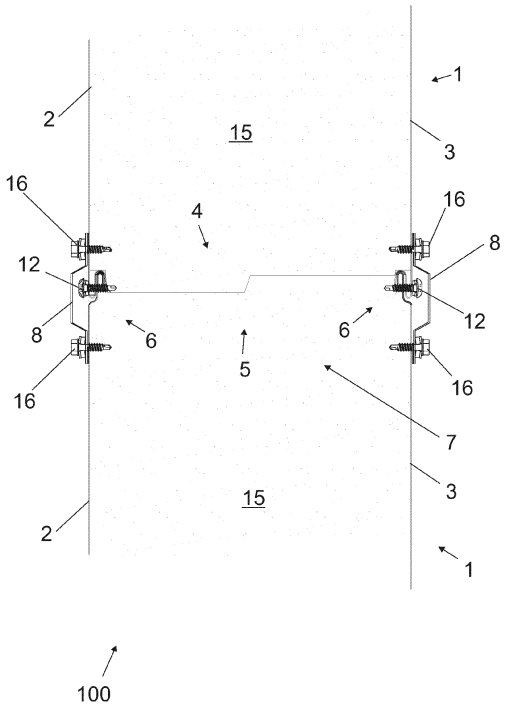

Fig. 1

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Description

BACKGROUND

[0001] The invention relates to a fireproof wall, comprising sandwich panels having first and second face skins and first and second attachment edges arranged on opposite edges of the sandwich panel.

[0002] It is known to use sandwich panels in buildings and constructions as a wall element, a partition wall panel element, or a ceiling or roof panel element. In some applications, there is need for fire resistant walls. In order to absorb impact energy due to a falling shelf, for example, the fixing system of the fire resistant walls needs to be flexible. This decreases risk of failures during fire and then decreases also costs affected by fire.

[0003] A disadvantage of existing sandwich panel wall structures designed to fulfill the requirements of fire wall impact loads is that they usually have rather complicated structures which makes assembly work difficult and time consuming.

BRIEF DESCRIPTION

[0004] Viewed from a first aspect, there can be provided a fireproof wall, comprising sandwich panels having a first face skin of sheet metal, a second face skin of sheet metal, and a first and second attachment edges arranged on opposite edges of the sandwich panel the attachment edge comprising an attachment profile being formed from at least one of said face skins and shaped for a tongue-and-groove attachment, the fireproof wall further comprising a joint in where two sandwich panels are adapted to be connected to each other by at least one tongue-and-groove attachment by their attachment profiles, a fastener in the joint arranged through a tongue of one of said two sandwich panels and a groove of another of said two sandwich panels, and a resilient fitting plate adapted to be attached on the joint, the resilient fitting plate comprising a first fitting edge adapted to be attached to a first of said two sandwich panels and a second fitting edge adapted to be attached to a second of said two sandwich panels, and at least one bulge arranged between said first and second fitting edges in parallel to the edges of said sandwich panels arranged in the joint, the bulge configured to extend outwards away from the panels.

[0005] Thereby a fire wall structure having improved impact load resistance performance and maintaining simplicity of the wall structure may be achieved.

[0006] The arrangement is characterised by what is stated in the independent claim. Some other embodiments are characterised by what is stated in the other claims. Inventive embodiments are also disclosed in the specification and drawings of this patent application. The inventive content of the patent application may also be defined in other ways than defined in the following claims. The inventive content may also be formed of several separate inventions, especially if the invention is examined in the light of expressed or implicit sub-tasks or in view of obtained benefits or benefit groups. Some of the definitions contained in the following claims may then be unnecessary in view of the separate inventive ideas. Features of the different embodiments of the invention may, within the scope of the basic inventive idea, be applied to other embodiments.

[0007] In one embodiment, two resilient fitting plates are arranged in the joint, on both sides of the fireproof wall.

[0008] An advantage is that even stronger structure may be achieved, and also good fire-resistant properties on both sides of the wall.

[0009] In one embodiment, the resilient fitting plate comprises just one bulge only.

[0010] An advantage is that the structure is simple.

[0011] In one embodiment, the cross-sectional shape of the bulge is selected from sinusoidal shape, wavy shape, arched shape, crested shape, or any of their combination.

[0012] An advantage is that properties of resiliency may be selected in a broad range.

[0013] In one embodiment, the resilient fitting plate is made of metal.

[0014] An advantage is that a pliable and flexible but still sturdy resilient fitting plate may be achieved.

[0015] In one embodiment, the attachment edge comprises at least two attachment profiles, for instance two, so that a first attachment profile is formed from the first face skin and a second attachment profile is formed from the second face skin.

[0016] An advantage is that a robust structure of the joint may be achieved in a simple way.

[0017] In one embodiment, at least one of the attachment profiles is arranged on the outer surface of the sandwich panel such that an outer surface of a lip/outer edge of the groove is flush with the outer surface of the respective face skin.

[0018] An advantage is that the attachment profile is easily reachable with the fastener.

[0019] In one embodiment, the resilient fitting plate is adapted to be attached to the sandwich panels by second fasteners.

[0020] An advantage is that this is a simple structure and may be realized with rather light fixation means and tools.

BRIEF DESCRIPTION OF FIGURES

[0021] Some embodiments illustrating the present disclosure are described in more detail in the attached drawings, in which

Figure 1 is a schematic view of a fireproof wall in partial cross-section,

Figure 2 is a schematic view of a detail of a fireproof

wall in partial cross-section,

Figure 3 is a perspective view of a resilient fitting plate,

Figure 4a is a schematic view of a resilient fitting plate, and

Figure 4b is a schematic view of a resilient fitting plate.

[0022] In the figures, some embodiments are shown simplified for the sake of clarity. Similar parts are marked with the same reference numbers in the figures.

DETAILED DESCRIPTION

[0023] **Figure 1** is a schematic view of a fireproof wall in partial cross-section, and **Figure 2** is a schematic view of a detail of the fireproof wall in partial cross-section.

[0024] The fireproof wall 100 comprises two or more sandwich panels 1 having first and second face skins 2, 3 and first and second attachment edges 4, 5 that are arranged on opposite ends of the sandwich panel 1. Said attachment edges 4, 5 are counterparts to each other.

[0025] In an embodiment, at least one of the first and second face skins 2, 3 is sheet of metal, in a further embodiment both first and second face skins 2, 3 are sheet of metal. In an embodiment, said metal is steel, such as stainless steel. In some other embodiments, the face skin 2, 3 comprises at least one of the following materials: copper, brass, titanzink. Typically, the first face skin 2 is made of same material as the second face skin 3, but not necessarily.

[0026] A core 15 is arranged between said face skins 2, 3. The core is e.g. mineral wool, polyisocyanurate (PIR), polyurethane (PUR), or extruded polystyrene (XPS).

[0027] There is a joint 7 in where two sandwich panels 1 are connected to each other by the first and second attachment edges 4, 5. The attachment edge 4, 5 comprises at least one attachment profile 6. The attachment profile 6 is formed from at least one of the face skins 2, 3 and shaped in form creating a tongue 13 or a groove 14 of a tongue-and-groove attachment. The sandwich panels 1 connect to each other by said tongue-and-groove attachment. In an embodiment, such as shown in Figure 1, there are two attachment profiles 6 in each of the attachment edges 4, 5 and thus also two tongue-and-groove attachments. First of the attachment profiles is formed from the first face skin 2 and second of the attachment profiles 6 is formed from the second face skin 3.

[0028] In an embodiment, such as shown in Figure 1, the attachment profile 6 is arranged on the outer surface of the sandwich panel 1 in a way that an outer surface of a lip or outer edge 17 of the groove is flush with the outer surface of the respective face skin 2, 3. This way a quite imperceptible joint can be created. It is to be noted, however, that the lip or outer edge 17 may be arranged another way, too.

[0029] The joint 7 further comprises a fastener 12 that is arranged through the tongue 13 and the groove 14 of the tongue-and-groove attachment. Typically, there are plurality of fasteners 12 arranged with suitable spacing in the entire length of the joint 7. The fasteners 12 may be e.g. screws or rivets.

[0030] The joint 7 further comprises a resilient fitting plate 8 that is attached on the joint 7, to the outer surfaces of the sandwich panels 1. The resilient fitting plate 8 comprises a first fitting edge 9 for attaching to a first of said two sandwich panels 1 and a second fitting edge 10 for attaching to a second of said two sandwich panels 1. In an embodiment, the fitting edges 9, 10 are parallel to the attachment edges 4, 5 of the sandwich panels. The fitting edges 9, 10 are arranged on both sides of the joint 7 such that the resilient fitting plate 8 at least essentially covers said joint 7.

[0031] In an embodiment, the resilient fitting plate 8 is attached to the sandwich panels 1 by second fasteners 16, such as screws or rivets. The second fasteners 16 may be arranged with suitable spacing in the entire length of the fitting plate 8.

[0032] In an embodiment, such as shown in Figure 1, there are two resilient fitting plates 8 are arranged in the joint, on both sides of the fireproof wall 100. In another embodiment, the fitting plate 8 is arranged on one side of the fireproof wall 100 only.

[0033] The resilient fitting plate 8 comprises at least one bulge 11 arranged between the first and second fitting edges 9, 10 and in parallel to the attachment edges 4, 5 of the sandwich panels 1. The bulge 11 extends outwards, i.e. away from the panels 1 and the joint 7. In the embodiment shown in Figure 1, there is just one bulge 11 in the resilient fitting plate.

[0034] The resilient fitting plate 8 is configured to deform, e.g. expand or bend, in the area of the bulge 11 from its original shape (shown in Figures) into another shape. According to an aspect, the deformation is permanent or at least mainly permanent by its nature. This ability to change shape of the resilient fitting plate 8 enables it to absorb dynamic impact loads or shocks incurred on the sandwich panels 1 and the joint 7. The resilient fitting plate 8 is distributing the energy of the loads or shocks over length of the plate 8 and also over a prolonged period of time. Thus, the resilient fitting plate 8 may prevent the sandwich panels 1 from coming loose from each other.

[0035] **Figure 3** is a perspective view of a resilient fitting plate. In an embodiment, the length L of the resilient fitting plate 8 is equal or at least substantially equal to the length of the joint 7. In another embodiment, the resilient fitting plate 8 is substantially shorter than the joint 7. In this embodiment, the joint 7 may be covered by using two or even more resilient fitting plates arranged one after another on the joint 7.

[0036] In an embodiment, the resilient fitting plate 8 is made of metal, such as steel. The shape of the fitting plate may be formed by bending and edging or pultrusion, for instance.

[0037] In an embodiment, the thickness of the resilient fitting plate 8 is in range of 0,5 mm - 1,5 mm. In an embodiment, the thickness of the resilient fitting plate is in range of 0,5 mm - 0,7 mm.

[0038] In an embodiment, the thickness of the resilient fitting plate 8 is at least essentially constant all over the plate. In another embodiment, the first and the second fitting edges 9, 10 of the resilient fitting plate 8 has a thicker structure than rest of the resilient fitting plate or the bulge(s) 11 therebetween. In an embodiment, the thicker structure has been made by turning the plate material double on the edges thereof. Thus, the attachment of the resilient fitting plate to the sandwich panels may be reinforced, without scarifying resilient characters thereof.

[0039] In an embodiment, the width W of the resilient fitting plate 8 is in range of 30 mm - 200 mm. In an embodiment, the width W is in range of 50 mm - 100 mm.

[0040] The resilient fitting plate 8 comprises at least one bulge 11 arranged between the first and second fitting edges 9, 10 and in parallel or at least substantially parallel to said edges. In the embodiments shown in Figures, there is one bulge 11 in the resilient fitting plate 8. In some other embodiments, there may be two or even more bulges 11 in the resilient fitting plate 8.

[0041] In an embodiment, the deepness of the bulge 11 is in range of 5 mm - 100 mm. In an embodiment, the deepness is in range of 8 mm - 50 mm. The "deepness" means dimension of the resilient fitting plate perpendicular to its length L and width W.

[0042] **Figure 4a** is a schematic view of a resilient fitting plate, and **Figure 4b** is a schematic view of another resilient fitting plate.

[0043] In some embodiments, the resilient fitting plate 8 comprises just one bulge 11 only. In another embodiment, the resilient fitting plate 8 comprises at least two bulges 11, for instance two, three or four bulges.

[0044] In an embodiment, the bulge 11 has a sinusoidal shape. In another embodiment, the bulge 11 has a wavy shape. In another embodiment, the bulge 11 has an arched shape. In still another embodiment, the bulge 11 has a crested shape. In an embodiment, the resilient fitting plate 8 comprises bulges 11 having different cross-sectional shapes, for instance any combinations of the shapes mentioned above.

[0045] The invention is not limited solely to the embodiments described above, but instead many variations are possible within the scope of the inventive concept defined by the claims below. Within the scope of the inventive concept the attributes of different embodiments and applications can be used in conjunction with or replace the attributes of another embodiment or application.

[0046] The drawings and the related description are only intended to illustrate the idea of the invention. The invention may vary in detail within the scope of the inventive idea defined in the following claims.

REFERENCE SYMBOLS

[0047]

1	sandwich panel
2	first face skin
3	second face skin
4	first attachment edge
5	second attachment edge
6	attachment profile
7	joint
8	resilient fitting plate
9	first fitting edge
10	second fitting edge
11	bulge
12	fastener
13	tongue
14	groove
15	core
16	second fastener
17	outer surface of outer edge
100	fireproof wall
L	length
W	width

Claims

1. A fireproof wall (100), comprising

- sandwich panels (1) having
  - a first face skin (2) of sheet metal,
  - a second face skin (3) of sheet metal, and
  - a first and second attachment edges (4, 5) arranged on opposite edges of the sandwich panel (1),
- the attachment edge (4, 5) comprising
  - an attachment profile (6) being formed from at least one of said face skins (2, 3) and shaped for a tongue-and-groove attachment,
- the fireproof wall (100) further comprising
- a joint (7) in where two sandwich panels (1) are adapted to be connected to each other by at least one tongue-and-groove attachment by their attachment profiles (6),
- a fastener (12) in the joint (7) arranged through a tongue (13) of one of said two sandwich panels (1) and a groove (14) of another of said two sand-

wich panels (1), and
- a resilient fitting plate (8) adapted to be attached on the joint (7), the resilient fitting plate (8) comprising

- a first fitting edge (9) adapted to be attached to a first of said two sandwich panels (1) and a second fitting edge (10) adapted to be attached to a second of said two sandwich panels (1), and
- at least one bulge (11) arranged between said first and second fitting edges (9, 10) in parallel to the edges of said sandwich panels (1) arranged in the joint (6)
- the bulge (11) configured to extend outwards away from the panels (1).

2. The fireproof wall as claimed in claim 1, wherein

- two resilient fitting plates (8) are arranged in the joint, on both sides of the fireproof wall (100).

3. The fireproof wall as claimed in claim 1 or 2, wherein

- the resilient fitting plate (8) comprises just one bulge (11) only.

4. The fireproof wall as claimed in any of the preceding claims, wherein

- the cross-sectional shape of the bulge (11) is selected from sinusoidal shape, wavy shape, arched shape, crested shape, or any of their combination.

5. The fireproof wall as claimed in any of the preceding claims, wherein

- the attachment edge (4, 5) comprises at least two attachment profiles (6) so that
- a first attachment profile (6) is formed from the first face skin (2) and a second attachment profile (6) is formed from the second face skin (3).

6. The fireproof wall as claimed in any of the preceding claims, wherein

- the attachment profile (6) is arranged on the outer surface of the sandwich panel (1) such that
- an outer surface of an outer edge (17) of the groove is flush with the outer surface of the respective face skin (2, 3).

7. The fireproof wall as claimed in any of the preceding claims, wherein

- the resilient fitting plate (8) is made of metal.

8. The fireproof wall as claimed in any of the preceding claims, wherein

- the thickness of the resilient fitting plate (8) is in range of 0,5 mm - 1,5 mm.

9. The fireproof wall as claimed in any of the preceding claims, wherein

- the thickness of the resilient fitting plate (8) is in range of 0,5 mm - 0,7 mm.

10. The fireproof wall as claimed in any of the preceding claims, wherein

- the width W of the resilient fitting plate (8) is in range of 30 mm - 200 mm

11. The fireproof wall as claimed in any of the preceding claims, wherein

- the deepness of the bulge (11) is in range of 5 mm - 100 mm.

12. The fireproof wall as claimed in any of the preceding claims, wherein

- the resilient fitting plate (8) is adapted to be attached to the sandwich panels (1) by second fasteners (16) .

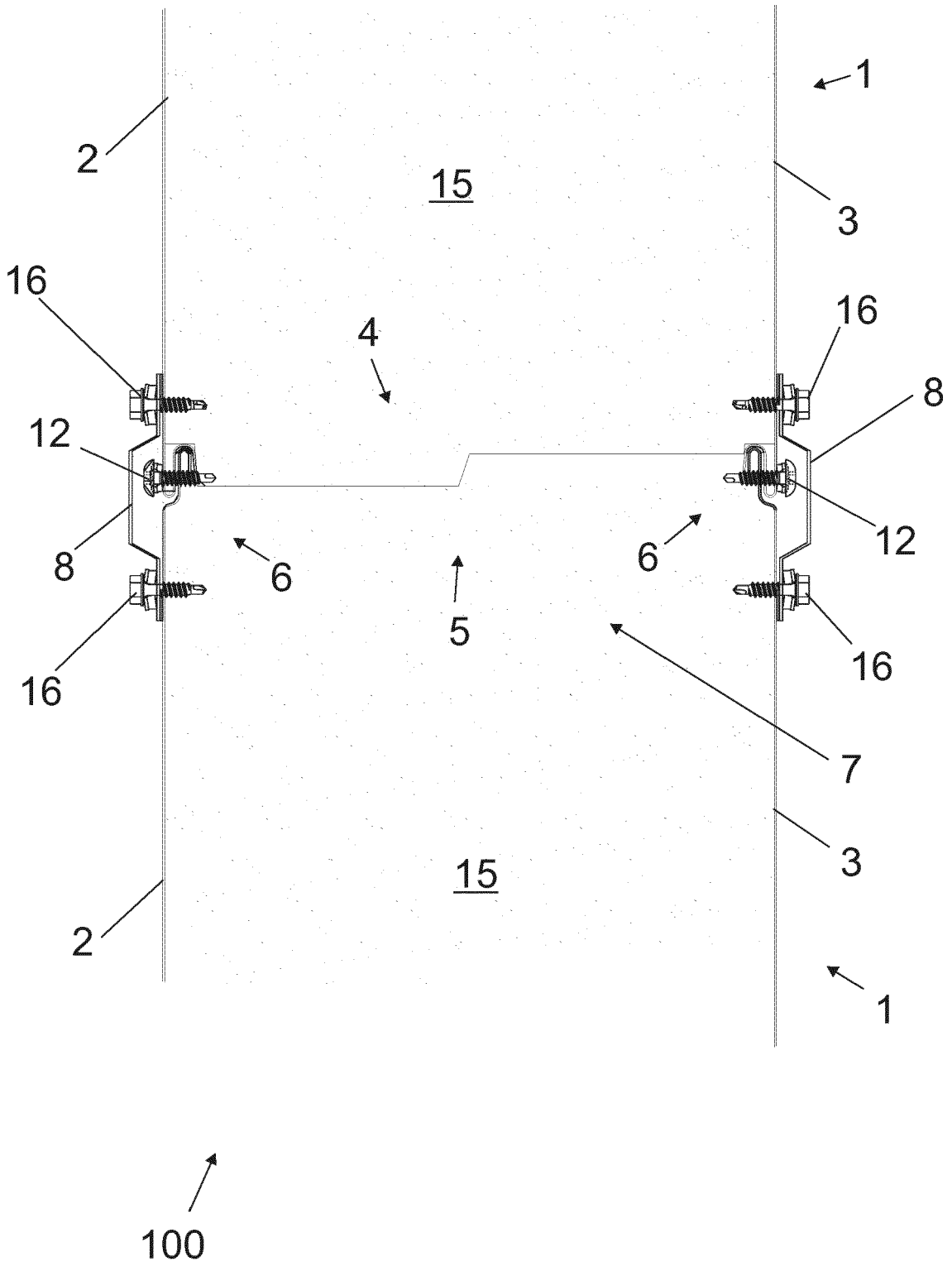

Fig. 1

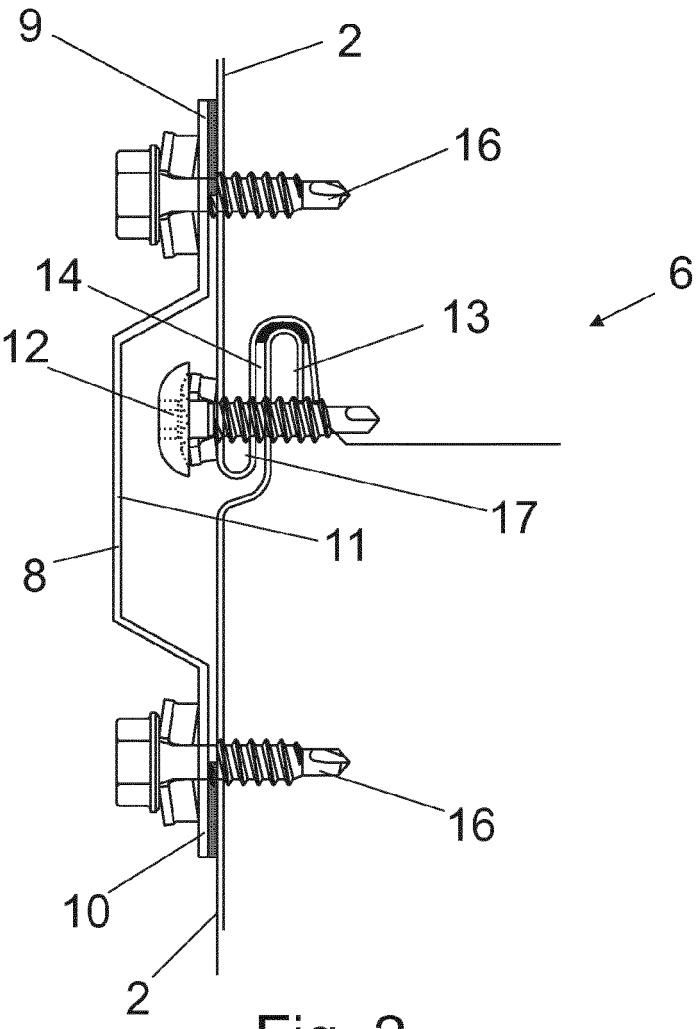

Fig. 2

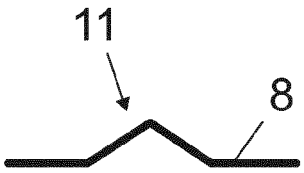

Fig. 4a

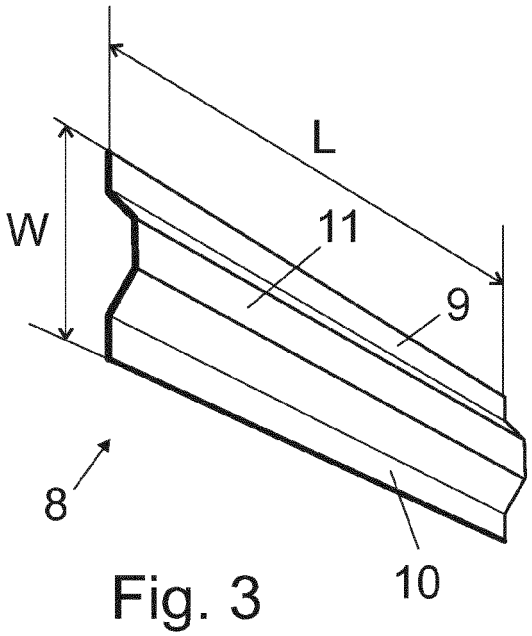

Fig. 3

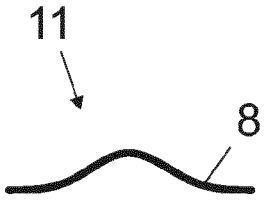

Fig. 4b

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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 9715

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	EP 3 315 683 B1 (LINDAB AB [SE]) 16 June 2021 (2021-06-16) * paragraph [0035] - paragraph [0051] * * figures *	1-12	
X	WO 2017/122840 A1 (KIRIN IND CO LTD [KR]) 20 July 2017 (2017-07-20) * figures 5-9 *	1	
A	US 2018/016786 A1 (BOYD MARK A [US]) 18 January 2018 (2018-01-18) * figure 3 *	1-12	
			TECHNICAL FIELDS SEARCHED (IPC) E04C E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 November 2022	Durrenberger, Xavier

CATEGORY OF CITED DOCUMENTS

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