

(19)



(11)

EP 4 818 429 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.10.2026 Bulletin 2026/41

(51) International Patent Classification (IPC):
E04B 9/00 (2006.01) **E04B 1/94** (2006.01)
E04B 9/24 (2006.01) **E04B 9/30** (2006.01)

(21) Application number: **26168217.3**

(52) Cooperative Patent Classification (CPC):
E04B 9/001; E04B 1/94; E04B 2/7411;
E04B 2/7457; E04B 9/245; E04B 9/30

(22) Date of filing: **26.03.2026**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH LA MA MD TN

(71) Applicant: **SAINT-GOBAIN PLACO**
92400 Courbevoie (FR)

(72) Inventor: **LENKER, Christoph**
68526 Ladenburg (DE)

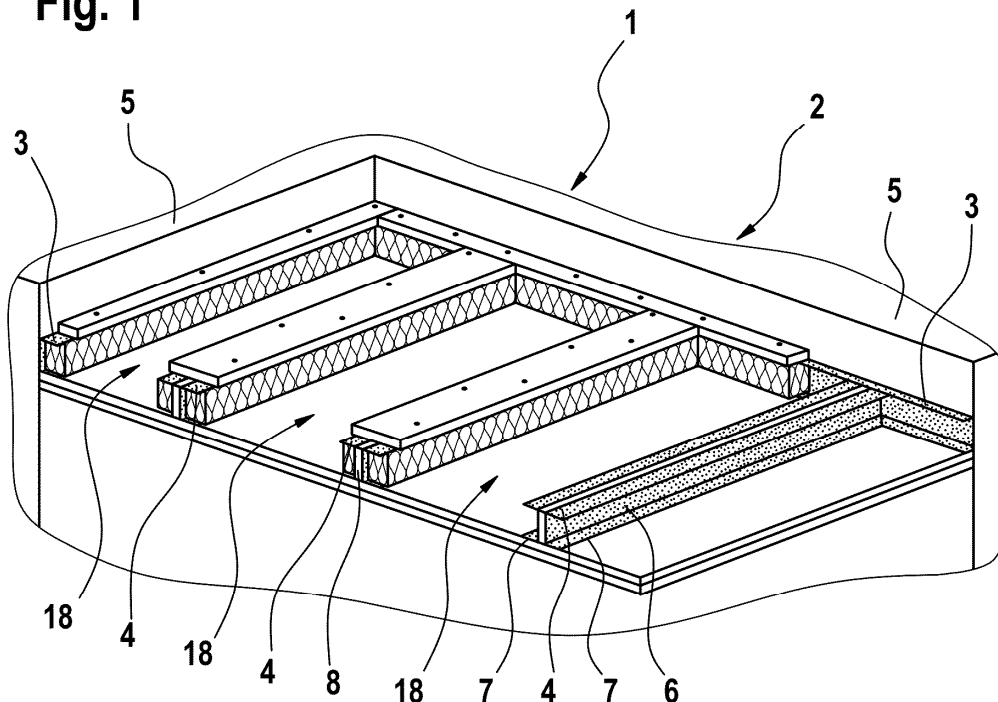
(74) Representative: **Kuhnen & Wacker**
Patent- und Rechtsanwaltsbüro PartG mbB
Prinz-Ludwig-Straße 40 A
85354 Freising (DE)

(30) Priority: **02.04.2025 DE 102025112974**

(54) **FIRE-RESISTANT SUPPORTING STRUCTURE FOR A SELF-SUPPORTING CEILING IN DRYWALL CONSTRUCTION**

(57) The invention pertains to a fire-resistant supporting structure for a self-supporting ceiling (2) in drywall construction, wherein the supporting structure (1) has wall-running beams (3) and free beams (4), wherein the free beams (4) are held at their ends by the wall-running beams (3) and the wall-running beams (3) are connected to a building wall (5), wherein the free beams (4) are formed from two C-profiles (7) or U-profiles (7) with their

bottom walls (6) placed against each other and open on opposite sides (7), characterized in that at least one intermediate layer (8) made of a fleece-laminated gypsum board (9), in particular further the base walls (6), and a free upper side (10) of the C-profiles (7) or the U-profiles (7) is covered with at least one of the cover layers (11) made of the fleece-laminated gypsum board (9).

Fig. 1**EP 4 818 429 A1**

Description

[0001] The invention relates to a fire-resistant supporting structure for a self-supporting ceiling in drywall construction according to the general concept of claim 1.

[0002] Fire-resistant supporting structures, in particular self-supporting suspended ceiling constructions featuring such a fire-resistant supporting structure, are known. These known supporting structures are usually formed from wall-running beams and free beams. The wall-running beams support the ends of the free beams. A two-layer planking made of gypsum boards is provided on the underside of the supporting structure. This planking forms the ceiling surface of the self-supporting ceiling construction. In the event of increased fire protection requirements in the event of flames from above, it is common practice to provide the self-supporting beams with a box-like enclosure, which is also formed from two layers of gypsum building boards. This type of construction for the supporting structure or the self-supporting suspended ceiling construction has proven itself from a fire protection point of view, but is relatively complex to implement, as the multi-layer, box-like enclosures in particular are costly to manufacture.

[0003] A further fire resistant supporting structure is known from DE 201 19 526 U1. The achievable fire-resistance class is F-30, which does not meet enhanced requirements of fire resistance.

[0004] The objective of the invention is therefore to provide a fire-resistant supporting structure for a self-supporting ceiling and a self-supporting ceiling which is classified at least in fire resistance class F-90-A in accordance with DIN 4102-2:1977-09 with one-sided fire exposure from above (i.e., in an intermediate ceiling area between the self-supporting ceiling and a shell ceiling) or from below (underside of the lower ceiling) and requires less manufacturing effort compared to the prior art as well as less material in the form of gypsum boards. In addition, the weight per unit area of the fire-resistant supporting structure and the self-supporting ceiling should be reduced compared to the state of the art.

[0005] These tasks are solved by a fire-resistant supporting structure for a self-supporting ceiling, in dry construction, which achieves at least a classification in fire resistance class F-90-A according to DIN 4102-2:1977-09, wherein the supporting structure has wall-running beams and free beams, the free beams are held at their ends by the wall-running beams, and the wall-running beams are connected to a building wall, wherein the free beams are formed from two C-profiles or U-profiles with their bottom walls placed against each other and open on opposite sides. According to the invention at least one intermediate layer of a fleece-laminated gypsum board, in particular arranged in contact with the bottom walls, is arranged between the bottom walls of the C-profiles or U-profiles set against each other, and a free upper side of the C-profiles or U-profiles is covered with at least one of the cover layers of a fleece-laminated

gypsum board.

[0006] With such a fire-resistant supporting structure according to the invention, it is possible to achieve the required classification in fire resistance class F-90-A for a self-supporting ceiling with these supporting structures with significantly lower manufacturing costs for the supporting structure and the self-supporting ceiling compared to the prior art. This eliminates the need for the complete encasement of opposing U-profiles or C-profiles with strips of gypsum boards, as was previously necessary in the prior art. On the one hand, the intermediate layer, which is an essential component of the fire protection effect, can be pre-assembled together with the bottom walls of the C-profiles or U-profiles set against the intermediate layer, and such a pre-assembled free beam can be inserted as a whole into the wall-running beams. On the other hand, on the construction site where the supporting structure is connected to a building, only the top layer needs to be placed on the free beams and on the wall-running beams and, if necessary, the interior spaces of the C-profiles and/or U-profiles need to be filled with mineral wool.

[0007] If necessary, it may even be possible to pre-assemble the free beams from the U-profiles or C-profiles placed against each other with the intermediate layer and the cover layer, and to insert such a pre-assembled unit on the construction site into the wall-running beams attached to the building walls and then apply the cover layers to the wall-running beams.

[0008] The measures described above mean that installation is considerably simplified and the preparation work required to provide adequate fire protection is reduced.

[0009] Surprisingly, it was found in the course of the invention that it is possible to dispense with encasing the beams, both the free beams and the wall-running beams, if fleece-laminated gypsum building boards are used instead of conventional gypsum boards, such as plasterboard. Such fleece-laminated gypsum boards do not have a paper layer; the fleece with which the gypsum core of the gypsum boards is laminated is applied directly to the gypsum core.

[0010] It is expedient for the width of the top layer to be such that the top layer protrudes slightly beyond the free upper side of the C-profiles and/or U-profiles of the free beam, in particular by at least the height of the legs of the C-legs or U-legs of the C-profiles or U-profiles.

[0011] Such lateral protrusion contributes to improving the fire protection properties. In addition, such a lateral protrusion of the fleece-laminated gypsum building boards provides good support for a filling of the C-profiles or U-profiles that also protrudes laterally with mineral wool suitable for fire protection, which, for example, has a melting point greater than 1000 °C in accordance with DIN 4102-17:2017-12.

[0012] It is preferable that the fleece-laminated gypsum board has a gypsum core and at least one fleece layer made of glass fiber fleece on at least large surfaces

of the gypsum core.

[0013] Such glass fiber fleece-laminated gypsum boards have proven themselves in meeting the requirements for classification in fire resistance class F-90-A.

[0014] Preferably, the glass fiber fleece layer has a weight per unit area of at least 70 g/m², preferably 80-120 g/m².

[0015] It is advantageous for the glass fiber fleece to be a mineral-coated glass fiber fleece with a weight per unit area of 280 g/m² to 450 g/m², in particular 300 g/m² to 420 g/m². The uncoated glass fiber fleece used to form the mineral-coated glass fiber fleece has a weight per unit area of preferably 80-120 g/m², e.g., 85 g/m².

[0016] It is advantageous for the interiors of the C-profiles or U-profiles to be at least partially filled with mineral wool.

[0017] Such mineral wool preferably has a melting point greater than 1000 °C in accordance with DIN 4102-17:2017-12, with a bulk density of approximately 50 kg/m³.

[0018] In a further embodiment, at least one spacer layer made of a fleece-laminated gypsum board is arranged between a bottom wall of the wall-running beams and the shell wall.

[0019] In order to achieve the fire protection objectives, in particular to achieve the required fire protection class, it is advisable not to connect the wall-running beams directly to the shell wall, but to provide a spacer layer made of a fleece-laminated gypsum board between the bottom wall of the wall-running beams and the building wall.

[0020] It has proven sufficient to use standard drywall UW profiles for the wall-mounted beams.

[0021] To make the wall-mounted beams fire-resistant, it is advisable to cover the exposed upper side of the drywall UW profile of the wall-mounted beams with at least one covering layer of a fleece-laminated gypsum board.

[0022] It is advisable to fill the space between two exposed beams at least partially with mineral wool.

[0023] Fleece-backed gypsum boards with a thickness of 10 mm to 20 mm, in particular a thickness of 12.5 mm, a thickness of 15 mm, or a thickness of 20 mm, have proven to be suitable thicknesses for the gypsum boards.

[0024] It is advantageous for the cover layers to be screwed or clamped to the U-profiles or C-profiles of the free beams or to the U-profile of the wall-running beam.

[0025] These are standard drywall connection techniques that meet the requirements of the fire resistance class to be achieved.

[0026] It is advantageous for the C-profiles or U-profiles with the floor walls placed against each other to be screwed together, penetrating the intermediate layer.

[0027] It is advantageous for the intermediate layer between the C-profiles and/or the U-profiles, as well as the spacer layer, to be flush with or slightly recessed from the free upper side and the free lower side of the C-profiles or the U-profiles.

[0028] This ensures that the upper cover layers and the

lower planking lie flat.

[0029] Based on the fire-resistant supporting structures according to the invention, a fire-resistant self-supporting ceiling can be advantageously formed if, to form a fire-resistant self-supporting ceiling, an underside of the supporting structure is at least double planked using fleece-laminated gypsum boards.

[0030] The invention is explained in more detail below with reference to the drawings. These show:

Figure 1: an isometric view of the upper side of a self-supporting ceiling in dry construction with a fire-resistant supporting structure according to the invention;

Figure 2: a cross-sectional view of a cross-section through the self-supporting ceiling along line A-A from Figure 1 in the case of attachment to a solid building wall;

Figure 3: a cross-sectional view of a fleece-laminated gypsum board used in the invention.

[0031] A fire-resistant supporting structure 1 according to the invention for a self-supporting ceiling 2 (see Figures 1, 2), which has at least a fire resistance rating of F-90-A in accordance with DIN 4102-2:1977-09 with one-sided fire exposure from above (i.e., in an intermediate ceiling area between the self-supporting ceiling and a shell ceiling) or from below (underside of the lower ceiling).

[0032] The wall-running beams 3 are designed as U-profiles and are attached to a building wall 5 with a bottom wall 6 of the U-profile. The building wall 5 can be a load-bearing building wall, for example in solid construction, or a non-load-bearing building wall, for example in drywall construction.

[0033] The free beams 4 are each formed from two C-profiles 7 or two U-profiles 7, which are fastened to each other along their length with their bottom walls 6 facing each other, for example by means of screws. An intermediate layer 8 is provided between the bottom walls 6 of two adjacent C-profiles 7/U-profiles 7, which is formed from a fleece-laminated gypsum board 9. The intermediate layer 8 preferably extends over the entire length of the free beam 4 in one piece or assembled from parts without joints.

[0034] The two C-profiles/U-profiles 7 thus form the free beam 4 together with the intermediate layer 8 arranged between them. A cover layer 11 is arranged on the free upper side 10 of C-legs/U-legs 12, which extends over the entire length of the free beam 4, either in one piece or joined together from parts without joints, except for the end areas of the free beams 4.

[0035] The cover layers 11 are made of fleece-laminated gypsum boards 9 and are screwed in the usual manner to the C-legs/U-legs 12 of the C-profiles/U-profiles 7 using drywall screws or clamped using appropriate clamps.

[0036] The free beams 4 are inserted into the wall-

running beams 3 with their end areas spaced parallel to each other and thus act in conjunction with the building wall 5 to transfer loads via the wall-running beams 3.

[0037] The wall-running beams 3 are connected to the building wall 5 in a load-bearing manner. The wall-running beams 3 are designed, for example, as commercially available UW-drywall-profiles. A spacer layer 17 is placed against a bottom wall 6 of the wall-running beam 3, which in turn is placed against the building wall 5.

[0038] The spacer layer 17 is made of a fleece-laminated, in particular a glass fiber fleece-laminated gypsum board, either in one piece or assembled from parts without joints.

[0039] A cover layer 11 is placed on a free upper side 10 of the wall-running beam 3, analogous to the free beams 4, which protrudes slightly beyond the U-legs 12 of the wall-running beam towards the interior of the room. Towards the building wall 5, the cover layer 11 protrudes beyond the wall-running beam 3 in such a way that the spacer layer 17 or its vertically upward-facing end face is covered by the cover layer 11. The cover layer 11 of the wall-running beams 3 is also formed in one piece or without joints from parts of a fleece-laminated gypsum board 9, in particular from a glass fiber fleece-laminated gypsum board.

[0040] A surrounding frame made of wall-running beams 3 and a plurality of spaced-apart free beams 4 running parallel to each other, which are seated in the wall-running beams 3 with their end regions in a load-transferring manner, form the fire-resistant supporting structure 1, which can be further developed into a fire-resistant self-supporting ceiling 2 by means of a bottom planking 16 (as described below) to form a fire-resistant self-supporting ceiling 2.

[0041] In the interior spaces 13 of the wall-running beams 3 and in the interior spaces 13 of the free beams 4, which are formed, for example, by U-profiles/C-profiles 7 open on one side, an insulating material, for example fireproof mineral wool, is preferably used. A suitable mineral wool has, for example, a melting point of more than 1000 °C in accordance with DIN 4102-17:2017-12 and has a bulk density of approx. 50 kg/m³.

[0042] Compartments 18 are formed between two adjacent free beams 4, which are filled with a suitable, in particular a suitable fireproof mineral wool 14 if necessary.

[0043] The mineral wool 14, which is arranged in the interior spaces 13 of the U-profiles/C-profiles 7, may differ in particular with regard to its bulk density from the mineral wool 14 which may be arranged in the compartments 18 between two adjacent free beams 4.

[0044] To form a fire-resistant, self-supporting ceiling 2 according to the invention, the aforementioned supporting structure 1 according to the invention is planked on its underside with fleece-laminated gypsum boards 9, in particular with glass fiber fleece-laminated gypsum boards 9. A double-layer planking 16 is appropriate.

[0045] Figure 3 shows a cross-section through a

fleece-laminated gypsum board 9 as used in this invention. The fleece-laminated gypsum board 9 has a gypsum core 30 which is provided with a visible fleece layer 31 and a rear fleece layer 32 on at least both large surfaces of the gypsum core 30. The fleece layers 31, 32 are connected directly to the gypsum core 30 without any additional intermediate layers. The fleece-laminated gypsum boards 9 are in any case free of a paper/card-board layer.

[0046] In a preferred manner, the visible fleece layer 31 is guided around the longitudinal edges 33 of the gypsum core 30 and connected to the rear fleece layer 32 in an overlapping manner, in particular by being glued.

[0047] The fleece layers 31, 32 can be made of the same fleece material and are formed, for example, from a mineral-coated glass fiber fleece. Preferably, mineral-coated glass fiber fleeces of different grammages are provided on the visible side and the reverse side. A mineral-coated glass fiber fleece with a weight per unit area of 320 g/m² to 420 g/m² is preferred for the visible fleece layer 31, and a lighter, more cost-effective mineral-coated glass fiber fleece with a weight per unit area of 300 g/m² to 400 g/m² is preferred for the rear fleece layer 32.

[0048] The gypsum core 30 may be fiber reinforced.

[0049] The fleece layers 31, 32 cover the large surfaces of the gypsum core 30 in any case, but may also additionally cover the longitudinal edges 33 of the gypsum core 30. In the event of longitudinal trimming of the fleece-laminated gypsum boards 9 on site, for example during the production of the strip-shaped intermediate layers 8, cover layers 11, and spacer layers 17, free, non-fleece-laminated longitudinal edges 33 may be created.

List of reference numbers

[0050]

1	Fire-resistant supporting structure
2	Self-supporting ceiling
3	Wall-running beam
4	Free beam
5	Building wall
6	bottom walls
7	C-profiles/U-profiles
8	Intermediate layer
9	Fleece-laminated gypsum board
10	Free upper side
11	Cover layer
12	C-legs/U-legs
13	Interior spaces
14	Mineral wool
15	Underside
16	Planking
17	Spacer layer
18	Compartments
30	Gypsum core
31, 32	Fleece layer

33 Longitudinal edge

Claims

1. Fire-resistant supporting structure for a self-supporting ceiling (2) in drywall construction, wherein the supporting structure (1) has wall-running beams (3) and free beams (4), wherein the free beams (4) are held at their ends by the wall-running beams (3) and the wall-running beams (3) are connected to a building wall (5), wherein the free beams (4) are formed from two C-profiles (7) or U-profiles (7) with their bottom walls (6) placed against each other and open on opposite sides (7), **characterized in that** at least one intermediate layer (8) made of a fleece-laminated gypsum board (9), in particular further the base walls (6), and a free upper side (10) of the C-profiles (7) or the U-profiles (7) is covered with at least one of the cover layers (11) made of the fleece-laminated gypsum board (9). 5 10 15 20
2. Fire-resistant supporting structure according to claim 1, **characterized in that** the width of the top layer (11) is dimensioned such that the top layer (11) covers the free upper side (10) of the C-profiles (7) and/or the U-profiles (7) of the free beams (4) laterally by a certain amount, in particular at least by the height of the legs of the C-legs (12) or U-legs (12) of the C-profiles (7) or the U-profiles (7). 25 30
3. Fire-resistant supporting structure according to claim 1 or 2, **characterized in that** the fleece-laminated gypsum board (9) has a gypsum core (30) and at least one fleece layer (31) made of glass fiber fleece on at least large surfaces of the gypsum core (30). 35
4. Fire-resistant supporting structure according to claim 3, **characterized in that** the fleece layer (31) made of glass fiber fleece has a weight per unit area of at least 70 g/m², preferably 80-120 g/m². 40
5. Fire-resistant supporting structure according to claim 3 or 4, **characterized in that** the glass fiber fleece is a mineral-coated glass fiber fleece with a weight per unit area of 280 g/m² to 450 g/m², in particular of 300 g/m² to 420 g/m². 45
6. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** the interior spaces (13) of the C-profiles (7) or the U-profiles (7) are at least partially filled with mineral wool (14). 50
7. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** a planking (16) made of gypsum boards, in particular gypsum boards laminated with fleece (9), is provided on one of the free lower sides (15) of the C-profiles (7) and/or the U-profiles (7) opposite the upper side (10). 55
8. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** at least one spacer layer (17) made of a fleece-laminated gypsum board (9) is arranged between a bottom wall (6) of the wall-running beams (3) and the building wall (5).
9. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** the wall-running beams (3) are designed as drywall-UW-profiles.
10. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** a free upper side (10) of the drywall-UW-profile of the wall-running beams (3) is covered with at least one cover layer (11) made of a fleece-laminated gypsum board (9).
11. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** compartments (18) between two free beams (4) are at least partially filled with mineral wool (14).
12. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** the fleece-laminated gypsum boards (9) have a thickness of 10 mm to 20 mm, in particular a thickness of 12.5 mm, a thickness of 15 mm or a thickness of 20 mm.
13. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** the cover layers (11) are screwed or clamped to the U-profiles (7) or C-profiles (7) of the free beams (4) or to the U-profile (7) of the wall-running beam (3).
14. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that** the intermediate layer (8) between the C-profiles (7) and/or the U-profiles (7) as well as the spacer layer (17) is flush with or slightly recessed from the free upper side (10) and the free lower side (15) of the C-profiles (7) or the U-profiles (7).
15. Fire-resistant supporting structure according to one of the preceding claims, **characterized in that**, in order to form a fire-resistant self-supporting ceiling (2), an underside of the supporting structure (1) is at least double-planked using fleece-laminated gypsum boards (9).

Fig. 1

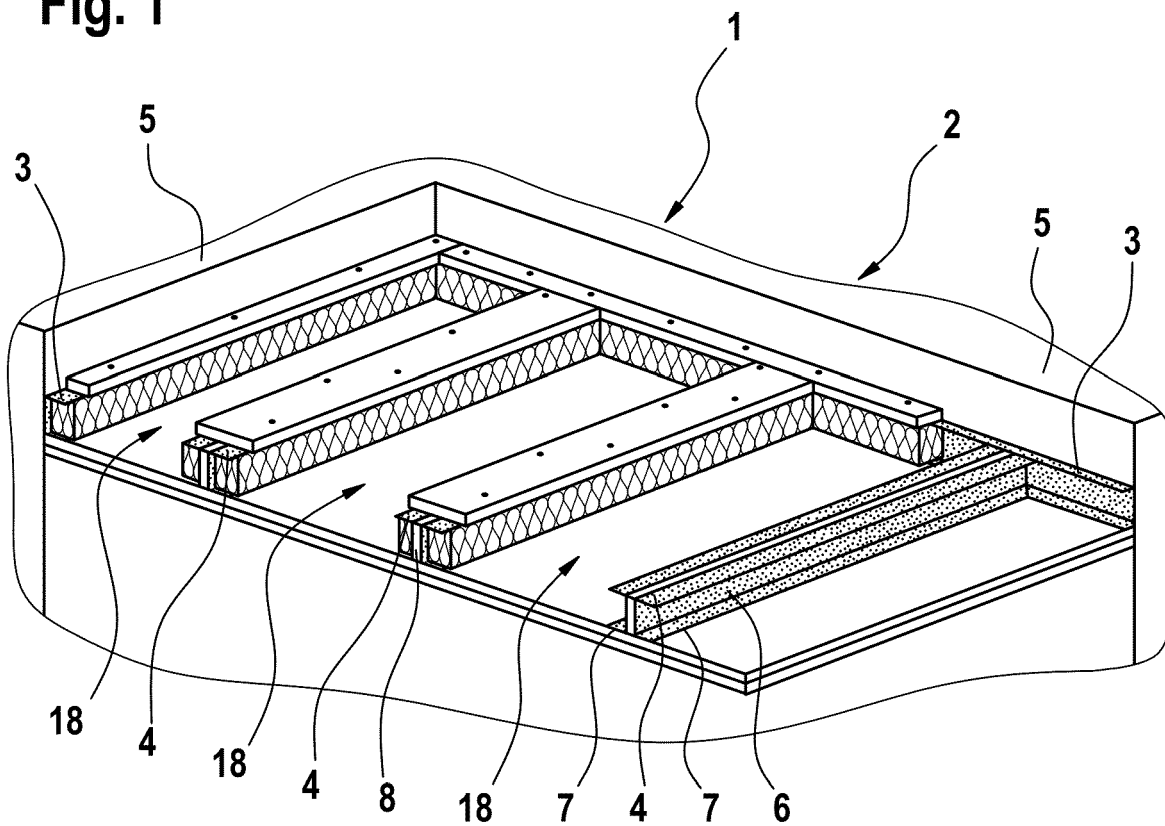


Fig. 2

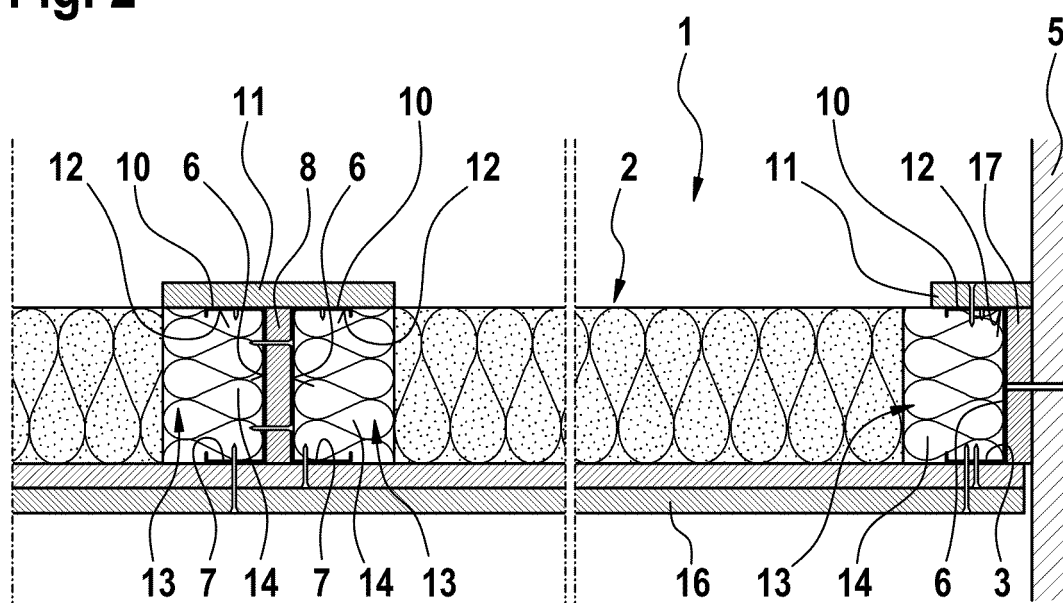
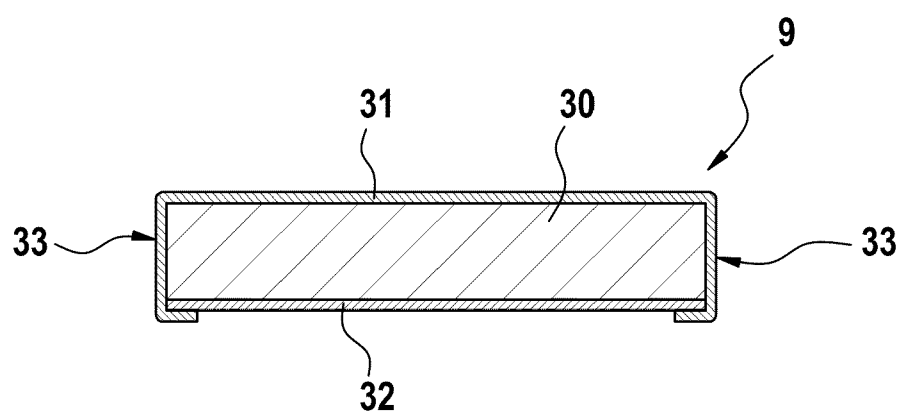


Fig. 3





EUROPEAN SEARCH REPORT

Application Number

EP 26 16 8217

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 201 19 526 U1 (KNAUF WESTDEUTSCHE GIPS [DE]) 30 April 2003 (2003-04-30) * page 1 - page 4; figures 1-3 * -----	1-15	INV. E04B9/00 E04B1/94
A	Fireboard Knauf: "Special gypsum board A1 for fire protection Description", , 1 December 2023 (2023-12-01), pages 1-3, XP093428694, Retrieved from the Internet: URL:https://knauf.com/api/download-center/v1/assets/8939be88-ea51-4f7e-b4db-77645a544f8a?download=true [retrieved on 2026-08-25] * the whole document * -----	1-15	ADD. E04B9/24 E04B9/30
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E04C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		25 August 2026	Lopes, Claudia
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P24C01)

25-08-2026

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 20119526 U1 [0003]