

(19)



(11)

EP 4 818 433 A1

(12)

EUROPEAN PATENT APPLICATION

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

(51) International Patent Classification (IPC):
E04F 11/18^(2006.01) E04F 15/02^(2006.01)

(21) Application number: **26167029.3**

(52) Cooperative Patent Classification (CPC):
E04F 11/1812; E04F 15/02183

(22) Date of filing: **24.03.2026**

(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

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(30) Priority: **26.03.2025 GB 202504395**

(54) IMPROVED UPRIGHT STRUCTURE ASSEMBLY FOR FLOORING SYSTEM

(57) A flooring assembly comprising:
a sub structure comprising a plurality of spaced apart joists (10), at least one of the joists having a joist cavity;
a mount (100) having an extension (102) and a mounting portion (104, 106) attached to the extension;

wherein the extension (106) is engaged at least partially within the joist cavity, with the mounting portion outside the joist cavity, for attachment of an upright structure to the mounting portion.

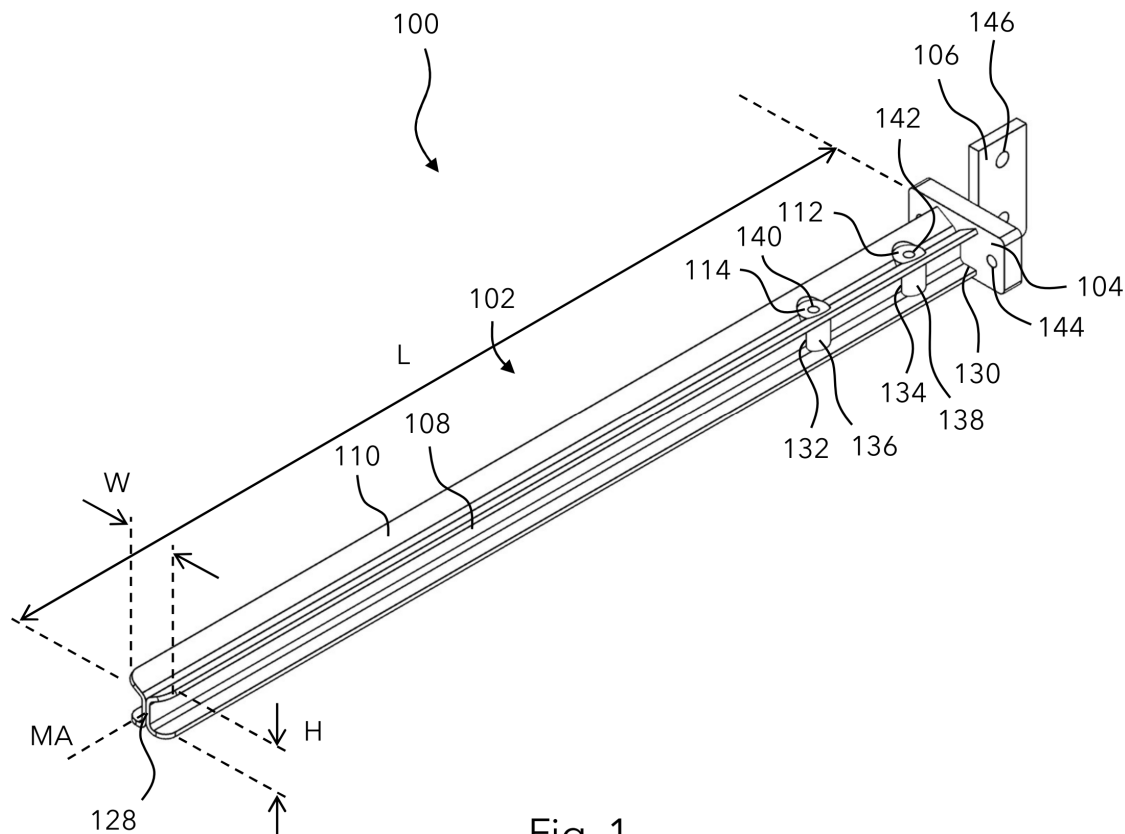


Fig. 1

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Description

Technical Field

[0001] The present application is concerned with an upright structure assembly for a flooring system. More specifically, the present invention is concerned with an assembly for supporting a balustrade or other vertically extending structure normal to the surface of a suspended floor.

Background Art

[0002] Suspended floors are well known in the art. Such systems comprise a plurality of spaced-apart pedestals (typically in a grid). Joists are supported on, and between adjacent, pedestals in a parallel and spaced-apart manner. Rails are then secured to the top surface of the joists perpendicular thereto to form a layered grid or lattice structure. Flooring members such as paving slabs are supported on the rails. Various components may be secured to the rails to facilitate this, such as spacers and cushioning elements.

[0003] Other underfloor structures are possible. For example, in some cases, the rails are attached directly to the pedestals without the intervening joists.

[0004] Suspended floors are often constructed on raised areas such as balconies and roof terraces. The underlying substrate is often weather sealed (made waterproof) prior to the floor being installed. Such waterproofing takes the form of a sheet or coating to keep water from passing through the underlying substrate, and the pedestals are rested on the top of the waterproof layer.

[0005] Structural elements such as balustrades can be problematic to install in such systems. In the prior art, such elements are secured to the underlying substrate (for example a roof) using appropriate mechanical fasteners. The balustrade extends up through the flooring system to extend above the surface thereof.

[0006] Balustrades in particular need to be able to withstand significant loading. For example, several people may lean on a balustrade, which applies a significant torque at its base (or more specifically where the base attaches to an underlying surface). Attachment of the balustrade directly to the substrate allows those loads to be reacted without damage or movement of the balustrade itself.

[0007] There are several problems with this prior art method. Firstly, the mechanical fasteners need to penetrate the underlying substrate and therefore need to penetrate the waterproof layer. This requires further work to seal the penetrations.

[0008] Further, waterproofing is typically carried out by a different team to the flooring installer. The need to attach the upright structures to the substrate with penetration requires both teams to work together, which is problematic for planning issues.

[0009] The applicant's prior patent application GB

2416987.2 provides a solution in which an upright structure such as a balustrade is attached to a pair of plates positioned above and below two closely spaced joists.

[0010] It is an aim of the present invention to provide an improved flooring assembly with the ability to increase the load capacity of upright structures attached thereto.

Summary of Invention

[0011] According to a first aspect of the present invention there is provided a flooring assembly comprising:

a sub structure comprising a plurality of spaced apart joists, at least one of the joists having a joist cavity;

a mount having an extension and a mounting portion attached to the extension;

wherein the extension is engaged at least partially within the joist cavity, with the mounting portion arranged for attachment of an upright structure to the mounting portion.

[0012] Advantageously having a mount engaged in the cavity of a joist enables the forces acting on the upright member, producing a torque on the mount, to be reacted by the extension within the joist. The mount extension can be made to be very long in this instance, for example at least 0.5m long, and preferably at least 0.85m long to react the torque against the inside of the joist.

[0013] The joist preferably defines a closed or endless loop cross-section. In other words the joist cross section has an outer perimeter fully enclosing an inner cavity.

[0014] Preferably the mounting portion is outside the joist cavity.

[0015] Preferably the mounting portion is configured to abut the end of the at least one of the joists with the extension fully engaged within the joist cavity. So, for example, it may be too large to fit inside an opening in the end of the joist.

[0016] Preferably there is provided at least one retaining member constraining the mount to the at least one of the joists to inhibit removal of the mount from the joist cavity. The at least one retaining member may be normal to the mount axis.

[0017] Preferably there are two retaining members, spaced apart along the length of the extension. The retaining members are preferably positioned closer to a mounting portion end of the extension than to a free end of the extension.

[0018] Preferably the extension member is elongate, having at least one of a length to width ratio and length to height ratio of at least 15:1, more preferably 20:1. So, if the extension member is 0.85m long, the width and height are less than 57mm, more preferably less than 43mm.

[0019] Preferably the extension portion has a cross section defining a recess for receiving a mechanical fastener penetrating a wall of the at least one of the joists.

[0020] Preferably there is provided a plurality of rails attached to the plurality of joists to form a lattice, wherein the plurality of rails are attached to the plurality of joists with mechanical fasteners, at least one of which fasteners is received within the recess of the extension portion.

[0021] Preferably the extension fits within the joist cavity leaving a clearance of 5mm or less in at least one of a width direction and height direction.

[0022] Preferably the extension has a cross sectional profile having a central base portion and flanges at each end of the central base portion.

[0023] Preferably there are two opposing flanges extend oppositely at an angle to the central base position forming a "Y" shape.

[0024] Preferably the extension is constructed from two sections, joined together.

[0025] Preferably the two sections are joined at the central base portion.

[0026] Preferably the two sections are mirror images of each other.

[0027] Preferably the extension has a free end opposite the mounting portion, the free end being at least partially tapered to aid insertion into the joist cavity.

[0028] Preferably there is provided an upright member attached to the mounting portion, the upright member being vertical with respect to a floor mounted on the sub structure in use.

[0029] Preferably the upright member is part of a balustrade.

[0030] According to the invention there is provided a flooring assembly according to the first aspect comprising:

a plurality of mounts, each having an extension and a mounting portion attached to the extension;

each of the plurality of mounts engaged in respective joist cavities, with the mounting portion outside the joist cavity, for attachment of an upright structure to the mounting portion; and,

an upright structure extending between, and supported by, the plurality of mounts.

[0031] According to a second aspect of the invention there is provided a method of mounting an upright structure to a flooring assembly comprising the steps of:

providing a sub structure comprising a plurality of spaced apart joists, at least one of the joists having a joist cavity;

providing a mount having an extension and a mounting portion attached to the extension;

engaging the extension at least partially within the joist cavity, with the mounting portion outside the joist cavity;

attaching an upright structure to the mounting portion.

Brief Description of Drawings

[0032] An embodiment of the present invention will now be described with reference to the following figure in which:

FIGURE 1 is a perspective view of a structural mount according to the present invention;

FIGURE 2 is a side view of the mount of Figure 1 engaged in a joist;

FIGURE 3 is a plan view of the mount of Figure 1 engaged in a joist;

FIGURE 4 is a detail view of an assembly comprising the joist of Figure 1;

FIGURE 5 is a section view V-V in Figure 2;

FIGURE 6 is a detail view of a part of the mount of Figure 1;

FIGURE 7 is a plan view of an assembly comprising the mount of Figure 1.

Description of the first embodiment

Configuration

[0033] Figure 1 shows a mount 100 according to the present invention. The mount 100 comprises an extension 102, a base 104 and a mounting flange 106.

[0034] The extension 102 is an elongate, generally prismatic member having a first, free end 128 and a second end 130. It extends along a (horizontal in use) mount axis MA in a length direction defining an extension length L. It has a constant cross-sectional profile shown in section in Figure 5. The extension 102 is constructed from two individual extension parts 108, 110 and two inserts 112, 114.

[0035] The extension parts 108, 110 are mirror images of each other, reflected in a section plane of symmetry SPS (Figure 5). The part 108 is generally U-shaped having a flat, planar base portion 116 and two flanges 118, 120 extending at respective angles a and b therefrom. The part 110 is generally U-shaped having a flat, planar base portion 122 and two flanges 124, 126 extending at respective angles c and d therefrom. It will be noted that because the parts 108, 110 are mirror images of each other, a=c and b=d. The angles a and c are between 0 and 90 degrees. The angles b and d are 90 degrees.

[0036] Referring to Figure 6, at the first end 128 of the extension 102, it can be seen that the flanges 118, 124 are filleted with radius R1. The flanges 120, 126 are filleted with radius R2.

[0037] Proximate the second end 130, each of the extension parts 108, 110 are provided with facing cutout regions 132, 134 (only regions 132, 134 in the part 108 are visible in Fig. 1). The cutout regions remove slots in

the base portions 116, 122 and part of the flanges 118, 120, 124, 126 forming two cylinder-receiving, openings normal to the mount axis MA.

[0038] The inserts 112, 114 are cylindrical members having cylindrical outer surfaces 136, 138 and central apertures 140, 142 respectively.

[0039] The base 104 is a rectangular plate member having openings 144 therethrough.

[0040] The mounting flange 106 is a rectangular plate member having openings 146 therethrough.

[0041] All of the components of the mount 100 are constructed from a metal material, preferably steel. Preferably the steel has a coating or treatment to allow it to contact aluminium components without problems that can be otherwise caused by dissimilar metal corrosion.

Assembly

[0042] All of the components of the mount are assembled by welding together where they connect as shown in the drawings. The base portions 116, 122 are welded together (back-to-back) to form the I-beam shaped profile visible in Figure 5. It will be noted that because the angles α and γ are between 0 and 90 degrees, a triangular or V-shaped recess 148 is formed between them.

[0043] The inserts 112, 114 are positioned between the parts 108, 110 in the cutout regions 132, 134 and welded thereto. The base 104 is welded to the second end 130 of the extension 102, normal to the axis MA with the openings 144 either side. The flange 106 is welded to the base 104, normal thereto.

Use

[0044] The mount 100 is configured for use with the applicant's suspended flooring assembly. Such an assembly comprises a plurality of elongate joists 10 supported on pedestals on an underlying surface (not shown) which may be e.g. a ground, balcony or roof surface. The joists 10 are hollow beams comprises side walls 12, 14, upper wall 16 and lower wall 18. The joists 10 therefore define a quadrilateral opening 20.

[0045] The joists 10 are mounted in a spaced-apart, parallel fashion. Normal to the joists 10, there are provided elongate rails 22. The rails 22 have attachment flanges 24 such that they can be screwed to the joists 10 with screws 28. The joists 10 and rails 22 form a lattice. Flooring members 26, such as paving slabs, are supported on the rails 22 to form a suspended flooring surface.

[0046] In use, the mount 100 is inserted into a free end of the joist 10 such that the extension is fully, or almost fully, engaged within the opening 20. The filleted edges of the flanges 118, 120, 124, 126 help the mount 100 to be inserted into the joist 10. The result of the fillets is that the cross-section is tapered at the end 128. Referring to the section view of Figure 5, the mount 100 is formed such

that it is a close fit within the joist 10. To put it another way, the height H and width W of the joist is the same (or fewer than 5mm smaller than) the inside of the joist opening 20.

[0047] Once in position, if fully inserted, the base 104 abuts the end of the joist 10.

[0048] To secure the mount 100 in position, bolts 150 are inserted through corresponding, aligned openings in the upper wall 16 and lower wall 18, through the insert apertures 140, 142. This prevents the mount 100 from sliding out of the joist along the axis MA. It will be noted in Figure 4 that the bolts 150 are spaced to allow a rail 22 to sit therebetween. In another embodiment, the outermost bolt may be set back from the end of the joist to allow a rail 22 to be positioned adjacent the joist end.

[0049] It will be noted that the V-shaped recess 148 provides spaces on the interior side of the upper wall 16 for the rails 22 to be screwed into place without the screws abutting the mount 100. The joist 10 is typically constructed from an aluminium material, which can be screwed into, unlike the steel of the mount 100.

[0050] A vertical structure such as a balustrade can then be mounted to the mounting flange 106.

[0051] Referring to Figure 2, a force on the upright structure attached to the flange 106 produces a clockwise torque T on the mount 100. This torque is reacted by the upper surface of the mount 100 abutting the inner surface of the top wall 16 of the joist 10 (reaction force R is shown in Figure 2).

[0052] The fact that the mount 100 is elongate and extends by a distance L (the extension length) within the joist 10, provides a long uniformly distributed load. This reduces local stresses on the joist 10 and mount 100 to enable the assembly to take very high loads.

[0053] Further, it will be noted that forces on the upright structure in any direction can be reacted by the abutment of the mount 100 in the joist 10.

[0054] Evidently, the above embodiment facilitates attachment of upright structures such as balustrades along one side of a suspended floor. In some embodiments, it may be desired to install balustrades along a second side, at an angle to the first.

[0055] Referring to Figure 7, a suspended floor assembly 30 is shown, comprising a lower layer comprising joists 10, and an overlaid upper layer comprising rails 22. In a first region 32 of the assembly 30, the joists 10 extend in a first direction X, with the rails 22 in a second, perpendicular direction Y. In a second region 34, the joists 10 extend in the second direction Y, with the rails 22 in the first direction X. This is engineered by mounting joist portions 10' perpendicular to the rails and joining with angle brackets (not shown) in regions 36. Similarly, rail portions 22' are mounted normal to the rails 22 with angle brackets in regions 38.

[0056] The result is that along both a first edge 40 and a second edge 42 of the assembly 30, normal to each other, there are provided joist ends for insertion of mounts 100.

Variations

[0057] The mounts 100 may be constructed from other materials.

[0058] As well as balustrades, other vertical or upright structures such as signposts, poles, flag poles etc can be installed in this way.

[0059] The flange 106 may be removed for direct mounting to the base 104. The flange 106 may be replaced with an alternative means for mounting an upright structure.

[0060] The extension does not have to be fully inserted into the joist, and as such the penetration may be $<L$.

Claims

1. A flooring assembly comprising:

a sub structure comprising a plurality of spaced apart joists, at least one of the joists having a joist cavity;

a mount having an extension and a mounting portion attached to the extension; wherein the extension is engaged at least partially within the joist cavity, with the mounting portion arranged for attachment of an upright structure to the mounting portion.

2. A flooring assembly according to claim 1, wherein: the at least one of the joists has two sidewalls, an upper wall, and a lower wall defining a quadrilateral joist cavity.

3. A flooring assembly according to claim 1 or 2, wherein the mounting portion is outside the joist cavity.

4. A flooring assembly according to claim 3, wherein the mounting portion is configured to abut the end of the at least one of the joists with the extension fully engaged within the joist cavity.

5. A flooring assembly according to any preceding claim, comprising at least one retaining member constraining the mount to the at least one of the joists to inhibit removal of the mount from the joist cavity.

6. A flooring assembly according to claim 5, wherein the mount has a mount axis along the extension, wherein the at least one retaining member is normal to the mount axis.

7. A flooring assembly according to claim 5 or 6, comprising two retaining members, spaced apart along the length of the extension.

8. A flooring assembly according to claim 7, wherein

the retaining members are positioned closer to a mounting portion end of the extension than to a free end of the extension.

9. A flooring assembly according to any preceding claim, wherein the extension member is elongate, having at least one of a length to width ratio and length to height ratio of at least 5:1.

10. A flooring assembly according to claim 9, wherein the extension member is elongate, having at least one of a length to width ratio and length to depth ratio of at least 10:1.

11. A flooring assembly according to any preceding claim, wherein the extension portion has a cross section defining at a recess for receiving a mechanical fastener penetrating a wall of the at least one of the joists.

12. A flooring assembly according to claim 11, comprising a plurality of rails attached to the plurality of joists to form a lattice, wherein the plurality of rails are attached to the plurality of joists with mechanical fasteners, at least one of which fasteners is received within the recess of the extension portion.

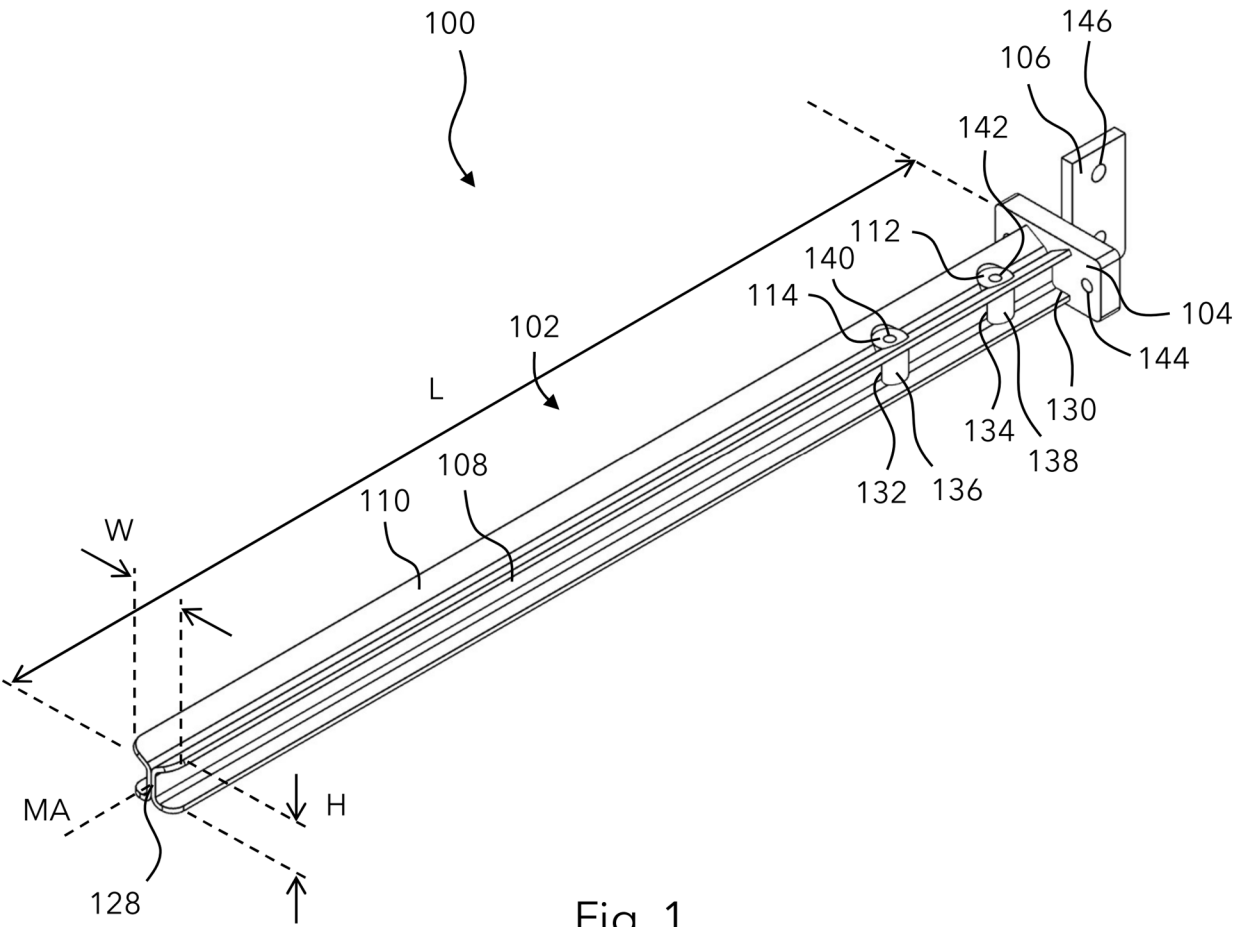
13. A flooring assembly according to any preceding claim, wherein the extension fits within the joist cavity leaving a clearance of 5mm or less in at least one of a width direction and height direction.

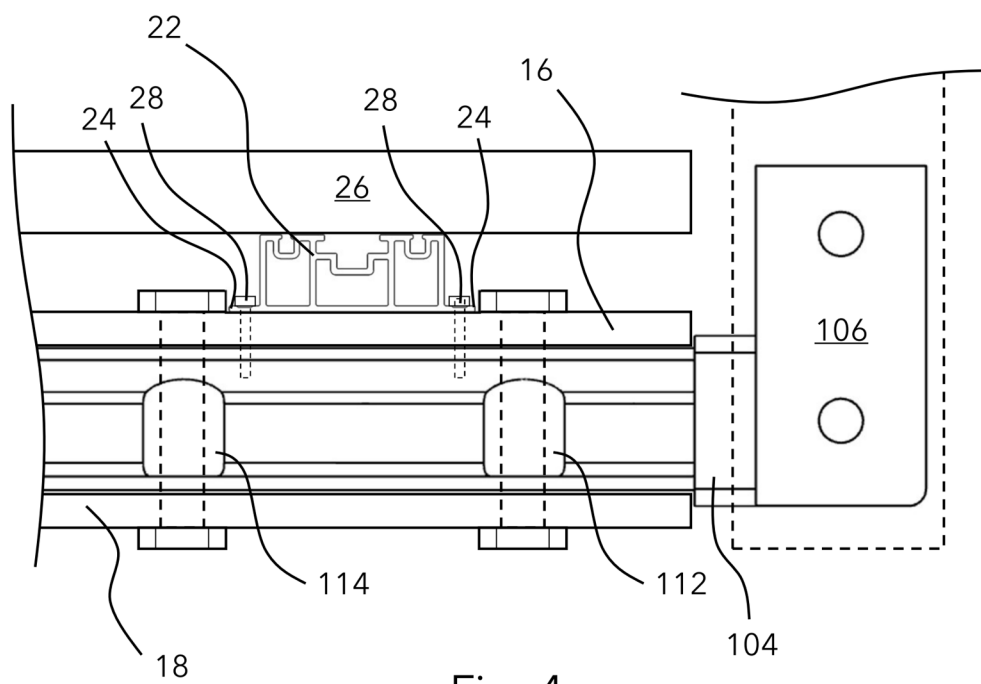
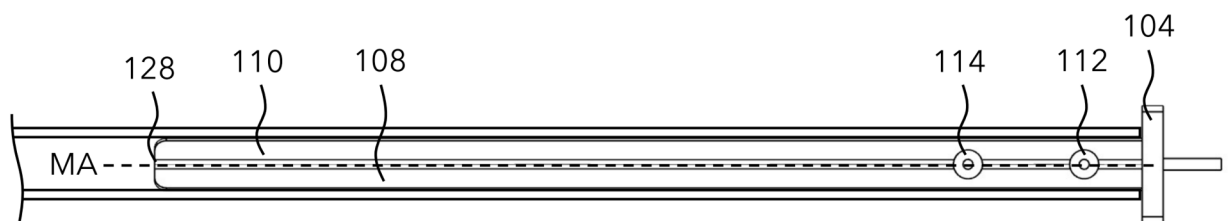
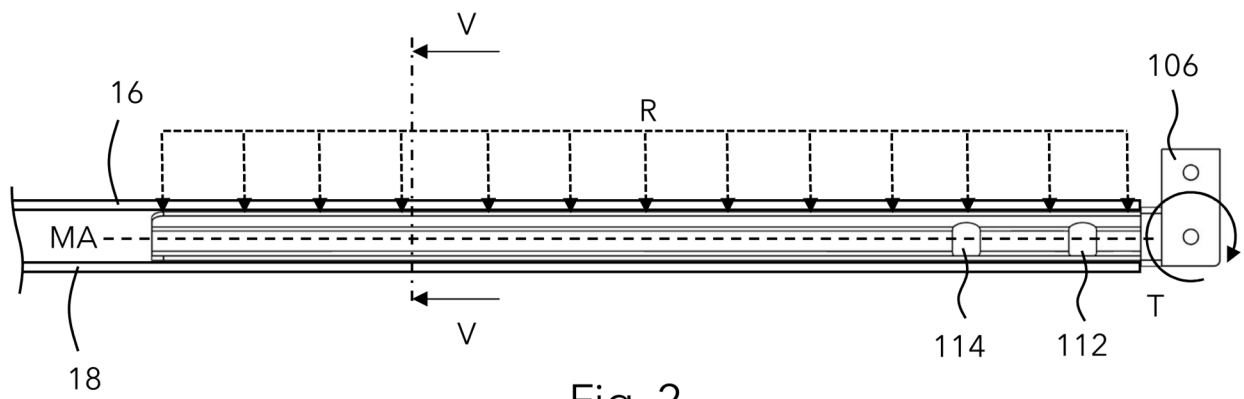
14. A flooring assembly according to any preceding claim comprising:

a plurality of mounts, each having an extension and a mounting portion attached to the extension; each of the plurality of mounts engaged in respective joist cavities, with the mounting portion outside the joist cavity, for attachment of an upright structure to the mounting portion; and, an upright structure extending between, and supported by, the plurality of mounts.

15. A method of mounting an upright structure to a flooring assembly comprising the steps of:

providing a sub structure comprising a plurality of spaced apart joists, at least one of the joists having a joist cavity; providing a mount having an extension and a mounting portion attached to the extension; engaging the extension at least partially within the joist cavity, with the mounting portion outside the joist cavity; attaching an upright structure to the mounting portion.





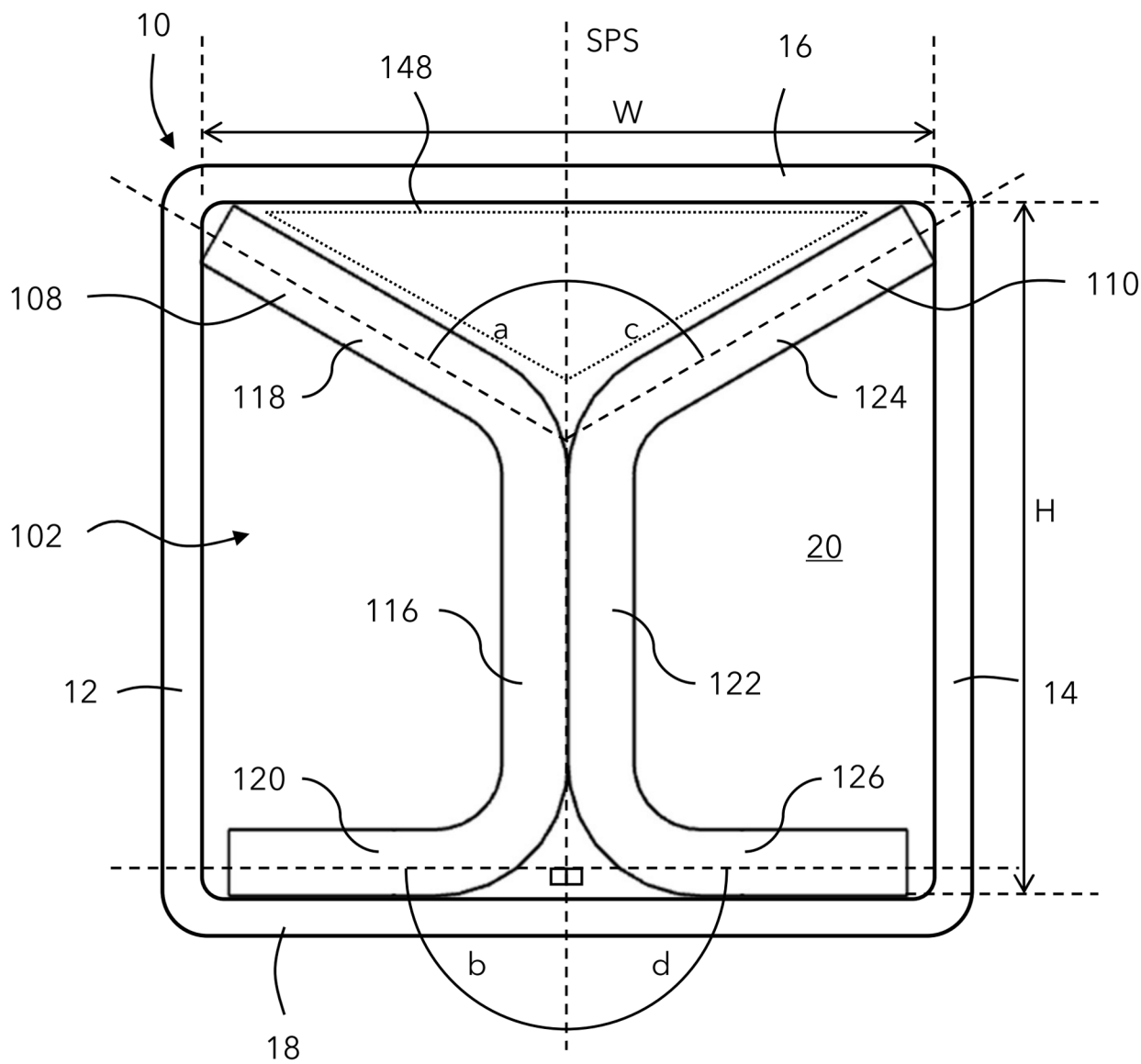


Fig. 5

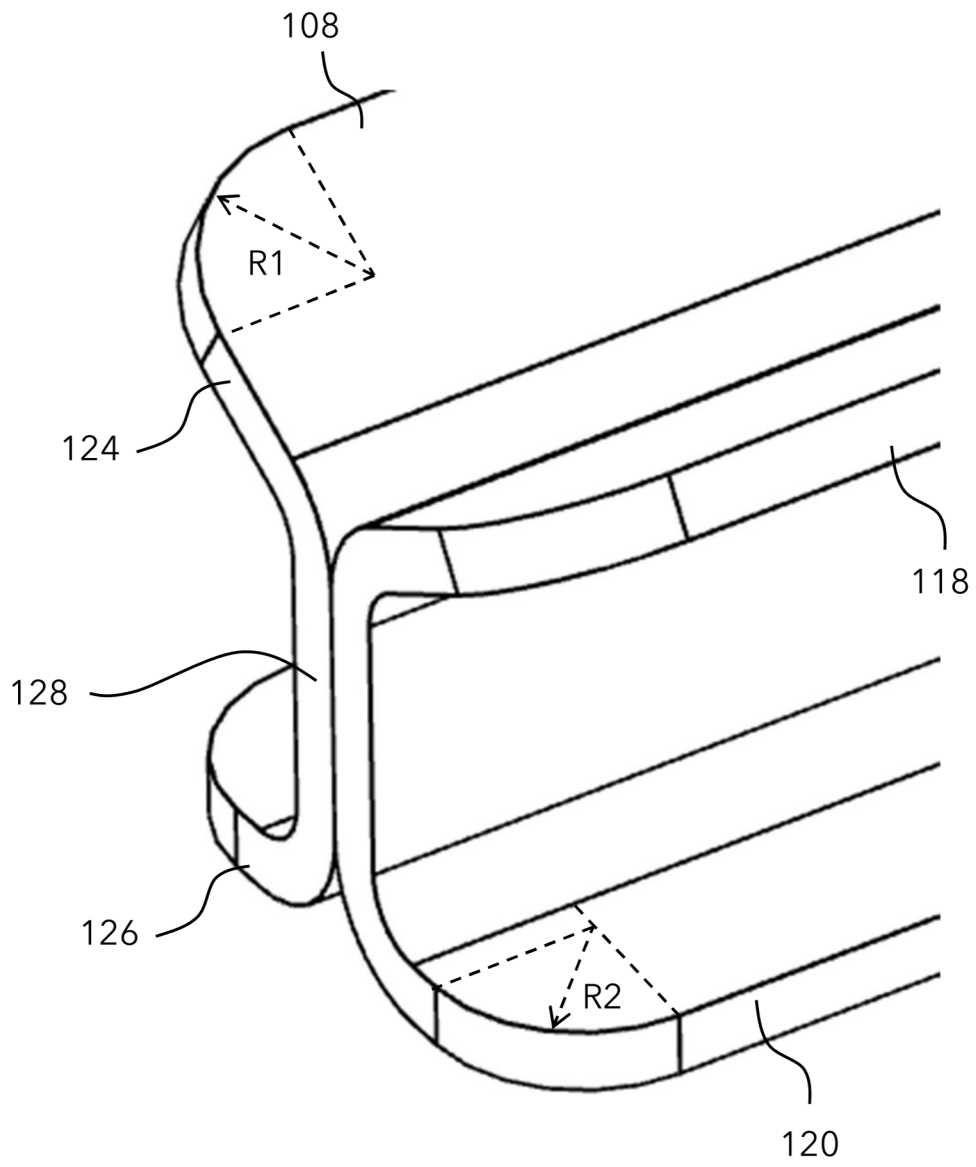


Fig. 6

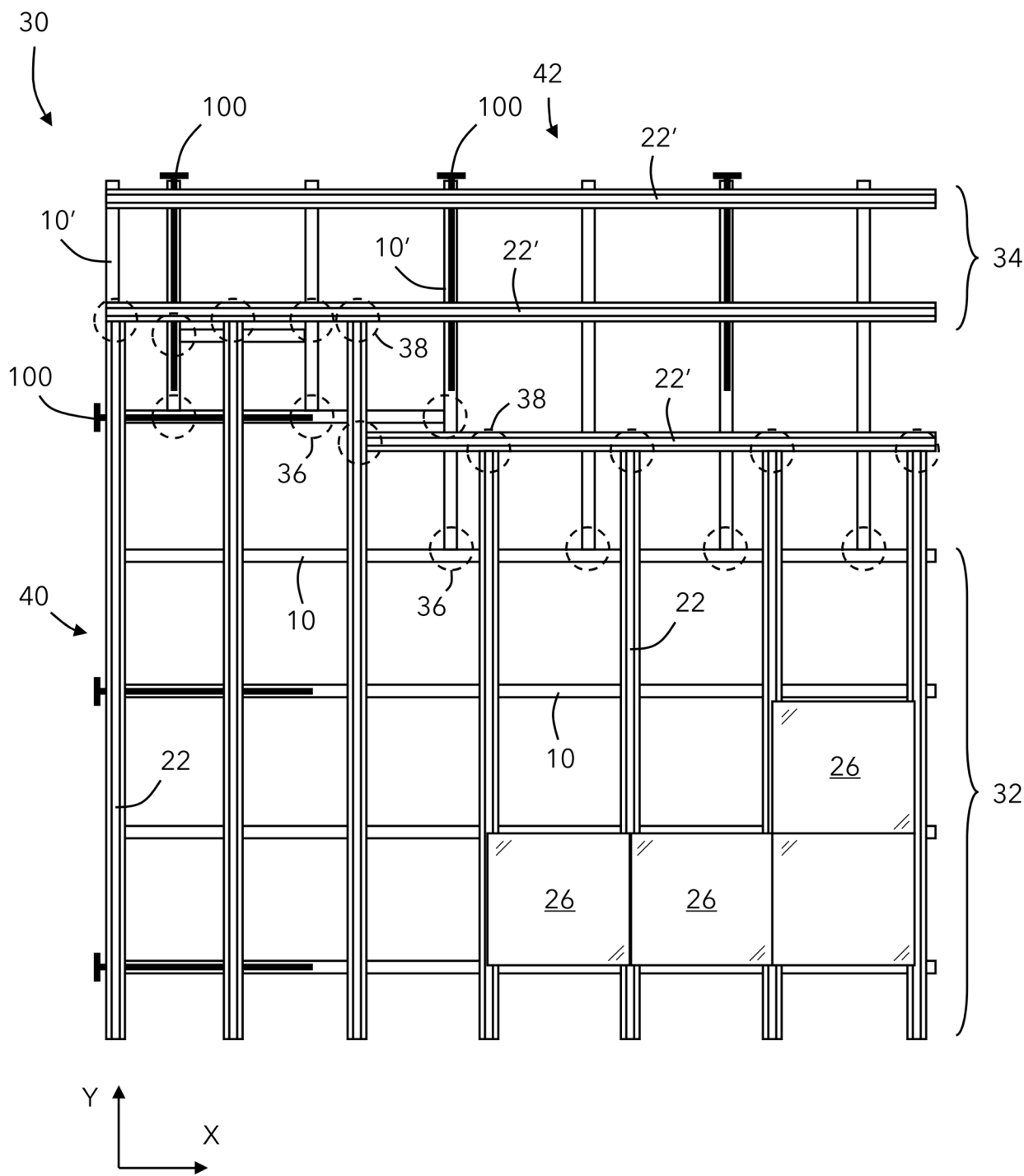


Fig. 7



EUROPEAN SEARCH REPORT

Application Number

EP 26 16 7029

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	US 7 900 417 B1 (LEINES RICHARD [US]) 8 March 2011 (2011-03-08) * column 12, lines 38-40; figures 1, 3-5, 7 *	1-11, 13-15	INV. E04F11/18 E04F15/02
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			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		24 August 2026	Demeester, Jan
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			
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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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