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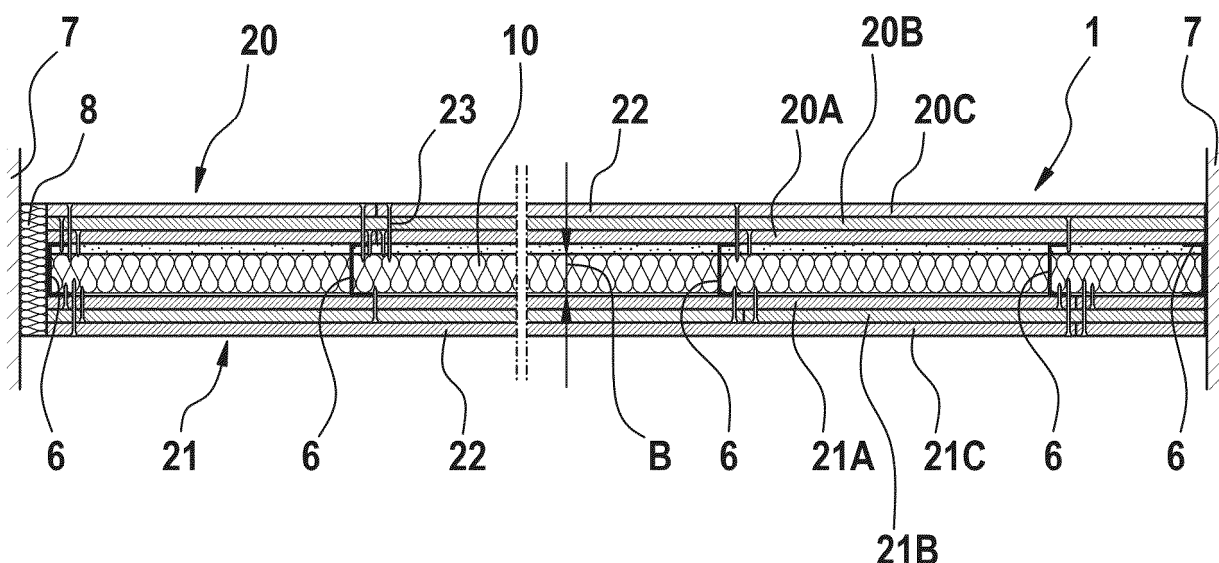
(54) FIREWALL WITHOUT A METAL SHEET LAYER

(57) The invention pertains to a firewall (1) without a metal sheet layer and comprises at least the following:
- a stud frame (2) made of metal drywall profiles (3, 6);
- at least partial filling of the cavities (9) between adjacent drywall profiles (3, 6) with mineral wool (10);

- a double-sided, at least two-layer cladding (20, 21) with gypsum boards (22), wherein
- the gypsum boards (22) of all cladding layers (20, 21) are designed as fleece-reinforced gypsum boards (22).

Fig. 2

A-A



EP 4 818 428 A1

Description

[0001] The invention relates to a firewall that meets the fire resistance and structural integrity requirements specified in DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1:1999-10 and DIN EN 1363-2:1999-10.

[0002] It is known to construct such firewalls that meet the aforementioned requirements regarding fire protection and structural integrity. In known firewalls, however, a sheet metal layer is always provided either between the stud frame of a drywall partition and the first cladding layer or between two cladding layers to achieve the required impact resistance.

[0003] It is also known to use cladding panels with a metal sheet laminate instead of a separate sheet metal layer when constructing a firewall.

[0004] The use of separate sheet metal layers to achieve the structural integrity and impact resistance required by standards is costly and cumbersome. Furthermore, flat sheet metal layers in building partition walls may also cause undesirable electromagnetic shielding, such as adverse effects on wireless networks.

[0005] The use of cladding panels that themselves feature sheet metal lamination also undesirably increases the cost of the firewall to be constructed. Potentially undesirable shielding effects for electromagnetic waves are also present in sheet metal-laminated cladding panels.

[0006] The objective of the invention is to provide a firewall that meets the relevant fire protection and stability requirements and also exhibits the necessary impact resistance required by the standards DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1:1999-10 and DIN EN 1363-2:1999-10, and which does not include a continuous metal sheet layer.

[0007] According to the invention, this objective is achieved with a firewall without a metal sheet layer, which meets the requirements of DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1:1999-10 and DIN EN 1363-2:1999-10, and comprises at least the following:

- a stud frame made of metal drywall profiles;
- at least partial filling of the cavities between adjacent drywall profiles with mineral wool;
- a double-sided, at least two-layer cladding with gypsum boards,

wherein the firewall according to the invention is further characterized in that the gypsum boards of all cladding layers are designed as fleece-reinforced gypsum boards.

[0008] Surprisingly, it was recognized in the context of the invention that the sheet metal layer typically provided when constructing a firewall, or the use of at least one sheet metal-faced gypsum board per cladding side of the firewall, can be dispensed with if, instead of gypsum plasterboards, gypsum boards reinforced with a non-woven fabric are used. Such reinforcement mechanically stiffens the gypsum core of a gypsum board to such an

extent that the impact tests required to verify a firewall's compliance with standards can be passed. The impact tests required by the standard can only be met with gypsum plasterboards if metal reinforcement is present.

[0009] It has been found that gypsum boards of the GM-FH2 type in accordance with DIN EN 15238-1:2008+A1:2009 are suitable.

[0010] It is particularly preferred that the non-woven layer of the non-woven-reinforced gypsum boards be a glass fiber non-woven fabric.

[0011] It is preferred that the glass fiber fleece has a basis weight of at least 70 g/m², preferably 80-120 g/m².

[0012] To meet the fire protection requirements for the firewall, it has proven effective for the glass fiber fleece to be a mineral-coated glass fiber fleece with a basis weight of 280 g/m² to 450 g/m², particularly 300 g/m² to 420 g/m². The uncoated glass fiber mat used to form the mineral-coated glass fiber mat has a basis weight of preferably 80-120 g/m², e.g., 85 g/m².

[0013] It is preferred that glass fiber mats of different basis weights be used for the visible side and the back side. When installed, the visible side of the fiber-reinforced gypsum board faces away from the supporting structure. Accordingly, the back side faces the supporting structure. The mineral-coated glass fiber mat on the visible side preferably has a basis weight of 320 g/m² to 420 g/m², while the mineral-coated glass fiber mat on the back side preferably has a basis weight of 300 g/m² to 400 g/m².

[0014] To meet the strength requirements for type GM-FH2 in accordance with DIN EN 15238-1:2008+A1:2009, the gypsum boards have a single-layer or multi-layer, preferably full-surface, lamination with the fleece layer on at least both major surfaces of the gypsum boards. Preferably, the visible-side fleece fabric is wrapped around the longitudinal edge and joined to the back-side fleece fabric with an overlap, as is also known from the cardboard layers of gypsum board.

[0015] Preferably, the front-side fleece fabric has a tensile strength in the machine direction (MD Tensile Strength) of at least 400 N/5 cm and across the machine direction (CMD Tensile Strength) of at least 290 N/5 cm, in each case in accordance with EN 29073-3. The back-side fleece fabric has a tensile strength in the machine direction (MD Tensile Strength) of at least 370 N/5 cm and across the machine direction (CMD Tensile Strength) of at least 280 N/5 cm, in each case in accordance with EN 29073-3.

[0016] A particular advantage of the invention is that the gypsum boards are manufactured without a metal sheet laminate.

[0017] This allows for a significant cost advantage in the construction of the firewall. The firewall can be clad exclusively with non-woven-faced gypsum boards, without the need for a metal sheet layer.

[0018] Compliance with the standard requirements for the firewall mentioned at the outset can be achieved by constructing the cladding as a three-layer system using

fleece-laminated gypsum boards, each 12.5 mm thick.

[0019] Compliance with the standard requirements for the firewall mentioned at the beginning can be achieved by constructing the cladding in two layers, each consisting of 15 mm thick gypsum boards with non-woven fabric backing.

[0020] It has been found that, to meet the standards, it is sufficient to design the filling of the cavities with a thickness less than the cavity depth between the innermost cladding layers of the firewall.

[0021] This allows for material savings if, for example, the required thermal insulation properties are already achieved with a thinner layer of mineral wool insulation.

[0022] A suitable fastening method for the cladding on the drywall stud frame has been found to be fastening all cladding panels to the stud frame using screws or clips.

[0023] It has been demonstrated that to meet the high strength requirements, particularly the impact resistance of a firewall, as specified in the aforementioned relevant DIN standard, standard fastening methods such as screwing (e.g., with drywall screws) or clamping (using standard drywall clips) are sufficient. This allows for the provision of a cost-effective and logistically simple fastening technology.

[0024] For the construction of the stud frame, it is advisable that the drywall profiles - specifically UW floor/-ceiling profiles and/or CW stud profiles - be made of galvanized sheet steel.

[0025] It has been demonstrated that the high requirements for a firewall, particularly the high mechanical requirements following exposure to flame during the impact test in accordance with the aforementioned DIN standard, can be met using commercially available drywall profiles such as UW floor/ceiling profiles and/or CW stud profiles. The omission of the sheet metal layer according to the invention, as used in prior art, does not necessitate any changes to the underlying stud framing of the firewall.

[0026] The invention is explained in more detail below with reference to the figures. They show:

Figure 1: a schematic view of a stud construction of a firewall according to the invention;

Figure 2: a cross-section through the firewall of the invention according to Figure 1 along line A-A;

Figure 3: a schematic cross-section of a gypsum board used in the firewall of the invention.

[0027] The following section uses the drawing to illustrate an example of a firewall 1 according to the invention.

[0028] The firewall 1 comprises a stud frame 2 that includes standard ceiling/floor U-channels 3 for connection to a building ceiling 4 and a building floor 5. CW-profiles are suitably used as the stud profiles 6, which are shoeed (inserted) into the ceiling/floor U-profiles 3 in the conventional manner. A horizontal distance b between two adjacent stud profiles 6 is halved compared to the

standard distance between stud profiles 6 in a normal drywall partition and is preferably 312,5 mm.

[0029] One of the stud profiles 6 in the illustration according to Figure 1, the stud profile 6 located farthest to the right, is firmly connected to a building-wall 7 using standard acoustic separation strips. The opposite outermost stud profile 6 in the illustration according to Figure 1, the stud profile 6 located farthest to the left, forms a free edge of the stud structure 2 and is merely provided with a layer of mineral wool 8 facing the building-wall 7. No mechanical connection of the stud profile 6, which forms the free edge of the firewall 1, to the building-wall 7 is provided. Compartments 9 are formed between two adjacent stud profiles 6. The compartments 9 have a depth defined by the width B of the stud profiles 6. In the embodiment, the compartments 9 extend from the floor-side ceiling/floor U-profile 3 to the ceiling-side ceiling/floor U-profile 3. The compartments 9 are filled with mineral wool 10 over their entire vertical height and across their entire horizontal width. In the thickness direction (width B) of the compartments 9, these may be completely filled; however, the compartments 9 may also be only partially filled in the thickness direction (width B).

[0030] The firewall 1 according to the invention comprises a first cladding 20 and, opposite to it, a second cladding 21. In the embodiment, both claddings 20, 21 are three-layered, each consisting of 3 cladding layers 20A, 20B, 20C and 21A, 21B, 21C, respectively. The cladding layers 20A, 20B, 20C and 21A, 21B, 21C are each formed from a plurality of gypsum boards 22, which are arranged in a manner customary in the art such that the superimposed cladding layers 20A, 20B, 20C and 21A, 21B, 21C in a staggered manner relative to one another. Each of the cladding layers 20A, 20B, 20C and 21A, 21B, 21C is fastened to the stud profiles 6, for example, using drywall screws 23. The length of the drywall screws 23 is selected such that, in the installed state, they penetrate one leg of the drywall profile 6 in every case.

[0031] In the embodiment shown in Figure 2, the gypsum boards 22 have a thickness of 12.5 mm. The gypsum boards have a gypsum core 24 and each have at least one single-layer fleece layer 25, 26 on their long sides. The fleece layers 25, 26 are preferably formed as glass fiber fleece. Preferably, the fleece layers 25, 26 have a basis weight of 280 g/m² to 450 g/m², preferably 300 g/m² to 420 g/m².

[0032] Preferably, the front fleece layer 25 is wrapped around the longitudinal edges 27 and connected to the rear fleece layer 26 in an overlapping manner, in particular by bonding. The fleece layers 25 and 26 may be formed from the same fleece material; preferably, a fleece with a basis weight of 320 g/m² to 420 g/m² is used for the front fleece layer, and a lighter, more cost-effective fleece with a basis weight of 300 g/m² to 400 g/m² is used for the back fleece layer.

[0033] A firewall 1 according to the present invention

meets the requirements established in DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1:1999-10 and DIN EN 1363-2: 1999-10 regarding fire protection, stability, and impact resistance, as defined in the standard, are met by a firewall 1 according to the invention, which has a 3-layer configuration of the cladding 20, 21 consisting of fleece-laminated gypsum boards 22, each 12,5 mm thick. The requirements regarding fire protection, stability, and impact resistance set forth in the standard DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1: 1999-10 and DIN EN 1363-2:1999-10 regarding fire resistance, stability, and impact resistance can also be met with a two-layer configuration of the cladding 20, 21 consisting of fleece fabric-faced gypsum boards 22, each 15 mm thick.

List of reference numbers

[0034]

1	Firewall
2	Stud frame
3	Floor/ceiling U-profile
4	Building ceiling
5	Building floor
6	Stud profile
7	Building wall
8	Mineral wool
9	Compartment
10	Mineral wool
20	First cladding
20A, 20B, 20C	Cladding layers
21	Second cladding
21A, 21B, 21C	Cladding layers
22	Gypsum boards
23	Drywall screws
24	Gypsum core
25, 26	Fleece layer
27	Long edge

Claims

1. A firewall without a metal sheet layer, which meets the requirements of DIN EN 1363-1:2012-10 in conjunction with DIN EN 1364-1:1999-10 and DIN EN 1363-2:1999-10, and comprises at least the following:
 - a stud frame (2) made of metal drywall profiles (3, 6);
 - at least partial filling of the cavities (9) between adjacent drywall profiles (3, 6) with mineral wool;
 - a double-sided, at least two-layer cladding (6) with gypsum boards, (7) wherein the firewall (1) is **characterized in that**
 - the gypsum boards (22) of all cladding layers (20, 21) are designed as fleece-reinforced gyp-

sum boards (22).

2. Firewall according to claim 1, **characterized in that** the gypsum boards (22) are of type GM-FH2 according to DIN EN 15238-1: 2008+A1:2009.
3. Firewall according to claim 1 or 2, **characterized in that** a fleece layer (25) of the fleece - reinforced gypsum boards (22) is a glass fiber fleece.
4. Firewall according to any of the preceding claims, **characterized in that** the glass fiber fleece has a basis weight of at least 70 g/m², preferably of 80-120 g/m².
5. Firewall according to any of the preceding claims, **characterized in that** the glass fiber fleece is a mineral-coated glass fiber fleece with a basis weight of 280 g/m² to 450 g/m², in particular 300 g/m² to 420 g/m².
6. Firewall according to any of the preceding claims, **characterized in that** a front-side glass fiber fleece and a back-side glass fiber fleece are different, wherein they differ in particular in area weight.
7. Firewall according to any of the preceding claims, **characterized in that** the gypsum boards (22) have a single-layer or multi-layer lamination with the fleece layer (25) on at least both major surfaces of the gypsum boards (22).
8. Firewall according to any of the preceding claims, **characterized in that** the gypsum boards (22) are formed without a metal sheet lamination.
9. Firewall according to any of the preceding claims, **characterized in that** the cladding (20, 21) is formed as a three-layer structure with gypsum boards (22) each 12.5 mm thick and laminated with fleece fabric.
10. Firewall according to one of the preceding claims, **characterized in that** the cladding (20, 21) is formed in two layers, each comprising 15 mm thick gypsum boards (22) laminated with fleece fabric.
11. Firewall according to any of the preceding claims, **characterized in that** the thickness of the filling of the compartments (9) is less than the compartment depth between the respective innermost cladding layers (20, 21).
12. Firewall according to any of the preceding claims, **characterized in that** all cladding panels (20, 21) are fastened to the stud frame (2) by means of screws (23) or by means of clips.
13. Firewall according to any of the preceding claims,

characterized in that the metal drywall profiles (3, 6) are UW-floor/ceiling profiles and/or CW-stud profiles made of galvanized sheet steel.

14. Firewall according to one of the preceding claims, **characterized in that** drywall screws (23) are used as fastening screws and drywall clips are used as fastening clips.

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Fig. 1

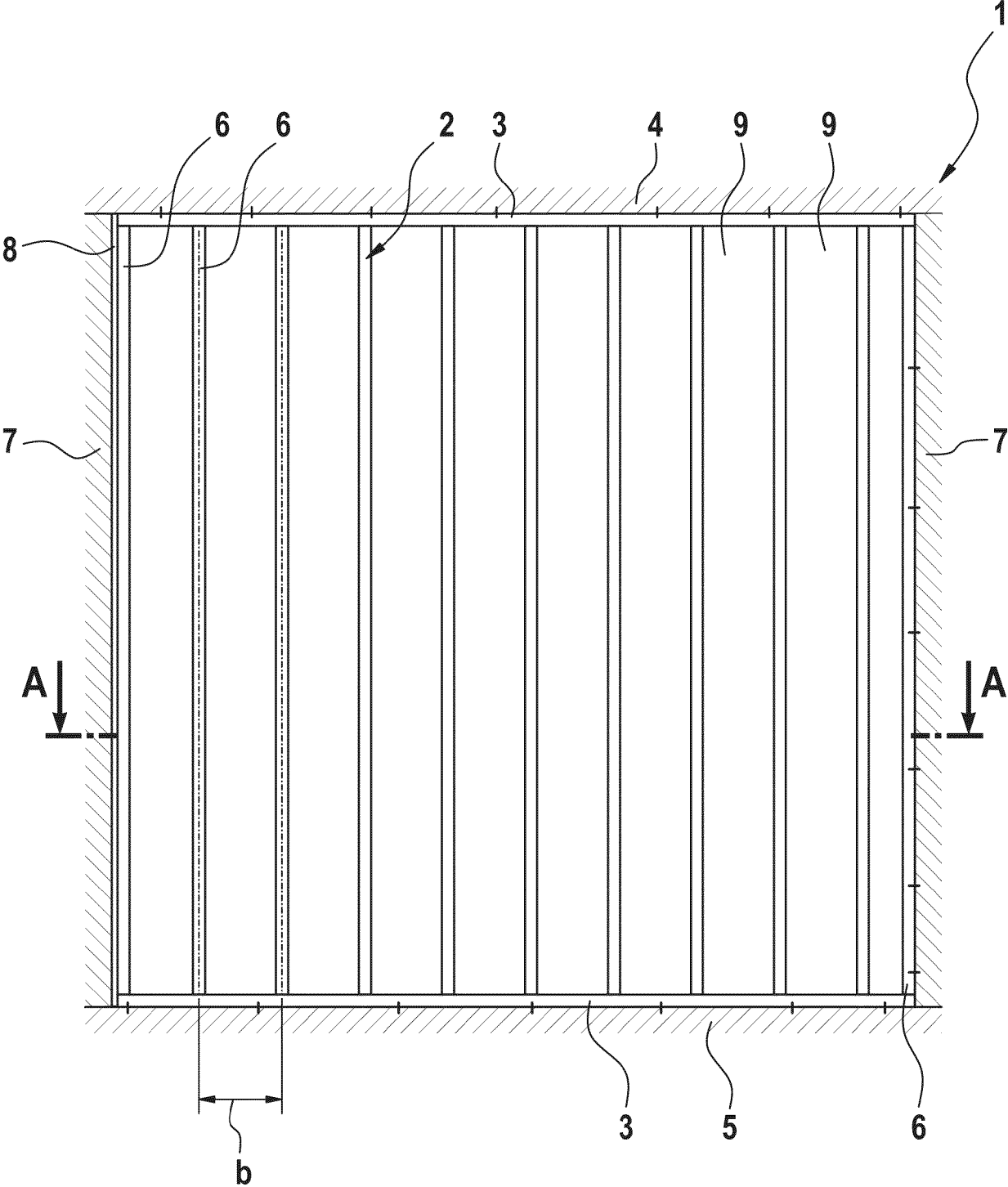


Fig. 2

A-A

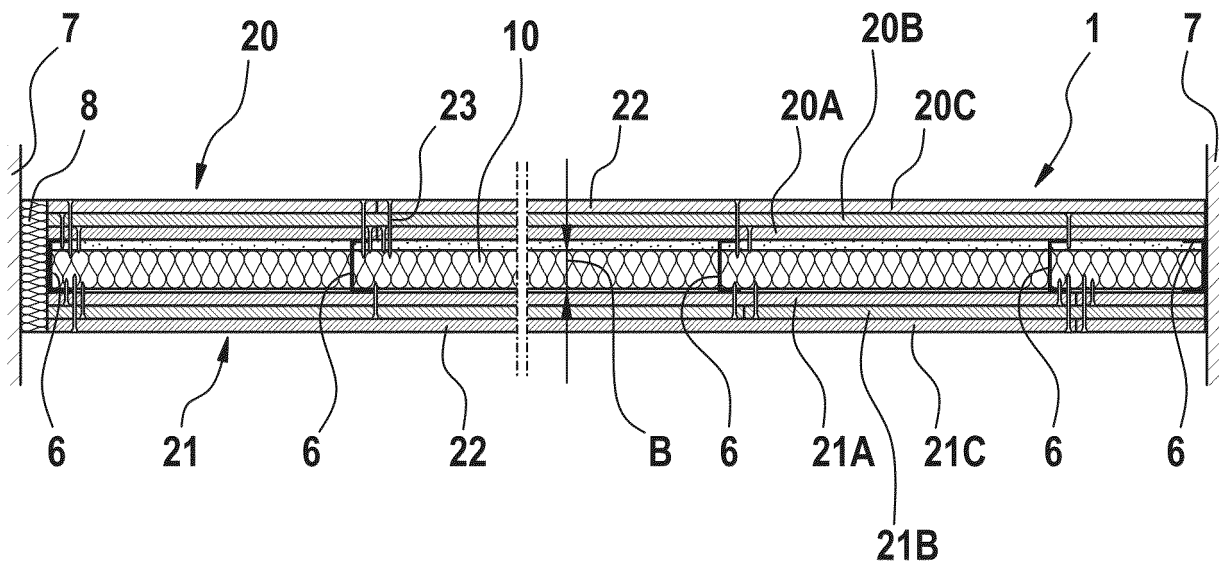
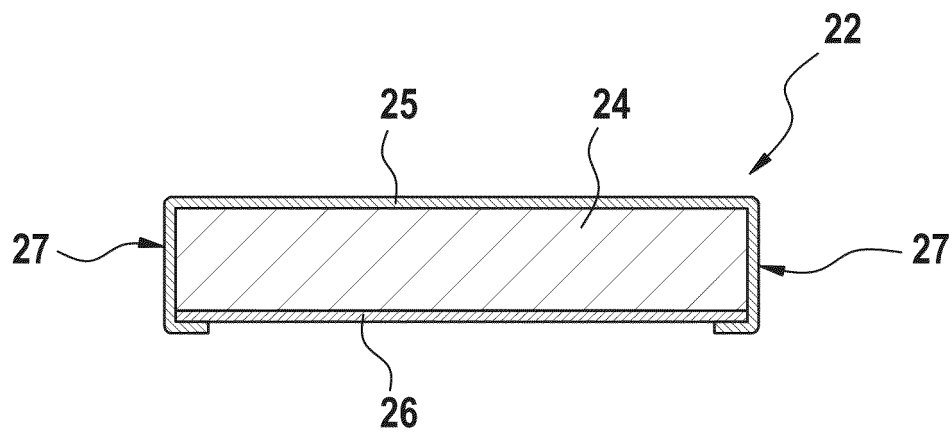


Fig. 3





EUROPEAN SEARCH REPORT

Application Number

EP 26 16 6126

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		3 August 2026	Giannakou, Evangelia
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
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A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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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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