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(71) Applicant: **Novatec B.V.**  
**6955 BK Ellecom (NL)**

(72) Inventor: **Stuiver, Jaap**  
**6955BK Ellecom (NL)**

(74) Representative: **van Essen, Peter Augustinus**  
**Van Essen Patent B.V.**  
**Agro Business Park 50**  
**6708 PW Wageningen (NL)**

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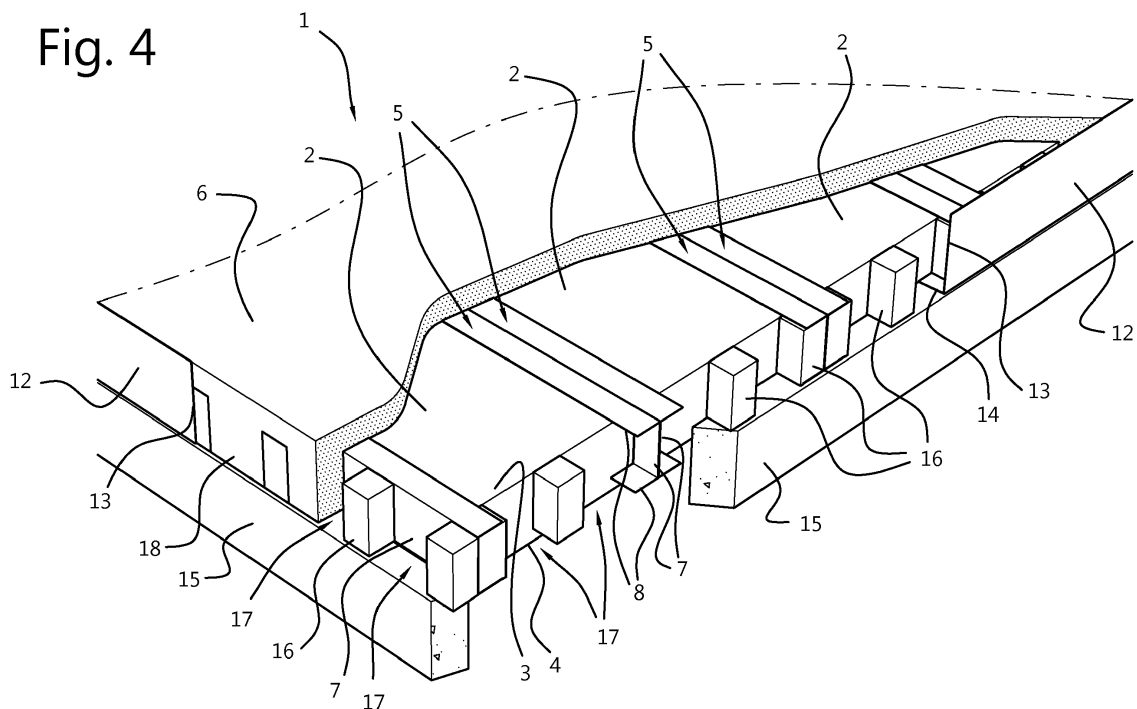
This application was filed on 14-03-2017 as a divisional application to the application mentioned under INID code 62.

(54) **FLOOR PART FOR AN INSULATION FLOOR**

(57) The invention relates to a floor construction with a floor part for an insulation floor for a floor for buildings, comprising floor parts comprising a substantially block-shaped floor element of synthetic foam which on both sides is enclosed by shape-retaining parts and sup-

port parts for ends of the shape-retaining parts, wherein a series of the floor parts in the longitudinal direction next to one another extend in their longitudinal direction and ends of the shape-retaining parts rest on the support parts.

Fig. 4



## Description

### Background of the invention

[0001] The invention relates to a floor part as a part for a floor construction such as an insulation floor, a floor construction, and a method for constructing an insulation floor, and a building provided with an insulation floor.

[0002] In NL2005380 a floor is provided with subfloor-boards and girders provided with one or more bearing surfaces for bearing the subfloor-boards, and a layer of concrete that constructionally connects the girders and covers the subfloor-boards. At least a part of the girders consists of a girder material that in case of the same bearing capacity of the girder results in a lower weight per running unit of length of the girder than reinforced or prestressed concrete does. The girders may for instance be made of a synthetic material, such as a composite, or of a sheet metal, shaped into the desired profile.

[0003] There is room for improvement of the processability of such floors and renovation floors.

[0004] According to its abstract, US6085479 describes a premanufactured structural building panel for promoting the efficient construction of the exterior wall members of a building having improved insulation, sound absorption, fire retardant and structural properties. The premanufactured structural building panels consist of a number of C-shaped structural channels. The panels are provided with a fire retarding board secured to opposing angle members and a foam insulation member secured to the fire retarding board. A plurality of retaining members are provided for additional structural support. The structural panels are supported on wall support members and connected to each other in a side-by-side fashion to form an exterior wall member of a building. The panels are arranged such that the C-shaped channels are protected from conditions external to the building by a portion of the foam insulation members. The exterior wall members include vertical sidewalls, a horizontal roof and ceiling wall, and a pitched roof system. The interior surface of the walls can be prepared for finishing. Affixed to the exterior of the wall members is a weatherable covering. This document does not relate to interior floors for a building.

### Summary of the invention

[0005] It is an object of the invention to provide a floor part that is easier in terms of construction and use. It is a further or additional object to provide a floor part that can be manufactured in an economically advantageous fashion.

[0006] For that purpose the invention provides a floor construction according to claim 1.

[0007] In one embodiment the floor part is used as insulation floor, in particular a ground floor insulation floor, in the construction of houses. This floor concept will in one embodiment be used in particular in new builds, ren-

ovations, refurbishments and small extensions.

[0008] By using the floor parts, which are generally pre-manufactured, also called "Prefab", a simple and quick construction of a complete floor in a building can be realised. The production takes place at a location that is remote from the building site.

[0009] The floor parts comprise floor elements of an expanded synthetic material or a synthetic foam. An example of such materials are expanded polyethylene (EPP), expanded polypropene (EPP), expanded polystyrene (EPS), polyurethane foam (PUR). A material that is suitable in terms of its properties, acceptance in construction work, and costs, is EPS. The floor elements are substantially block-shaped. As a result they can be fitted well into a building. It is of course possible to adapt outer ends to the building walls that are not straight.

[0010] The edges of the floor elements may be adapted so that the top surface and the profile parts provide a substantially flat top surface. For instance the top faces of the floor elements may at their longitudinal sides be provided with a recess for the flanges. As a result the top face of the floor parts can provide a flat surface.

[0011] The floor elements may be provided with a longitudinal groove for accommodating the flanges of the U-profile parts. A vertical cold bridge is thus avoided. The longitudinal groove will have been arranged at least a few centimetres above the bottom face. Said groove will usually be fitting to the flange, optionally clamping it. A simple incision or longitudinal cut may suffice to accommodate a flange.

[0012] A similar effect of avoiding a vertical cold bridge can be achieved by means of a floor element of a first block-shaped floor element member having a thickness fitting between the flanges of a U-profile part. The floor element furthermore comprises a second floor element member having a width adapted to the distance between the bodies of opposing U-profiles of a floor part. In one embodiment the width of the second floor element member substantially corresponds with the width of a floor part. A second floor element member may have a higher compression strength than the first floor element member.

[0013] Optionally the length of a second floor element member may be shorter than the length of the first floor element member. When the outer ends of the U-profiles have been supported on support members, one or more second floor element members may extend between the support members.

[0014] Usually the flanges of the U-profiles will be thin, a few millimetres at the most. A face of the second floor element member adjacent to the first floor element member may be provided with a recess for a flange. Alternatively the face of the first floor element member may be provided with a recess for a flange. A recess could also be divided over both floor element members.

[0015] The U-profile parts are shape-retaining and in one embodiment made of metal.

[0016] Suitable metals are for instance iron and/or gal-

vanised steel. In particular galvanised steel having a thickness of 0.5-2 mm is suitable, more in particular 0.7-1.5 mm. Other materials providing a corresponding rigidity and strength may also be suitable. In terms of costs galvanised steel is suitable.

**[0017]** The U-profile parts of abutting floor parts may be connected to each other back-to-back by means of snap members, or be connected by means of bolts or screws.

**[0018]** The invention furthermore relates to a floor construction comprising floor parts as described, comprising a series of floor parts in longitudinal direction adjacent to each other, wherein the U-profile parts in longitudinal direction extend beyond the floor elements, and wherein the floor construction furthermore comprises a circumferential formwork border provided with a support ledge for supporting the outer ends of the U-profile parts and with an upright edge.

**[0019]** The invention furthermore relates to a method for constructing an insulation floor in a building using a floor part according to the invention, wherein the floor parts are laid in longitudinal direction adjacent to each other on a floor or support member with the body of one of the U-profile parts of a floor part against the body of one of the U-profile parts of a next floor part, back-to-back, for providing a continuous insulation floor.

**[0020]** The invention further relates to a method for constructing an insulation floor in a building for obtaining a floor construction as described, wherein the formwork border is attached to a part of a building, the floor parts are laid in longitudinal direction adjacent to each other with the body of one of the U-profile parts of a floor part against the body of one of the U-profile parts of a next floor part, back-to-back, for providing a continuous insulation floor, and with the outer ends of the U-profile parts that in longitudinal direction extend beyond the floor elements and that support on the support ledges.

**[0021]** In one embodiment the U-profile parts may first be connected to each other back-to-back, after which the floor elements of synthetic foam are placed in between them. In that way H-profiles can in fact be provided and floor elements of synthetic foam, the longitudinal sides of which extend fully or in part in between such H-profile parts.

**[0022]** The invention further relates to a floor part for an insulation floor for a ground floor for buildings, comprising a substantially block-shaped floor element of synthetic foam provided with a top and bottom face and opposing longitudinal sides, and wherein along the opposing longitudinal sides the floor element is provided with shape-retaining, substantially rectangular U-profile parts provided with a body and flanges, wherein the bodies abut the longitudinal sides, a flange abuts a top face, and a flange is embedded in the floor element spaced apart from the bottom face.

**[0023]** The floor construction makes a self-supporting, insulating floor possible.

**[0024]** The invention further provides a floor construc-

tion for an insulation floor for a floor, particularly a ground floor, for buildings, comprising floor parts comprising a substantially block-shaped floor element of synthetic foam provided with an top and bottom face and opposing longitudinal sides, and wherein along the opposing longitudinal sides the floor element is provided with shape-retaining, substantially rectangular U-profile parts provided with a body and flanges, wherein the bodies substantially abut the longitudinal sides, a flange substantially abuts a top face, and a flange is substantially embedded in the floor element spaced apart from the bottom face, wherein the floor construction comprises a series of the floor parts adjacent to each other in longitudinal direction, wherein the U-profile parts in longitudinal direction extend beyond the synthetic foam floor elements, and wherein the floor construction furthermore comprises a circumferential formwork border provided with a support ledge for supporting the outer ends of the U-profile parts and with an upright edge, wherein the floor construction is furthermore provided with a concrete finishing layer wherein the upright edge extends above the U-profile parts and the floor elements as formwork border when pouring the concrete finishing layer.

**[0025]** The invention furthermore relates to a floor part provided with one or more of the characterising measures described in the attached description and/or shown in the attached drawings.

**[0026]** It will be clear that the various aspects mentioned in this patent application can be combined and that each individually may qualify for a divisional patent application.

### Brief description of the drawings

**[0027]** In the attached drawings an embodiment of a floor construction is shown in which:

Figure 1 shows an example of a part of a floor of a building in which the floor parts can be used, in perspective view;

figure 2 shows a perspective view of an embodiment of the floor parts provided with projections;

figure 3 shows a detail of figure 1,

figure 4 shows an alternative or additional embodiment provided with a formwork border.

### Description of the embodiments

**[0028]** Figure 1 shows an example of a floor provided with a subfloor, in this case a bearing subfloor. On the subfloor an insulating floor construction with floor parts 2 has been placed, and atop of it, partially interrupted, a finishing floor 6. Such a finishing floor may for instance be a wooden flooring, or a (snap-together) laminate flooring, or a pressure layer of poured material such as concrete.

**[0029]** The floor parts 2 here comprise block-shaped floor elements 3 of synthetic foam. Alongside both lon-

itudinal sides each floor element 3 is provided with a U-profile part 5. The U-profile parts 5 have a body 7 and flanges 8. In this embodiment the floor elements comprise a first floor element member 3 and a second floor element member 4. By using a second floor element member 4 there is no or hardly any heat contact between the lowermost flanges 8 of the U-profiles 5 and the sub-floor, and the environment. In that way a vertical cold bridge due to the U-profiles 5 is prevented. In terms of thickness the first floor element members 3 fit in between the flanges 8 of the U-profiles 5. In this solution, if so desired a material of the second floor element member 4 can be chosen to have a greater pressure resistance than the material of the first floor element member.

**[0030]** In an alternative embodiment a floor element 3 is provided with opposing cuts or longitudinal grooves for accommodating one of the flanges 8 of a U-profile part 5.

**[0031]** In figure 2 the top surface of a floor element 3 is provided with projections 10. In this case the projections have a flat top face. Between the projections pipes 11 such as heating pipes for underfloor heating can be laid. The projections 10 have here been arranged on a fixed grid, in this case a rectangular grid. The diameter of the projections will usually be 5-20 cm, mostly 5-15 cm. The height of the projections may be selected in between 1 and 3 cm.

**[0032]** Figure 3 shows a detail of figure 1.

**[0033]** In an alternative embodiment the floor parts 2 have not been arranged on a subfloor. An example thereof is shown in figure 4. In this embodiment the outer ends of the U-profiles 5 are supported by construction members 15. A floor part 2 here comprises a floor element 3, along both longitudinal sides provided with profile parts 5 extending beyond the floor parts. In the embodiment shown, the construction members 15 are a circumferential beam 15 or a small wall 15. The chosen construction 1 further accelerates the method, can be used for various storeys in a building, and provides an accurate finishing height for an optional pressure layer by using a circumferential formwork border 12. In this case the formwork border 12 is made of the same material as the profile parts 5. In one embodiment, as shown in the figure, the formwork border 12 comprises an upright edge 13 and a support ledge 14. Support ledge 14 can easily be placed on a supporting member such as the said circumferential beams of an interior wall. Optionally a dampening layer may have been placed in between the construction and the support ledge 14. In an alternative embodiment the formwork border with the upright edge 13 can be secured to a wall and the support ledge 14 provides a ledge for the profile parts 5. A separate bearing profile may also be screwed to the wall and the formwork border may then support thereon.

**[0034]** In this case the profile parts 5 extend beyond the floor elements 3. The floor elements 3 have here been provided with the longitudinal cut so that the flanges 8 of the profile parts 5 have been accommodated therein and the insulation extends beyond the profile parts and the

profile parts do not form a cold bridge. In between the outer ends of the profile parts 5, in particular their flanges 8, and the support ledge of the formwork border further layers can be applied for insulation, for instance rubber strips or parts of synthetic material. The space in between the outer ends of floor elements 3 and the upright edge 13 of the formwork border 12 may be filled with insulation blocks 16. In the embodiment intermediate spaces 17 have furthermore been left open. In this case the construction 1 has furthermore been provided with a floor, in this case a pressure layer 6 on which a finishing flooring such as parquet, laminate flooring or a carpet may be placed. The pressure layer may be of a poured material, such as for instance concrete. The intermediate spaces 17 can then be filled with the poured material so that support members 18 are created for additional bearing properties of the pressure layer.

**[0035]** A floor element 2 in one embodiment consists of a polystyrene foam (EPS) core enclosed on both sides by a metal U-profile 5.

**[0036]** The thickness of the floor depends on the desired RC-value and the span and the load that will be on the floor. In a specific embodiment this floor has a thickness of 200 mm. By using various qualities of EPS, different RC-values can be achieved.

**[0037]** In one embodiment the width of the floor element is for instance 500 mm. Other widths can be made for fitting pieces. The length of the floor element depends on the desired floor length of the building project and this may vary from 1.5 to 8 metres. The metal U-profile is formed according to the specifications required according to the Dutch calculation rules for floor loads. The present U-profile has a height of 200 mm with two flanges that are folded back of approximately 40 mm, but depending on the span, the required loading capacity, the width of the flanges, the thickness of the profile the height of the U-profile may vary. The thickness now is approximately 1 mm. The thickness may vary, taking among others the span and the load to be borne into account.

**[0038]** A complete floor consists of various floor elements.

**[0039]** What is unique about this product is:

- \* a floor element which unites the load bearing capacity and the insulation in one element.
- \* the floor element is made to length in the factory in conformity with the specifications of the project; As a result it will no longer be necessary to measure the floor elements at the project site.
- \* it is lightweight and as a result the mounting time, processing time is much shorter than is the case with existing systems. Mounting time can be reduced down to 15% of the conventional mounting time.
- \* use of a concrete pressure layer is also possible.
- \* due to the specifications of the metal profile a so-called pressure layer will not be required, as is the case for concrete bearing girders, and a wooden or laminated top plate will suffice.

\* optionally EPS-caps can be integrated or integrally formed on the EPS part, as a result of which under-floor heating pipes or electricity pipes can be laid quickly. This will reduce the height of the overall floor.

\* in case of a wooden or laminated top layer a border formwork will no longer be required due to the set-up of this floor element.

\* the entire set-up of the floor is cost-reducing.

**[0040]** Further additions:

\* when the floor elements have been mounted, wooden or laminated floor boards can be screwed onto the steel girders, resulting in an improved stability and it can also be used as a finishing layer for parquet or carpet.

\* Optionally the U-profile may project at the outer ends of the floor element in order to achieve a better support. In one embodiment 5-15 cm of the outer ends of the U-profiles sit on the support beams. Optionally the complete floor elements may be supported in such an end range.

**[0041]** It will be clear that the above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an expert.

**Claims**

1. A floor construction (1) for an insulation floor for a floor, particularly a ground floor, for buildings, comprising floor parts comprising a substantially block-shaped floor element (3) of synthetic foam which on both sides is enclosed by shape-retaining parts (5) and support parts (14) for ends of the shape-retaining parts (5), wherein a series of the floor parts in the longitudinal direction next to one another extend in their longitudinal direction and ends of the shape-retaining parts (5) rest on the support parts (14).
2. The floor construction according to claim 1, wherein the floor parts are load-bearing elements wherein the floor construction provides a free carrying, insulating floor.
3. The floor construction according to claim 1 or 2, wherein the shape-retaining parts are substantially rectangular U-profile parts (5).
4. The floor construction according to claim 3, wherein the U-profile parts comprises a body (7) and flanges(8).
5. The floor construction according to any one of the preceding claims, wherein the support parts (14) further comprise a support ledge on which ends of the shape-retaining parts (5) rest and a circumferential formwork border (12) provided with a support ledge (14) for supporting the outer ends of the U-profile parts (5) and with an upright edge (13).
6. The floor construction according to claim 5, wherein the floor construction further comprises a concrete finishing layer (6) wherein the upright edge (13) extends above the U-profile parts (5) and the floor elements (3) as formwork border when pouring the concrete finishing layer (6).
7. Floor construction according to claim 1 when dependent on claim 3 and 4, wherein the floor element comprises a first block-shaped floor element member having substantially a thickness fitting between the flanges of the U-profile parts.
8. Floor construction according to any one of the preceding claims, wherein the floor element is substantially made of polystyrene foam (EPS).
9. Floor construction according to any one of the preceding claims, wherein the floor element has a thickness of at least 150 mm.
10. Floor construction according to any one of the preceding claims, wherein the floor element has a width of 20-60 cm.
11. Floor construction according to any one of the preceding claims, wherein the floor element has an RC value of at least 3.5 m<sup>2</sup>K/W.
12. Floor construction according to any one of the preceding claims, wherein on a surface the floor element is provided with projections of the foamed synthetic foam, in particular the projections are substantially cylindrical having a substantially flat surface, specifically having a diameter of 5-20 cm, more specifically having a height of 1-5 cm, in particular the projections are integrally formed.
13. Floor construction according to any one of the preceding claims, wherein the shape-retaining parts are U-profiles, in particular U-profiles having a rectangular cross-section, wherein in particular the U-profile is a metal U-profile, preferably of galvanised steel.
14. Method for constructing an insulation floor in a building using a floor construction according to any one of the preceding claims 1-12, wherein the floor parts are laid in longitudinal direction adjacent to each other on a support member.

15. Method according to claim 14, wherein the support part is attached to or at a part of a building, the floor parts are laid in longitudinal direction adjacent to each other, and with outer ends of the U-profile parts that extend in longitudinal direction on the support ledges. 5

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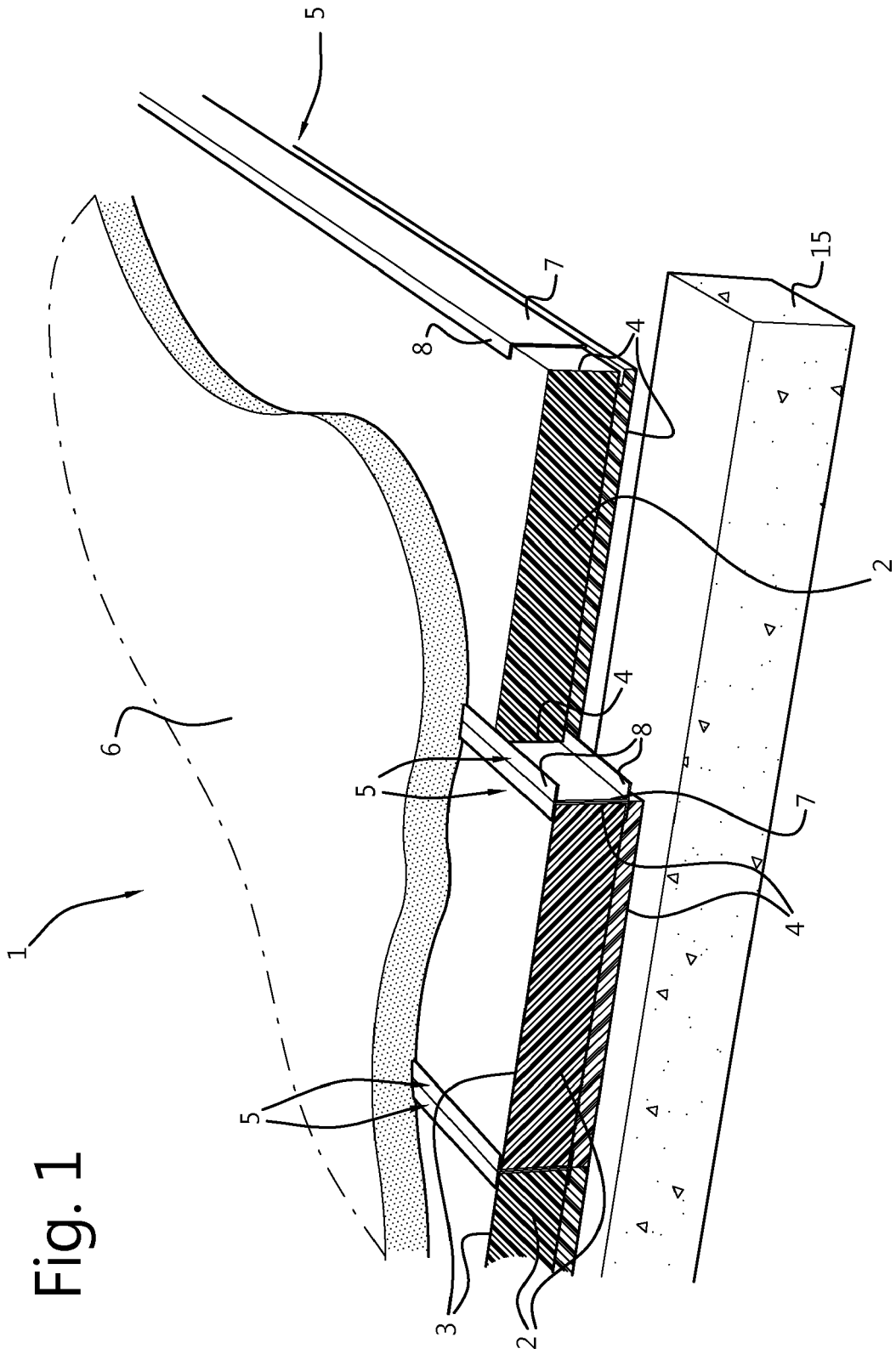
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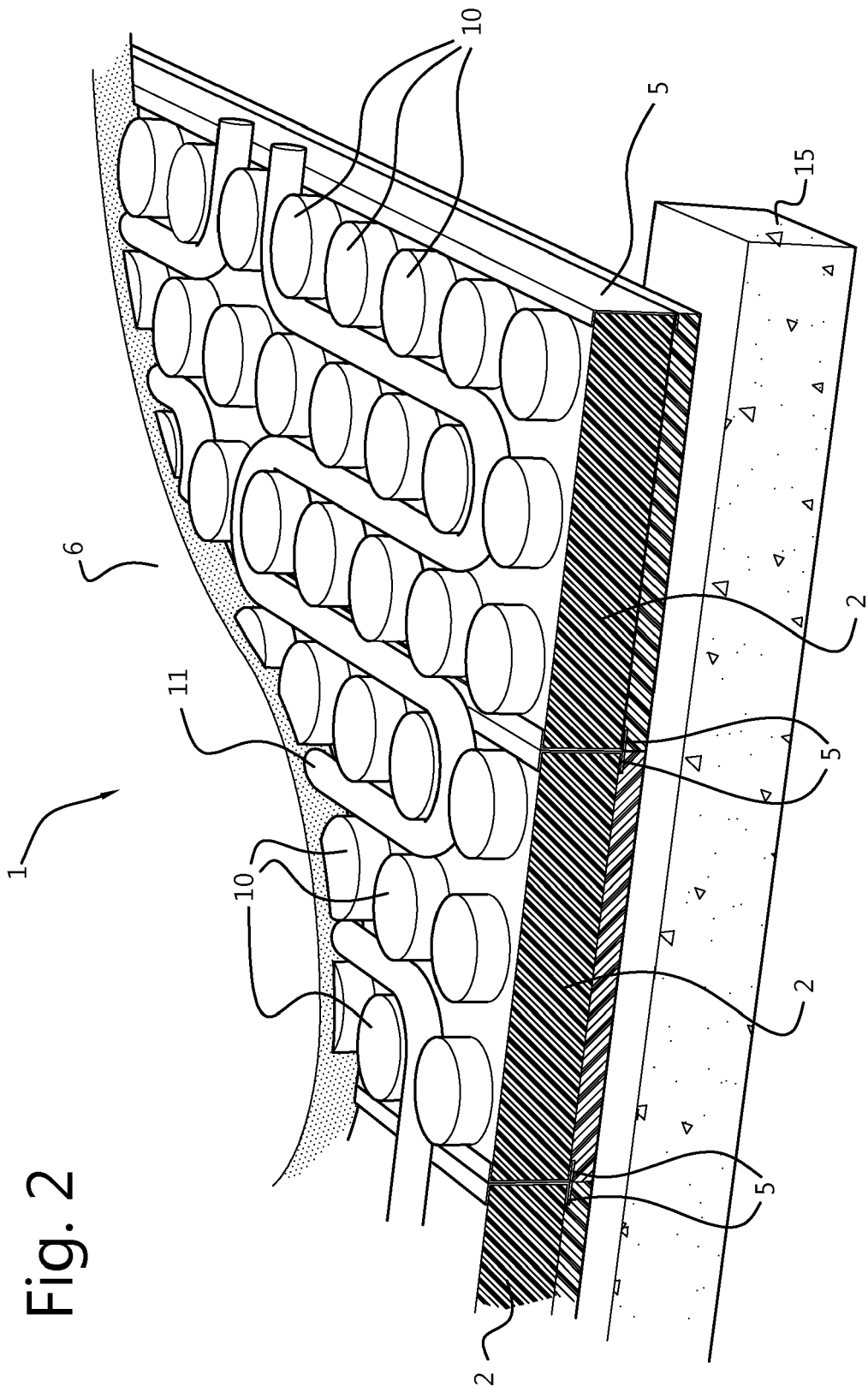
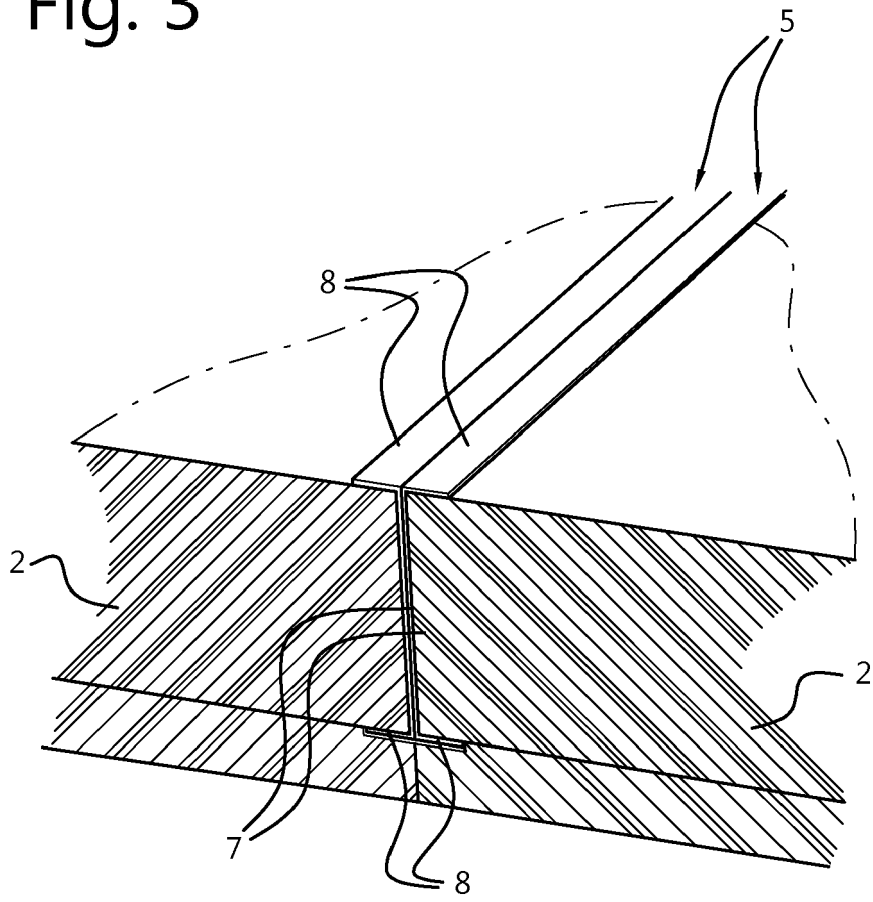


Fig. 2

Fig. 3



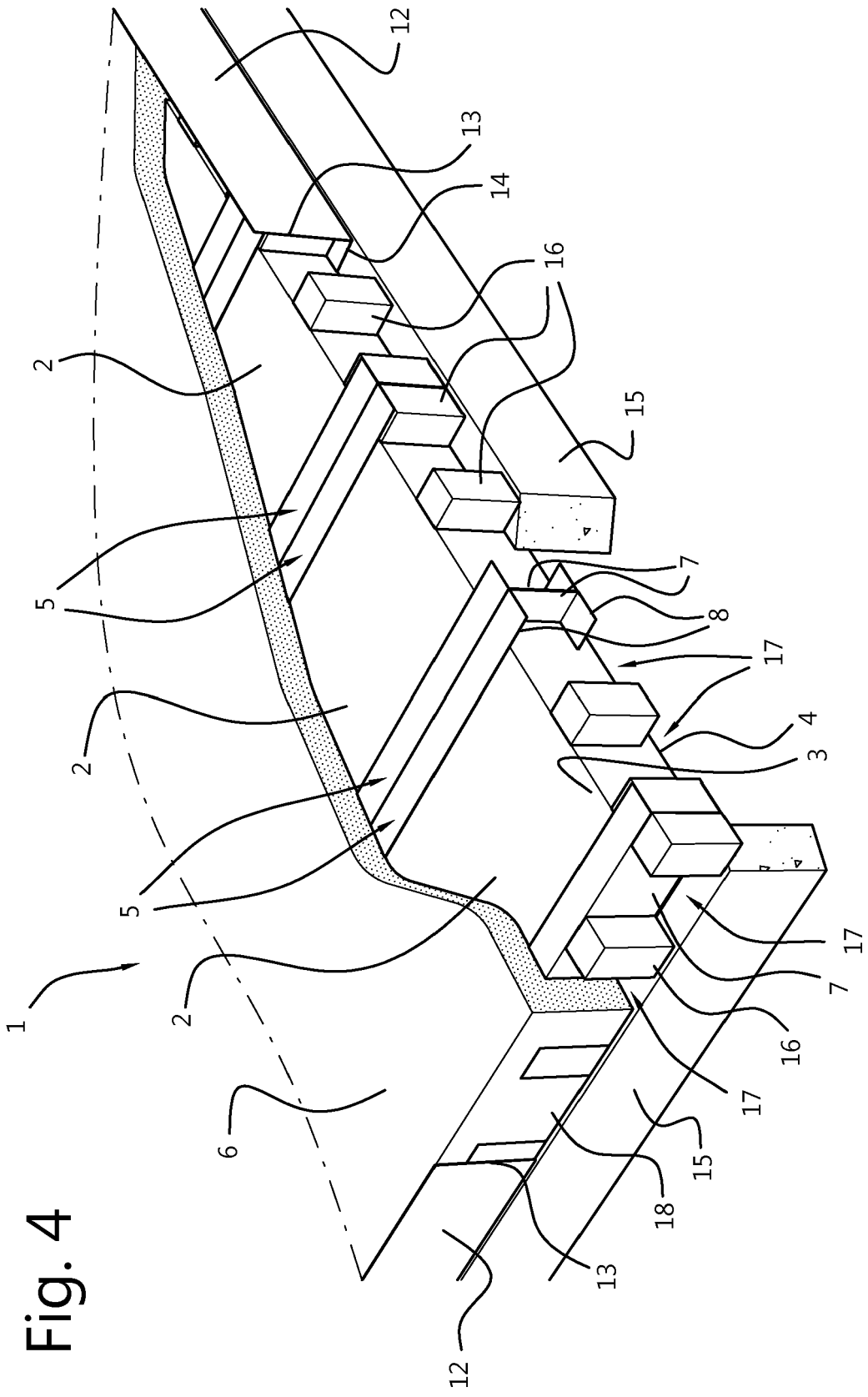


Fig. 4



EUROPEAN SEARCH REPORT

Application Number  
EP 17 16 0792

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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,D	US 6 085 479 A (CARVER TOMMY LEE [US]) 11 July 2000 (2000-07-11) * column 2, line 56 - column 10, line 56; figures 1-11 *	1-15	INV. E04B5/02 E04B5/26 E04B5/38 E04C2/22
A	FR 2 823 778 A1 (ACOME SOC COOPERATIVE DES TRAV [FR]) 25 October 2002 (2002-10-25) * page 6, line 1 - line 9; figure 1 *	12	ADD. E04C2/38 E04B5/48
			TECHNICAL FIELDS SEARCHED (IPC)
			E04B E04C E04F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 June 2017	Examiner Dieterle, Sibille
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 03/02 (P04C01)

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

EP 17 16 0792

5 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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12-06-2017

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6085479	A	11-07-2000	NONE
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FR 2823778	A1	25-10-2002	NONE
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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**

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**Patent documents cited in the description**

- NL 2005380 A [0002]
- US 6085479 A [0004]