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(71) Applicant: **Illinois Tool Works Inc.**
Glenview, IL 60025 (US)

(72) Inventor: **MCANDREW, Scott**
Glenview, Illinois 60025 (US)

(74) Representative: **HGF**
HGF Limited
1 City Walk
Leeds LS11 9DX (GB)

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(54) **TIMBER JOIST**

(57) There is provided a timber joist, a flooring assembly and a building system along with method of construction. The timber joist 10 comprises first and second timber chords 12, 14 maintained in spaced relation to one another. The chords 12, 14 having respective opposing surfaces 12a, 14a facing away from one another and delimiting a depth (d_1) of the joist therebetween. The timber joist 10 comprises a first timber block 32 attached to one of the chords 12 at an end 34 of the joist, the first timber block 32 extending axially beyond an end 22 of the other of the chords 14 and having a depth (d_2) less than the depth of the joist 10.

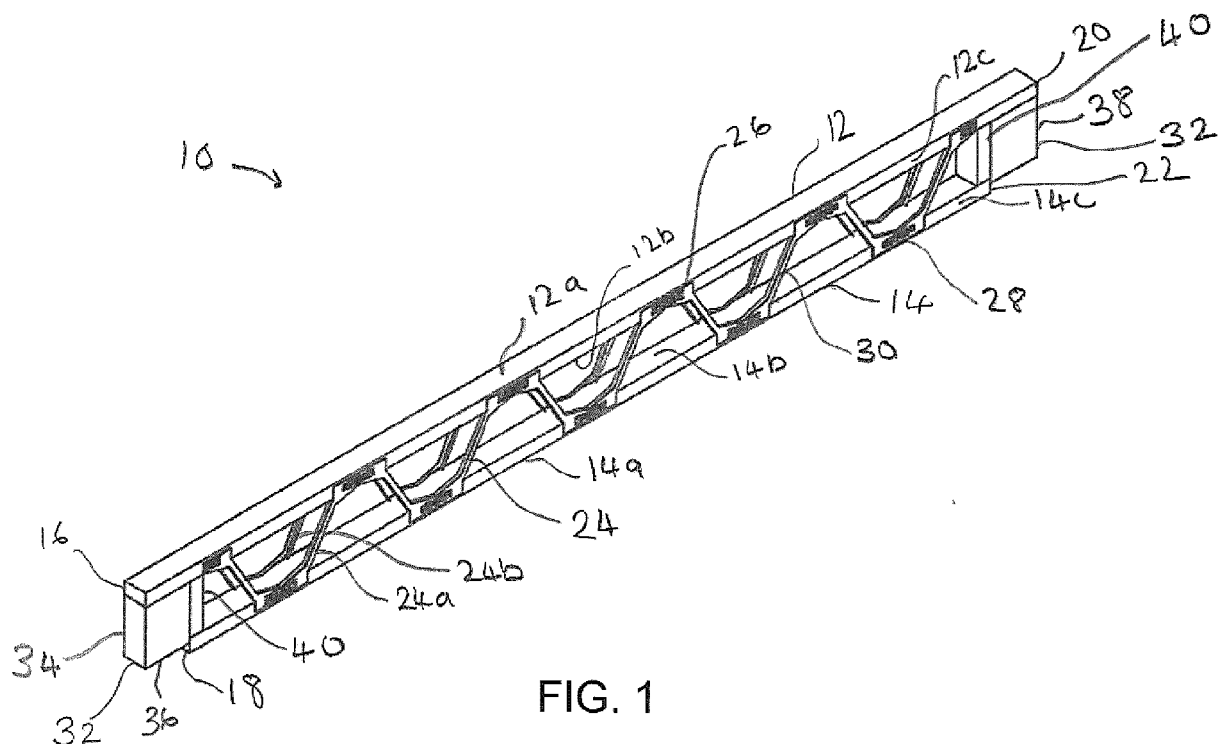


FIG. 1

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Description

TECHNICAL FIELD

[0001] The invention relates to a timber joist. Particularly, the invention relates to a timber joist for use in a floor cassette.

BACKGROUND

[0002] Floor cassettes are prefabricated structural components used in construction to create the floor system of a building. They are commonly used in both residential and commercial construction projects, and are part of the broader trend of off-site or modular construction. A floor cassette typically consists of a framework of joists made from steel and/or timber, with structural panels or boards fixed to the joists. The panels are usually made of materials such as oriented strand board (OSB), plywood, or composite materials.

[0003] The cassette is manufactured off-site in a controlled factory environment, allowing for efficient production and quality control. It is then transported to the construction site and installed as a complete unit, fitting between the supporting walls or beams of the building. The cassettes are designed to be easily lifted and positioned into place using cranes or other lifting equipment. Floor cassettes offer several advantages over traditional on-site construction methods, including speed of construction, improved quality and reduced waste. However, a limitation of such floor cassettes is limited on-site customisation, since once a floor cassette is manufactured, making changes or modifications on-site can be more challenging compared to traditional construction methods. Any alterations required during or after installation may require additional effort and may impact the overall construction timeline.

[0004] Floor cassettes are particularly suited to off-site or modular construction methods, though they can be used in more traditional brick and block construction. When using floor cassettes in brick and block buildings, the joists are typically installed to span between the load-bearing walls of the structure. The walls provide the necessary stability and support for the joists, and the bricks or blocks forming the walls can be built around them. When installing a timber joist into a wall, the process typically involves creating notches within the bricks or blocks, since the height of the joist will likely differ to the height of one or more courses of bricks or blocks.

[0005] It is important to ensure proper coordination between the floor cassette installation and the brick and block construction process. The design and positioning of the cassettes should be carefully planned to align with the layout of the walls. However, brick and block construction typically has poorer dimensional tolerance compared to timber frames, due to the brick and block construction relying on manual labour for the installation of each individual brick or block. This process introduces

a higher degree of human error, resulting in variations in dimensions and alignment. Consequently, misalignment can occur between the cassette and walls. As above, making changes or modifications on-site to cassette can be challenging, so addressing misalignment can be problematic.

[0006] It is an object of embodiments of the invention to provide an improved joist, in particular for use in floor cassettes, and/or at least mitigate one or more problems associated with known arrangements.

SUMMARY OF THE INVENTION

[0007] According to an aspect of the invention, there is provided a timber joist. The timber joist comprising:

first and second timber chords maintained in spaced relation to one another, the chords having respective opposing surfaces facing away from one another and delimiting a depth (d_1) of the joist therebetween; and
a first timber block attached to one of the chords at an end of the joist, the first timber block extending axially beyond an end of the other of the chords and having a depth (d_2) less than the depth of the joist.

[0008] In certain embodiments, the chords may have respective facing surfaces facing toward one another and the first timber block may abut the facing surface of the one of the chords.

[0009] In certain embodiments, together the one of the chords and the first timber block may have a depth (d_3) that is less than the depth (d_1) of the joist.

[0010] In certain embodiments, the first timber block may extend axially beyond the end of the other of the chords in its entirety.

[0011] In certain embodiments, the first timber block may abut the facing surface of the other of the chords.

[0012] In certain embodiments, the first timber block may extend axially no further than an end of the one of the chords.

[0013] In certain embodiments, the first timber block may extend axially to the same extent as the one of the chords.

[0014] In certain embodiments, the one of the chords may extend axially beyond the other of the chords at the end of the joist.

[0015] In certain embodiments, the one of the chords may have a width (w_1) and the first timber block may have a width (w_2) substantially the same as the width of the one of the chords.

[0016] In certain embodiments, the joist may further comprise a second timber block extending between the chords, attached to the one of the chords, and abutting and attached to the first timber block.

[0017] In certain embodiments, the second timber block may have a width (w_3) substantially the same as the width (w_1) of the one of the chords.

[0018] In certain embodiments, the first timber block may be attached to the one of the chords by a nail plate.

[0019] In certain embodiments, the second timber block may be attached to the one of the chords and the first timber block by the nail plate.

[0020] According to an aspect of the invention, there is provided a floor assembly. The floor assembly comprising:

a plurality of timber joists according to the above-described aspect of the invention; and
a planar substrate, for example a panel or board, connected to and spanning between at least two of the plurality of timber joists.

[0021] In certain embodiments, the first timber block of each of the at least two of the plurality of timber joists may extend axially beyond an end of the planar substrate.

[0022] According to an aspect of the invention, there is provided a building system. The building system comprising:

a timber joist according to the above described aspect of the invention; and
a brick wall comprising a plurality of courses of bricks,
wherein the timber joist is support by the brick wall by the first timber block sitting upon a first course of the courses of bricks and the first timber block extends through a second course of the courses of bricks.

[0023] In certain embodiments, the building system may comprise:

a flooring assembly according to the above described aspect of the invention; and
wherein each of the plurality of timber joists of the flooring assembly is support by the brick wall by the first timber block of each of the plurality of timber joists sitting upon a first course of the courses of bricks and the first timber block of each of the plurality of timber joists extends through a second course of the courses of bricks.

[0024] According to an aspect of the invention, there is provided a method of construction comprising:

providing a timber joist according to the above-described aspect of the invention;
laying a first course of bricks;
supporting the timber joist on the first course of bricks by positioning the first timber block upon the first course of bricks; and
laying a second course of bricks such that the first timber block extends through the second course of bricks;
wherein a depth (d_2) of the first timber block is such that a depth of the joist extending through the second

course of bricks is equal to or less than the depth of the second course of bricks.

[0025] In certain embodiments, the method may comprise laying a third course of bricks on the second course of bricks without creating notches in the bricks of the third course of brick to accommodate the joist.

[0026] In certain embodiments, supporting the timber joist on the first course of bricks may comprise positioning the first timber block upon the first course of bricks such that the first timber block extends beyond at least one side of the first course of bricks.

[0027] In certain embodiments, the first timber block may extend beyond an outside of the first course of bricks. The method may further comprise: laying a second course of bricks such that the first timber block extends through the second course of the courses of bricks; and trimming the joist so that the joist is substantially flush with the outside of the second course of bricks

[0028] In certain embodiments, the method may comprise: providing the flooring assembly of the above-described aspect of the invention; supporting each timber joist of the flooring assembly on the first course of bricks by positioning the first timber block of each timber joist upon the first course of bricks; and laying a second course of bricks such that each first timber block extends through the second course of the courses of bricks.

[0029] According to an aspect of the invention, there is provided a method of construction comprising:

providing a timber joist according the above-described aspect of the invention;
laying a first course of bricks;
supporting the timber joist on the first course of bricks by positioning the first timber block upon the first course of bricks such that the first timber block extends beyond at least one side of the first course of bricks.

[0030] In certain embodiments, the first timber block may extend beyond an outside of the first course of bricks. The method may further comprise: laying a second course of bricks such that the first timber block extends through the second course of bricks; and trimming the joist so that the joist is substantially flush with the outside of the second course of bricks.

[0031] In certain embodiments, a depth (d_2) of the first timber block may be such that a depth of the joist extending through the second course is equal to or less than the depth of the second course of bricks.

[0032] In certain embodiments, the method may comprise laying a third course of bricks on the second course of bricks without creating notches in the bricks of the third course of brick to accommodate the joist.

[0033] In certain embodiments, the method may comprise: providing the flooring assembly of the above-described aspect of the invention; supporting each timber joist of the flooring assembly on the first course of bricks

by positioning the first timber block of each timber joist upon the first course of bricks; and laying a second course of bricks such that each first timber block extends through the second course of the courses of bricks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] Embodiments of the invention will be described, by way of example only, with reference to the accompanying figures, in which:

Figure 1 shows a joist according to an embodiment of the invention;
 Figures 2a and 2b each show an end of the joist of Figure 1;
 Figures 3a to 3c each show an end of a joist according to an embodiment of the invention;
 Figure 4 shows a floor assembly according to an embodiment of the invention;
 Figures 5 to 7 shows the floor assembly of Figure 4 in a building system; and
 Figures 8 and 9 show a part of the floor assembly of Figure 4 in a building system.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0035] Figure 1 shows a timber joist 10 according to an embodiment of the invention. As described below with reference to Figures 5 to 9, the timber joist 10 may be used within a building system 200 which comprises a brick wall 224. Through the specification and in the appended claims, the terms "bricks", "brick wall" and "brickwork" include but are not limited to blocks, block wall and blockwork, respectively.

[0036] The timber joist 10 comprises first and second timber chords 12, 14. The first chord 12 and the second chord 14 have respective opposing surfaces 12a, 14a facing away from one another. As shown in the embodiment in Figure 1, the first chord 12 has an opposing surface 12a and the second chord 14 has an opposing surface 14a. The first and second chords 12, 14 are arranged in the timber joist 10 such that the opposing surface 12a of the first chord 12 faces away from the opposing surface 14a of the second chord 14.

[0037] The opposing surfaces 12a, 14a of the first and second chords 12, 14 delimit a depth d_1 of the timber joist 10 therebetween. The depth d_1 of the timber joist 10 is shown in Figure 2a. As such, the opposing surfaces of the first and second chords 12, 14 provide outer surfaces of the timber joist 10.

[0038] As shown in the embodiment of Figure 1, the first and second chords 12, 14 may have respective facing surfaces 12b, 14b that face toward one another. That is, the first chord 12 may have a facing surface 12b and the second chord 14 may have a facing surface 14b. The first and second chords 12, 14 may be arranged in the timber joist 10 such that the facing surface 12b of the

first chord 12 faces towards the facing surface 14b of the second chord 14. The first and second chords 12, 14 may have a pair of side surfaces 12c, 14c. In the Figures, only one of each pair of the side surfaces 12c, 14c is shown.

5 The side surfaces 12c, 14c may extend between the opposing and facing surfaces 12a, 12b, 14a, 14b of each chord 12, 14.

[0039] As shown in the embodiment in Figure 1, each chord 12, 14 may have a substantially rectangular cross-sectional area. The cross-sectional area being perpendicular to a direction from a first end 16, 18 to a second end 20, 22 of the respective chord 12, 14. Therefore, the opposing and facing surfaces 12a, 12b, 14a, 14b of each of the first and second chords 12, 14 may be parallel to one another. The pair of side surfaces 12c, 14c of each of the first and second chords 12, 14 may be parallel to one another.

[0040] The first chord 12 and the second chord 14 are maintained in a spaced relation to one another. Therefore, as shown in Figure 1, the facing surface 12b of the first chord 12 may be separated from the facing surface 14b of the second chord 14 by a distance.

[0041] The first and second chords 12, 14 may be maintained in spaced relation by any suitable means. As shown in the embodiment in Figure 1, the timber joist 10 may comprise a metal web 24 arranged to maintain the first and second chords 12, 14 in a spaced relation to one another. The metal web 24 may extend between the first and second chords 12, 14.

30 **[0042]** The metal web 24 may comprise a first web portion 24a and a second web portion 24b. The first and second web portions 24a, 24b may be arranged on opposing sides of the timber joist 10. As shown in the embodiment in Figure 1, the first web portion 24a may be attached to a first side surface 12c, 14c of each of the first and second chords 12, 14. The second web portion 24b may be attached to a second side surface (not shown) of each of the first and second chords 12, 14. The first and second web portions 24a, 24b may therefore reside in substantially parallel planes.

[0043] Any suitable metal web 24 may be used. As shown in the non-limited example in Figure 1, each of the first and second web portions 24a, 24b may comprise a plurality of first and second nail plates 26, 28 linked together and spaced apart from one another by a diagonal elongate bracing member 30. The first nail plates 26 may be secured to the side surfaces of the first chord 12. The second nail plates may be secured to the side surfaces of the second chord 14. Each nail plate 26, 28 may comprise integral nails for securing the plates 26, 28 to the respective chord surfaces.

50 **[0044]** The skilled person will appreciate that the invention is not limited to the embodiment shown in Figure 1. The first and second chords 12, 14 may be maintained in spaced relation by alternative means. For example, for certain embodiments, the timber joist 10 may comprise a panel arranged between and separating the first and second chords 12, 14. In non-limited examples, the panel

may be made of materials such as oriented strand board (OSB) or plywood.

[0045] The timber joist 10 comprises a first timber block 32. The first timber block 32 is attached to the one of the chords 12, 14 at one end 34 of the timber joist 10 and extends axially beyond an end 16, 18 of the other chord 12, 14. The first timber block 32 has a depth d_2 which is less than the depth d_1 of the timber joist 10. Therefore, the depth at the end 34 of the joist 10 is less than the depth away from the end 34 of the joist 10. The depth, d_2 , of the first timber block 32 may be selected based on the depth of a course in the brick wall 224 within which the joist 10 is used. The depth d_2 of the first timber block 32 may be selected so that the depth at the end 34 of the joist 10 is equal to or less than the depth of a course of bricks 226. The depth d_2 of the first timber block 32 may be selected so that the depth at the end of the joist 10 is equal to or less than the combined depth of a brick 228, the mortar above the brick 228 and the mortar below the brick 228 in the brick wall 224. Therefore, when installing the timber joist 10 into a brick wall 224, the first timber block 32 may remove the need to create notches within the bricks 228.

[0046] The embodiment shown in Figure 1 shows one example of how the first timber block 32 may be attached to one of the chords and extend axially beyond an end of the other chord. In the embodiment of Figure 1, the first timber block 32 is attached to the first chord 12 at the first end 34 of the timber joist 10. As shown in Figure 1, the first timber block 32 may be attached to the first chord 12 so that the first timber block 32 abuts the facing surface 12b of the first chord 12.

[0047] The first timber block 32 may be arranged to extend axially no further than a first end 16 of the first chord 12. Indeed, as shown in Figure 1, the first timber block 32 may extend axially to the same extent as the first chord 12. Therefore, a first end of the first timber block 32 may be flush with the first end 16 the first chord 12. Together the first timber block 32 and the first end 16 the first chord 12 may define the first end 34 of the joist 10.

[0048] In the embodiment of Figure 1, the first timber block 32 extends axially beyond a first end 18 of the second chord 14. As shown in Figure 1, the first timber block 32 may extend axially beyond the first end 18 of the second chord 14 in its entirety. That is, there may be no axial overlap between the first timber block 32 and the second chord 14. As the entirety of the first timber block 32 extends axially beyond the first end 18 of the second chord 14, the first timber block 32 may not abut the facing surface 14b of the second chord 14.

[0049] In the non-limiting embodiment shown in Figure 1, the first and second chords 12, 14 have different lengths. In Figure 1, the first end 16 of the first chord 12 extends axially beyond the first end 18 of the second chord 14. The first end 18 of the second chord 14 does not extend to the first end 34 of the joist 10. In the embodiment in Figure 1, the length of the first timber block 32 is substantially the same as the distance between the first end 18 of the second chord 14 and the first end 16 of the

first chord 12.

[0050] The depth at the first end 34 of the joist 10 in the embodiment shown in Figure 1 is therefore provided by the combination of the first chord 12 and the first timber block 32. Together the first chord 12 and the first timber block 32 may have a depth d_3 that is less than the depth d_1 of the joist 10.

[0051] As described above, the depth d_2 of the first timber block 32 may be selected based on the depth of a course in the brick wall 224 within which the joist 10 is used. As shown in the non-limited embodiment of Figure 1, the depth of the first timber block 32 is such that a portion of the first timber block 32 extends across a portion of the first end 18 of the second chord 14. However, the depth d_2 of the first timber block 32 is not limited to the arrangement shown in the Figures. Figures 3a to 3c illustrate alternative depths for the first timber block 32 that could be used in the embodiment of the timber joist 10 shown in Figure 1. In Figure 3a, the depth d_2 of the first timber block 32 is such that a lower end 36 of the first timber block 32 is next to or aligned with the facing surface 14b of the second chord 14. In Figures 3b and 3c, the depth d_2 of the first timber block 32 is such that the lower end 36 of the first timber block 32 resides between the facing surfaces 12b, 14b of the first and second chords 12, 14. The depth d_2 of the first timber block 32 may be selected so that the combined depth d_3 of the first chord 12 and first timber block 32 is equal to or less than the depth of a course of bricks 226.

[0052] The length l_1 of the portion of first timber block 32 that extends axially beyond the end 18 of the second chord 14 may be selected based on the bricks 228 in the brick wall 224 within which the timber joist 10 is used. As described in further detail below, the timber joist 10 may extend through a course of bricks 226 in the building system 200. The length l_1 of the first timber block 32 which extends axially beyond the second chord 14 may be selected so that the first timber block 32 may extend to one side of the brick wall 224 or to both sides of the brick wall 224. Therefore, the length l_1 of the portion of the first timber block 32 which extends axially beyond the second chord 14 may be greater than a width w_b of a brick 228 in the brick wall 224 within which the joist 10 is to be used. The width of a brick 228 is illustrated in Figure 8 and corresponds to the thickness of the brick 228 in a direction parallel to the direction from the first end 34 to a second end 38 of the timber joist 10 when the joist 10 is installed in a brick wall 224. The length l_1 may therefore allow the joist 10 to accommodate variations in dimensions and alignment in the brick wall 224 introduced during construction. As shown in the embodiment in Figure 1, the length l_1 of the portion of the first timber block 32 which extends axially beyond the second chord 14 may correspond to the entire length of the first timber block 32.

[0053] As shown in the embodiment in Figure 1, the timber joist 10 may comprise a second timber block 40 extending between the first and second chords 12, 14.

The second timber block 40 may extend from the facing surface 12b of the first chord 12 to the facing surface 14b of the second chord 14. That is, the second timber block 40 may be in contact with the facing surface 12b of the first chord 12 and the facing surface 14b of the second chord 14

[0054] The second timber block 40 may be attached to the first chord 12. As such, the second timber block 40 may be attached to the same chord to which the first timber block 32 is attached. The second timber block may also be abutting and attached to the first timber block 32 as shown in Figure 1. Including the second timber block 40 in the timber joist 10 may improve the attachment of the first timber block 32 to the first chord 12. In certain embodiments, the second timber block 40 may also be attached to the second chord 14.

[0055] The second timber block 40 may be attached to the first chord 12 and the first timber block 32, and optionally to the second chord 14, by any suitable means. For example, the second timber block 40 may be attached to the first chord 12 and the first timber block 32 by a first nail plate 42. Optionally, the second timber block 40 may be attached to the second chord 14 by a second nail plate 44. The first and second nail plates 42, 44 are shown in Figure 4. One or both of the first and second nail plates 42, 44 may comprise integral nails.

[0056] As shown the embodiment in Figure 1, the first chord 12 may have a width w_1 and the first timber block 32 may have a width w_2 that is substantially the same as the width w_1 of the first chord 12. The width w_2 of the first timber block 32 may also be substantially the same as a width of the second chord 14. The widths of the first chord 12 and the first timber block 32 are shown in Figures 2a and 2b. The widths are measured in a direction perpendicular to a direction extending from one end 34 of the joist 10 to the other end 38 of the joist and perpendicular to a direction extending from the first chord 12 to the second chord 14.

[0057] The second timber block 40 may have a width w_3 that is substantially the same as the width w_1 of the chord to which it is attached. As shown in the embodiment of Figure 1, the width w_3 of the second timber block 40 may be substantially the same as the width w_1 of the first chord 12. The width w_3 of the second timber block 40 may be substantially the same as the width of the second chord 14.

[0058] In addition to a first timber block 32 being attached to one of the chords at the first end of the timber joist 10, a first timber block 32 may be attached to one of the chords at the second opposing end 38 of the joist 10. In the embodiment shown in Figure 1, a first timber block 32 is attached to the first chord 12 at the second end 38 of the joist 10 and extends axially beyond the second end 22 of the second chord 14. The first timber block 32 at the second end 38 of the timber joist 10 may be substantially the same as the first timber block 32 at the first end 34 of the timber joist 10. The first timber block 32 at the second end 38 of the timber joist 10 may have the same depth d_2

as the first timber block 32 at the first end 34 of the timber joist 10. The first timber block 32 at the second end 38 of the timber joist 10 may be attached to the first chord 12 and, optionally the second chord 14, in the same manner as the first timber block 32 at the first end 34 of the timber joist 10. Therefore, the first and second ends 34, 38 of the timber joist 10 may be substantially identical.

[0059] Figure 4 shows a floor assembly 100 in accordance with an embodiment of the invention. The floor assembly 100 comprises a plurality of timber joists 10 and at least one planar substrate 122. Each of the timber joists 10 shown in the flooring assembly Figure 4 may be the same as the timber joist 10 described above with reference to Figure 1. The planar substrate 122 may be, for example, a panel, a board, or any suitable substrate for forming a floor in a building. The planar substrate 122 is connected to and spans between at least two of the plurality of timber joists 10. As shown in the embodiment in Figure 4, the planar substrate 122 may be arranged perpendicular to the at least two of the plurality of timber joists 10.

[0060] The planar substrate 122 may be connected to the timber joists 10 by any suitable means. Non-limiting examples include connecting the planar substrate 122 to the timber joists 10 by screw or nails. The planar substrate 122 may be connected to the opposing surface of a chord of the timber joist 10. In the embodiment shown in Figure 4, the planar substrate 122 is connected to the opposing surface 12a of the first chord 12 of each timber joist 10. However, in alternative embodiments, the planar substrate 122 may be attached to the second chord 14 of each timber joist 10. In such embodiments, the timber joist 10 may be rotated 180° compared to the arrangement shown in Figure 4.

[0061] Whilst the embodiment shown in Figure 4 includes multiple planar substrates 122, the invention is not limited to this arrangement. Depending to the shape and size required for the flooring assembly 100, the flooring assembly 100 may comprise one or more planar substrates 122.

[0062] The planar substrate 122 may be arranged so that the first timber blocks 32 extend axially beyond an end of planar substrate 122 at either end of each timber joist 10. A first end of the planar substrate 122 which is closest to the first ends 34 of the timber joists 10 may be axially aligned with the first end 18 of the second chord 14 in each of the timber joists 10. In certain embodiments, the entirety of the first timber blocks 32 may extend axially beyond the first end of planar substrate 122 so that there is no axial overlap between the first timber block 32 and the planar substrate 122. A second end of the planar substrate 122 which is closest to the second ends 38 of the timber joists 10 may be positioned relative to the first timber blocks 32 at the second ends 38 of the joist 10 in the same way as the first end of the planar substrate 122 is positioned relative to the first timber blocks 32 at the first ends 34 of the joist 10. In the embodiment shown in Figure 4, the floor assembly 100 comprises a first planar

substrate 123 positioned near the first ends 34 of the timber joists 10 and a second planar substrate 124 positioned near the second ends 38 of the timber joists 10. At one side of the floor assembly 100, the first timber blocks 32 extend axially beyond a first end 123a of the first planar substrate 123 which is closest to the first ends 34 of the timber joist 10. At the other end of the floor assembly, the first timber blocks 32 extend axially beyond a first end 124a of the second planar substrate 124 which is closest to the first ends 34 of the timber joist 10.

[0063] Figures 6 and 7 show a building system 200 according to an embodiment of the invention. The building system 200 comprises a timber joist 10 and a brick wall 224 comprising a plurality of courses of brick 226. As shown in the Figures, the building system 200 may comprise a plurality of timber joists 10. Each of the timber joists 10 shown in the building system 200 of Figures 6 and 7 may be the same as the timber joist 10 described above with reference to Figure 1. The building system 200 may comprise at least one planar substrate 122 connected to and spanning between at least two of the plurality of timber joists 10. The building system 200 may therefore comprise the floor assembly 100 of the embodiment shown in Figure 4.

[0064] In the building system 200, the timber joist 10 is supported by the brick wall 224 by the first timber block 32 sitting upon a first course 266a of the courses of bricks 226. In the embodiment shown in the Figures, the first timber block 32 sits directly upon the first course of bricks 226a. That is, the joist 10 bears directly upon the bricks 228 in the first course of bricks 226a. In the embodiment shown in the Figures, the first timber block 32 is attached to the first chord 12 of joist 10 and the planar substrate 122 is connected to the first chord 12 of the joist 10. In an alternative embodiment to the one shown in the Figures, the planar substrate 122 may be connected to the second chord 14 of the joist 10 shown in Figure 1. In such embodiments, the timber joist 10 may be supported by the brick wall 224 by the first timber block 32 sitting upon the first course 226a of the courses of bricks 226. However, the first timber block 32 would not sit directly upon the first course of bricks 226a. Rather, the first chord 12 would sit directly upon the first course of bricks 226a. The first timber block 32 would sit on the first chord 12 upon the first course of bricks 226a. In such embodiments, the joist 10 still bears directly upon the bricks 228 in the first course of bricks 226a.

[0065] As shown in Figure 6, the building system 200 may comprise a second course of bricks 226b. The second course of bricks 226b is laid such that the first timber block 32 of the joist 10 extends through the second course 226b of the courses of bricks 226. The second course of bricks 226b may be laid on the first course of bricks 226a. As shown in Figure 6, a plurality of joists 10 may be supported by the brick wall 224 by sitting the first timber block 32 of each timber joist 10 upon the first course of bricks 226b. The bricks 228 in the second course of bricks 226b may be used to fill the spaces

between the ends 34, 38 of the joists 10. A third course of bricks 226c may be laid on the second course of bricks 226b. Additional subsequent courses of bricks may be laid on the third course of bricks 226c. The ends 34, 38 of the joists 10 are therefore embedded through holes in the brick wall 224. The planar substrate 122 may not interfere with the third or subsequent courses of bricks as the planar substrate 122 may be arranged so that the first timber blocks 32 extend axially beyond an end of planar substrate 122 at each end of each timber joist 10.

[0066] As described above, the depth d_2 of the first timber block 32 is less than the depth d_1 of the joist 10. The depth d_2 of the first timber block 32 may be selected so that the depth of the portion of the joist 10 that extends through the second course of bricks 226b is equal to or less than the depth of the second course of bricks 226b. That is, the depth of the end 34 of the joist 10 may be equal to or less than the depth of the second course of bricks 226b. The depth of the portion of the joist 10 that extends through the second course of bricks 226b is less than the depth d_1 of the joist 10 defined as the distance between the opposing surfaces 12a, 14a of the first and second chords 12, 14 due to the first timber block 32. In the embodiment shown in the Figures, the depth at the end 34 of the joist 10 is the combined depth d_3 of the first chord 12 and the first timber block 32. The third course of bricks 226b may therefore be laid without the need to create notches in the bricks 228 of the third course of bricks 226c. As such, the timber joist 10 of the present invention may reduce the number of on-site modifications needed to construct the brick wall 224 thereby improving the resulting building system 200.

[0067] As shown in Figures 8 and 9, the first timber block 32 may be arranged upon the first course of bricks 226a such that the first timber block 32 extends beyond at least one side of the first course of bricks 226a. The first timber block 32 may be arranged so that it extends beyond both sides of the first course of bricks 226a. As such, the first timber block 32 (and the joist 10) may cantilever on one or both sides of the first course of bricks 226a. The length of the first timber block 32 may be selected to achieve this effect. The length of the first timber block 32 may be selected based on the dimensions of bricks 228 in the brick wall 224. In particular, as described above, the length l_1 of the first timber block 32 that extends axially beyond the second chord 14 may be selected based on the bricks 228 in the brick wall 224. As shown in the embodiments in the Figures, the length l_1 of the first timber block 32 that extends axially beyond the second chord 14 may be greater than a width w_b of a brick 228 in the brick wall 224. Using the first timber block 32 in this way may improve the building system 200 and construction of the brick wall 224 because the joist 10 can accommodate variations in dimensions and alignment in the brick work.

[0068] Figures 7 and 9 show a portion of the first timber block 32 extending beyond an outside 230 of the first course of bricks 226a. In general and as shown in Figures

5 to 7, the joist 10 is supported by two brick walls 224a, 224b. The outside 230 of a course of bricks 226 in one brick wall 224a is the side of the course 226 facing away from the other wall 224b by which the joist 10 is supported. The first timber block 32 may extend beyond the outside 230 of the first course of bricks 226a if the distance between the two brick walls 224a, 224b supporting the joist 10 is narrower than originally intended. The portion of the first timber block 32 extending beyond the outside 230 of the first course of bricks 226a may be trimmed. Once the second course of bricks 226b has been laid, the first timber block 32 may be trimmed so that the joist 10 is substantially flush with the outside 230 of the second course of bricks 226b. Each of the joists 10 included in the brick wall 224 may be trimmed in this manner. The joist 10 may be trimmed using any suitable means. In one non-limiting example, joist 10 may be trimmed using a saw. Altering the joist 10 in this way during construction of the brick wall 224 is a simple modification that can be made on-site. As shown in the embodiment in the Figures, both a portion of the first timber block 32 and a portion of the first chord 12 may extend beyond an outside of the first course of bricks 226a. Therefore, both the first timber block 32 and the first chord 12 may be trimmed so that the joist 10 is substantially flush with the outside of the second course of bricks 226b.

[0069] Figure 8 shows a portion of the first timber block 32 extending beyond an inside 232 of the first course of bricks 226a. The first timber block 32 cantilevers on the inside of the first course of bricks 226a. The inside 232 of a course is bricks 226 in one brick wall 224a is the side of the course 226 facing toward the other wall 224b by which the joist 10 is supported. In the embodiment shown in the Figures, the length of the second chord 14 and the length of the first timber block 32 that extends axially beyond the second chord 14 may be selected to achieve this effect. The first timber block 32 may extend on an inside 232 of the first course of bricks 226a if, for example, the distance between the two brick walls 224a, 224b supporting the joist 10 is wider than originally intended. Arranging the timber joist 10 so that the first timber block 32 extends beyond the inside 232 of the first course of bricks 226a may help ensure that the second chord 14 does not sit upon the first course of bricks 226a thereby reducing the likelihood of notches needing to be created in the bricks 228 in the third course of bricks 226c.

[0070] In embodiments shown in the Figures, the building system 200 is the same at each end of the timber joist 10. That is, each end the timber joist 10 is incorporated into a brick wall 224 in the same manner. The above-described building system 200 may be best suited for supporting the joist 10 in an external wall of a building. However, in alternative embodiments, the building system 200 may differ at one of the ends of the timber joist 10. For example, in certain embodiments one end of the timber joist 10 may be incorporated into a brick wall 224 in a different manner. One end of the timber joist

10 may supported by the brick wall 224 by the first timber block 32 sitting upon a first course 226a of the courses of bricks, however, a second course of bricks 226b may not be laid on the first course of bricks 226a. Rather, the end of the joist 10 may be embedded in the wall 224 by alternative means. This may be advantageous when the end of the joist 10 is supported by an internal wall of a building.

[0071] According to an embodiment of the invention, the timber joist 10 may be used in a method of construction. The method of construction may be used to produce the building system 200. The method comprises a step of laying a first course of bricks 226a. The first course of bricks 226a may be laid on top of one or more courses of bricks 226 so that the first course of bricks 226a is at the required height.

[0072] The method comprises a step of providing a timber joist 10. The timber joist 10 may be the same as the timber joist 10 described above for the embodiment shown in Figure 1. In certain embodiments, the method may comprise providing a plurality of timber joists 10.

[0073] The method comprises a step of supporting the timber joist 10 on the first course of bricks 226a by positioning the first timber block 32 upon the first course of bricks 226a as shown in Figure 5. The joist 10 may be directly supported on the first course of bricks 226a. As shown in the embodiment in the Figures, the first timber block 32 may be directly supported on the first course of bricks 226a.

[0074] The method comprises the step of laying a second course of bricks 226b such that the first timber block 32 extends through the second course of bricks 226b as shown in Figure 6.

[0075] In certain embodiments of the method, the depth d_2 of the first timber block 32 may be such that a depth of the joist 10 extending through the second course of bricks 226b is equal to or less than the depth of the second course of bricks 226b. As such, there may be no need to create notches in the bricks 228 of a subsequent course of bricks 226 to accommodate the joist 10. The method may therefore comprise the step of laying a third course of bricks 226c on the second course of bricks 226b without creating notches in the bricks 228 of the third course of bricks 226c to accommodate the joist 10 as shown in Figure 7.

[0076] In certain embodiments, the step of supporting the timber joist 10 on the first course of bricks 226a may comprise positioning the first timber block 32 upon the first course of bricks 226a such that the first timber block 32 extends beyond at least one side 230, 232 of the first course of bricks as shown in Figures 8 and 9. The first timber block 32 may extend beyond both sides 230, 232 of the first course of bricks 226a. As such, the first timber block 32 may cantilever on one or both sides 230, 232 of the first course of bricks 226a. The length of the first timber block 32 may be such that the first timber block 32 extends beyond the one or both sides 230, 232 of the first course of bricks.

[0077] In certain embodiments, the first timber block 32 may extend beyond an outside 230 of the first course of bricks 226a. In such embodiments, the method may comprise a step of laying a second course of bricks 226b such that the first timber block 32 extends through the second course of bricks 226b and a step of trimming the joist 10 so that the joist 10 is substantially flush with the outside of the second course of bricks 226b. The step of trimming the joist 10 may comprise sawing the joist 10 so that the joist 10 is substantially flush with the outside 230 of the second course of bricks 226b.

[0078] The method of construction may be performed at each end 34, 38 of the joist 10. Therefore, each end of the joist 10 may be supported by a first course of bricks 226a. The first course of bricks 226a at each end 34, 38 of the joist 10 may be laid so that the joist 10 may be simultaneously supported by a first course of bricks at each end as shown in Figure 5.

[0079] Whilst the method has been described with reference to a timber joist 10, the method may comprise providing the flooring assembly 100 of the embodiment shown in Figure 4. The flooring assembly 100 may be installed in the brick wall 224 as a single unit. Each joist 10 in the flooring assembly 100 may be simultaneously supported by the first course of bricks 224a as described above. Each joist 10 in the flooring assembly 100 may be trimmed so that each joist 10 is substantially flush with the outside of the second course of bricks 226b as described above.

[0080] The skilled person would understand that various modifications can be made to the above described embodiments.

[0081] In certain embodiments, the first timber block 32 may extend beyond the end of the second chord 14 but the first timber block 32 may not extend axially beyond the end of the second chord 14 in its entirety. In such embodiment, the first timber block 32 may abut the facing surface 14b of the second chord 14. In such embodiments, the joist 10 may not comprise the second timber block 40. The first timber block 32 may be attached to the first and second chords 12, 14 directly. The first timber block 32 may be attached to the first and second chords 12, 14 by one or more nail plates.

[0082] In the embodiment in Figure 1, the first timber block 32 does not abut the facing surface 14b of the second chord 14 because the first timber block 32 extends axially beyond the end of the second chord 14 in its entirety. However, in alternative embodiments, the first timber block 32 may not abut the facing surface 14b of the second chord 14 for a different reason. For example, first timber block 32 may not abut second chord 14 because the depth d_2 of the first timber block 32 may be less than the distance between the facing surfaces of the first and second chords 12, 14. In such embodiments, the first timber block 32 may not extend axially beyond the end of the second chord 14 in its entirety.

[0083] The first timber block 32 may be attached to the joist 10 in an alternative manner to that shown in Figure 1.

[0084] In certain embodiments, the first timber block 32 may be attached directly to one or both of the chords. That is, the second timber block 40 may be omitted. The first timber block 32 may be attached to one or both of the chords 12, 14 by a nail plate.

[0085] In certain embodiments, the first timber block 32 may extend axially beyond an end of both of the first and second chords 12, 14. The first timber block 32 may abut the facing surfaces 12b, 14b of both of the first and second chords 12, 14. That is, the first timber block 32 may be sandwiched or positioned between the two chords and extend axially beyond the ends of both of the two chords. Therefore, the depth at the end of the timber joist 10 is provided solely by the depth of the first timber block 32. In such embodiments, the first and second chords 12, 14 may have the same length as each other. In such embodiments, the joist 10 may not comprise the second timber block 40. The first timber block 32 may be attached to the first and second chords 12, 14 directly. The first timber block 32 may be attached to the first and second chords 12, 14 by one or more nail plates.

[0086] In certain embodiments, the first timber block 32 may be attached to the end of the first chord 12 and/or the end of the second chord 14. As such, the first timber block 32 may not abut the facing surface of either chord. The first timber block 32 may be attached to the end of the first chord 12 and/or the end of the second chord 14 by one or more nail plates.

[0087] In the embodiment shown in Figure 1, the first and second ends of the timber joist 10 are the same as each other. In certain embodiments, the first and second ends of the timber joist 10 may differ. In certain embodiments, only one end of the timber joist 10 may comprise a first timber block 32.

[0088] The invention is not restricted to the details of any foregoing embodiments. Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of them mean "including but not limited to", and they are not intended to (and do not) exclude other moieties, additives, components, integers or steps. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0089] Features, integers, or characteristics described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. In particular, the words "certain embodiments" are to be understood to mean any embodiment described, illustrated, or otherwise disclosed herein. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some

of such features and/or steps are mutually exclusive. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

[0090] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

Claims

1. A timber joist comprising:

first and second timber chords maintained in spaced relation to one another, the chords having respective opposing surfaces facing away from one another and delimiting a depth (d_1) of the joist therebetween; and
a first timber block attached to one of the chords at an end of the joist, the first timber block extending axially beyond an end of the other of the chords and having a depth (d_2) less than the depth of the joist.

2. A timber joist according to claim 1, wherein the chords have respective facing surfaces facing toward one another and the first timber block abuts the facing surface of the one of the chords.

3. A timber joist according to claim 2, wherein together the one of the chords and the first timber block have a depth (d_3) that is less than the depth (d_1) of the joist.

4. A timber joist according to claim 2 or 3, wherein the first timber block extends axially beyond the end of the other of the chords in its entirety.

5. A timber joist according to claim 2 or 3, wherein the first timber block abuts the facing surface of the other of the chords.

6. A timber joist according to any preceding claim, wherein the first timber block extends axially no further than an end of the one of the chords.

7. A timber joist according to any preceding claim, wherein the first timber block extends axially to the same extent as the one of the chords.

8. A timber joist according to any preceding claim, the one of the chords extends axially beyond the other of the chords at the end of the joist.

9. A timber joist according to any preceding claim, wherein the joist further comprises a second timber block extending between the chords, attached to the one of the chords, and abutting and attached to the first timber block.

10. A floor assembly comprising:

a plurality of timber joists according to any preceding claim; and
a planar substrate, for example a panel or board, connected to and spanning between at least two of the plurality of timber joists.

11. A building system comprising:

a timber joist according to any of claims 1 to 9; and
a brick wall comprising a plurality of courses of bricks,
wherein the timber joist is support by the brick wall by the first timber block sitting upon a first course of the courses of bricks and the first timber block extends through a second course of the courses of bricks.

12. A method of construction comprising:

providing a timber joist according to any one of claims 1 to 9;
laying a first course of bricks;
supporting the timber joist on the first course of bricks by positioning the first timber block upon the first course of bricks; and
laying a second course of bricks such that the first timber block extends through the second course of bricks;
wherein a depth (d_2) of the first timber block is such that a depth of the joist extending through the second course of bricks is equal to or less than the depth of the second course of bricks.

13. A method according to claim 12, comprising laying a third course of bricks on the second course of bricks without creating notches in the bricks of the third course of brick to accommodate the joist.

14. A method of construction comprising:

providing a timber joist according to any one of claims 1 to 9;
laying a first course of bricks;
supporting the timber joist on the first course of bricks by positioning the first timber block upon the first course of bricks such that the first timber block extends beyond at least one side of the first course of bricks.

15. A method according to claim 14, wherein the first timber block extends beyond an outside of the first course of bricks; and the method comprises:

laying a second course of bricks such that the 5
first timber block extends through the second
course of bricks; and
trimming the joist so that the joist is substantially
flush with the outside of the second course of
bricks. 10

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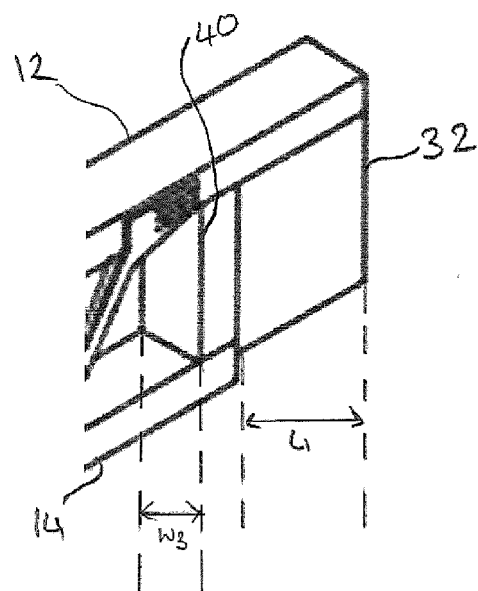
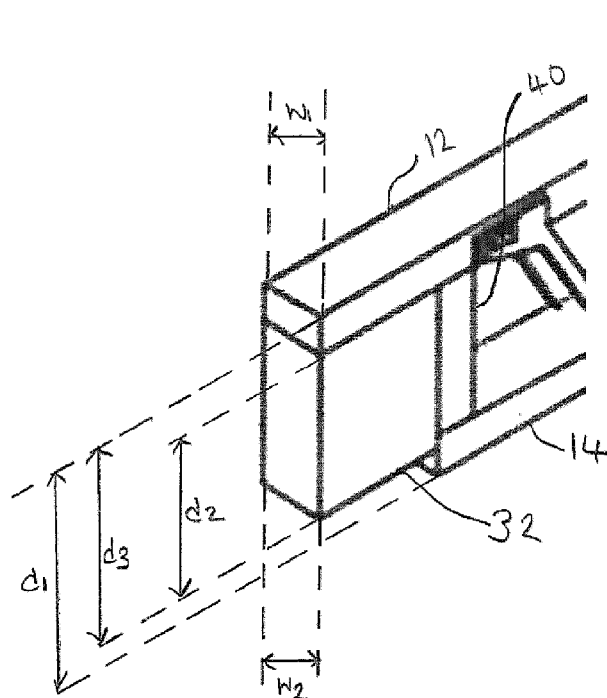
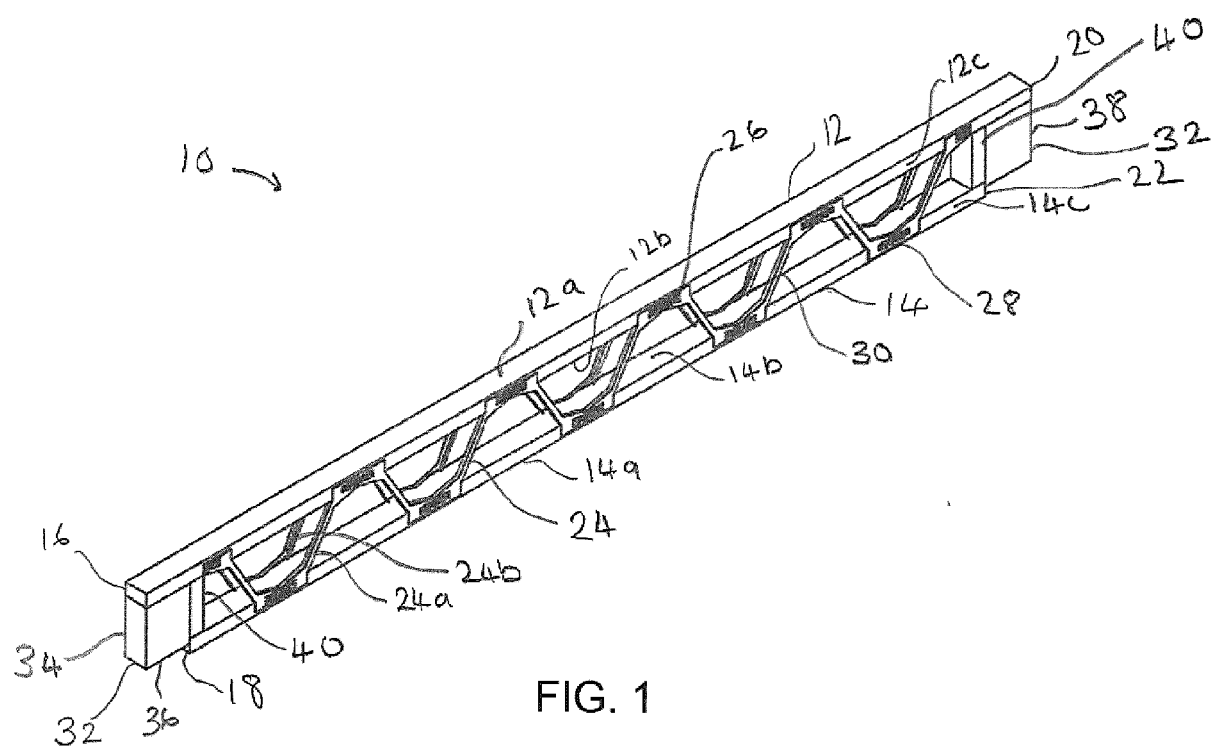
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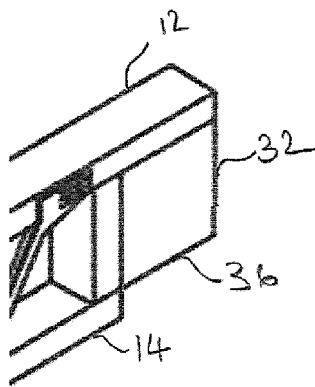


FIG. 3a

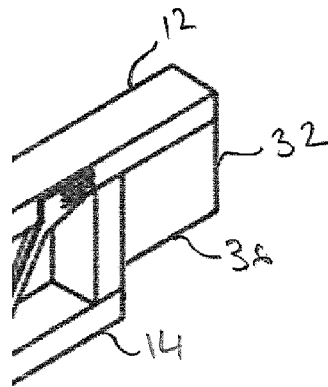


FIG. 3b

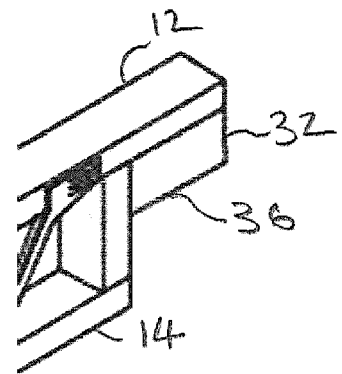


FIG. 3c

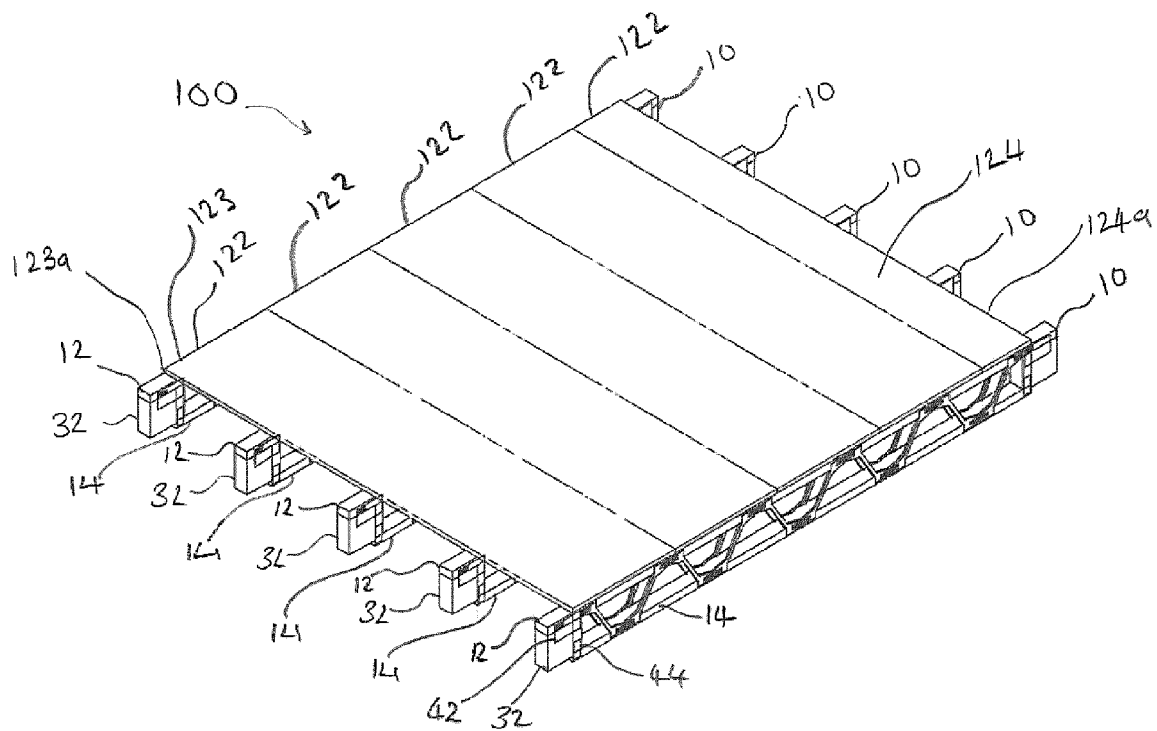


FIG. 4

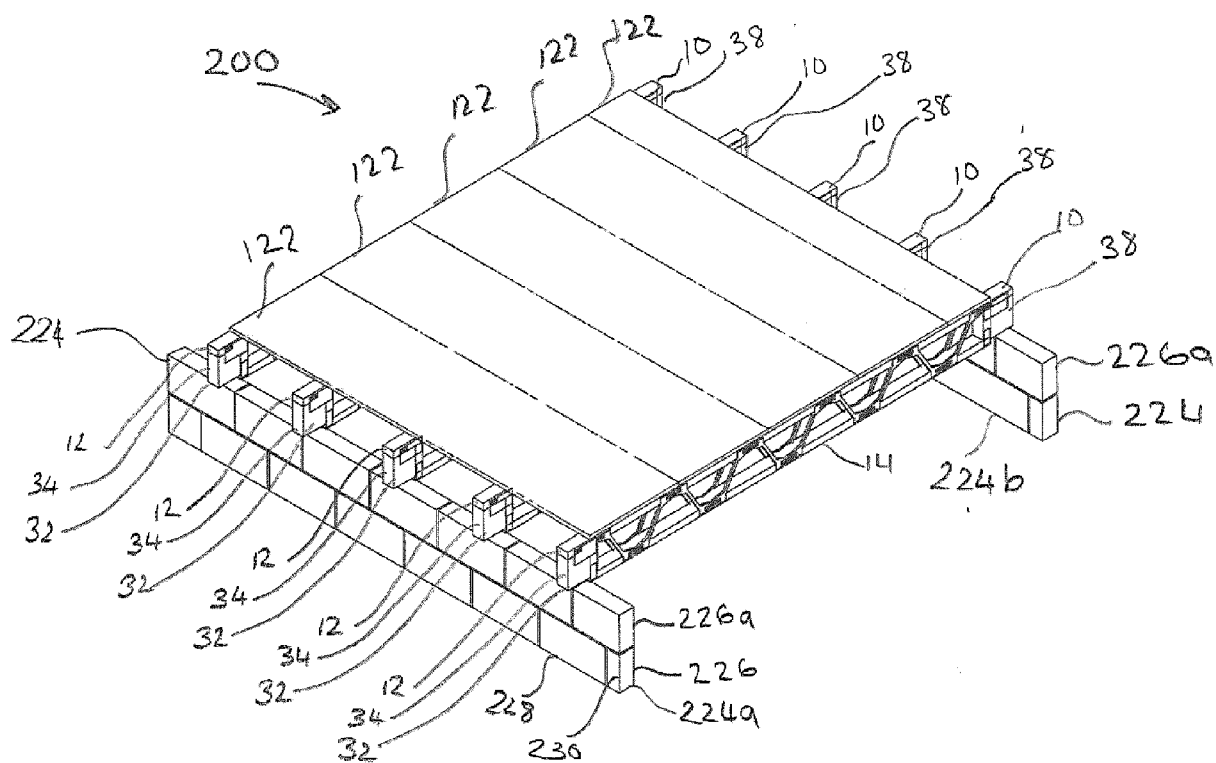


FIG. 5

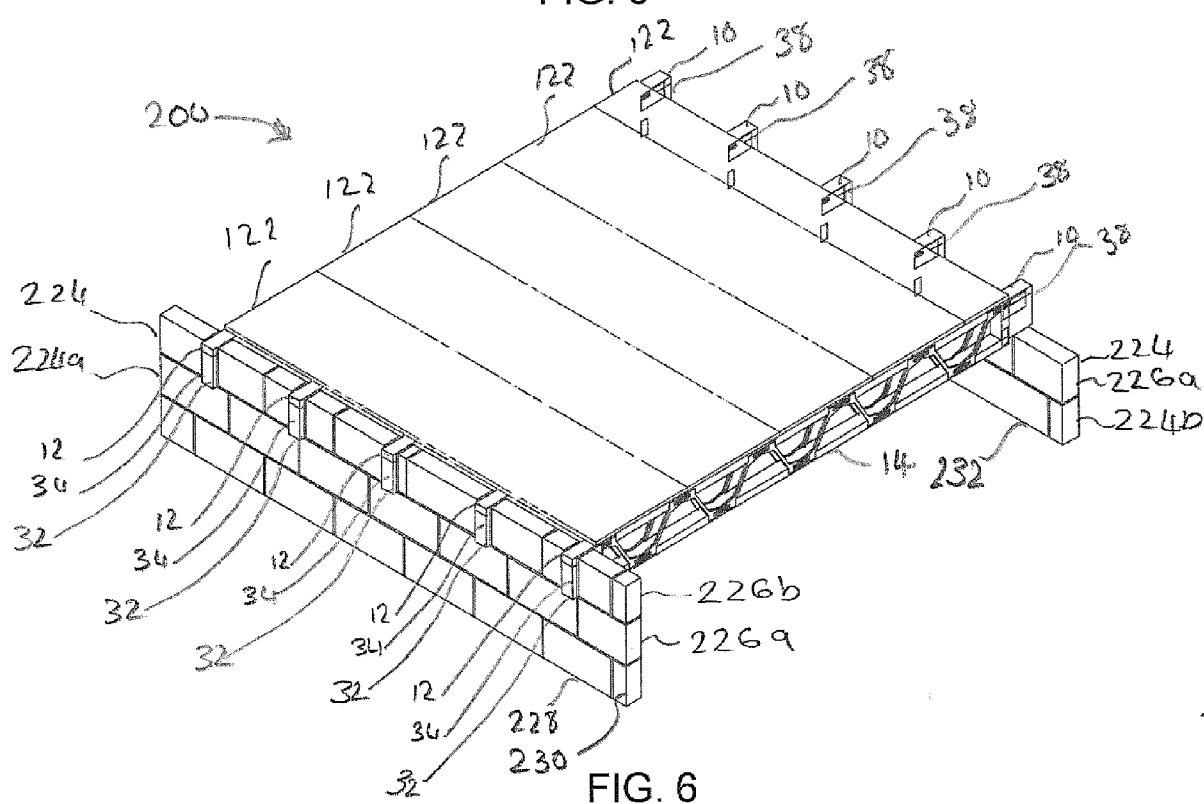
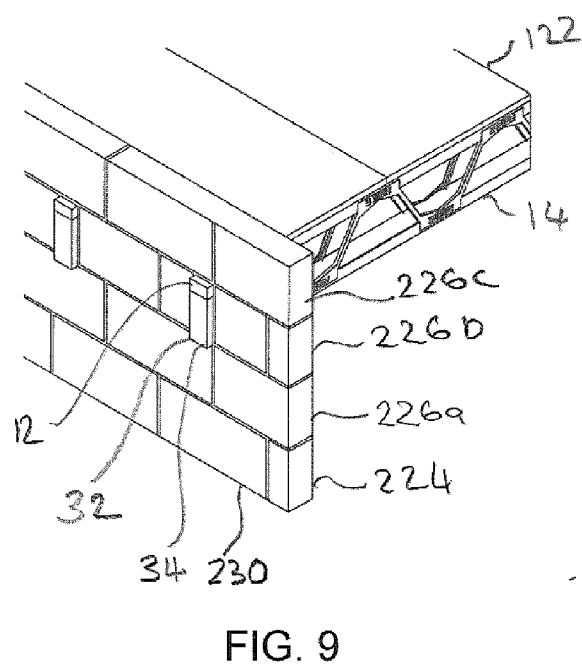
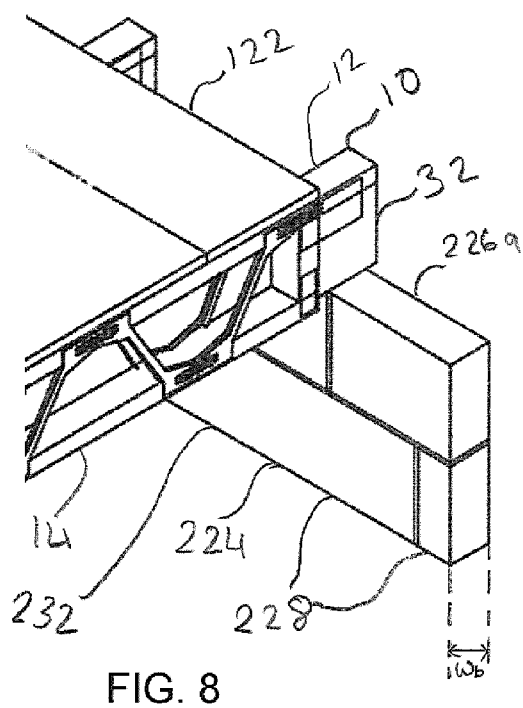
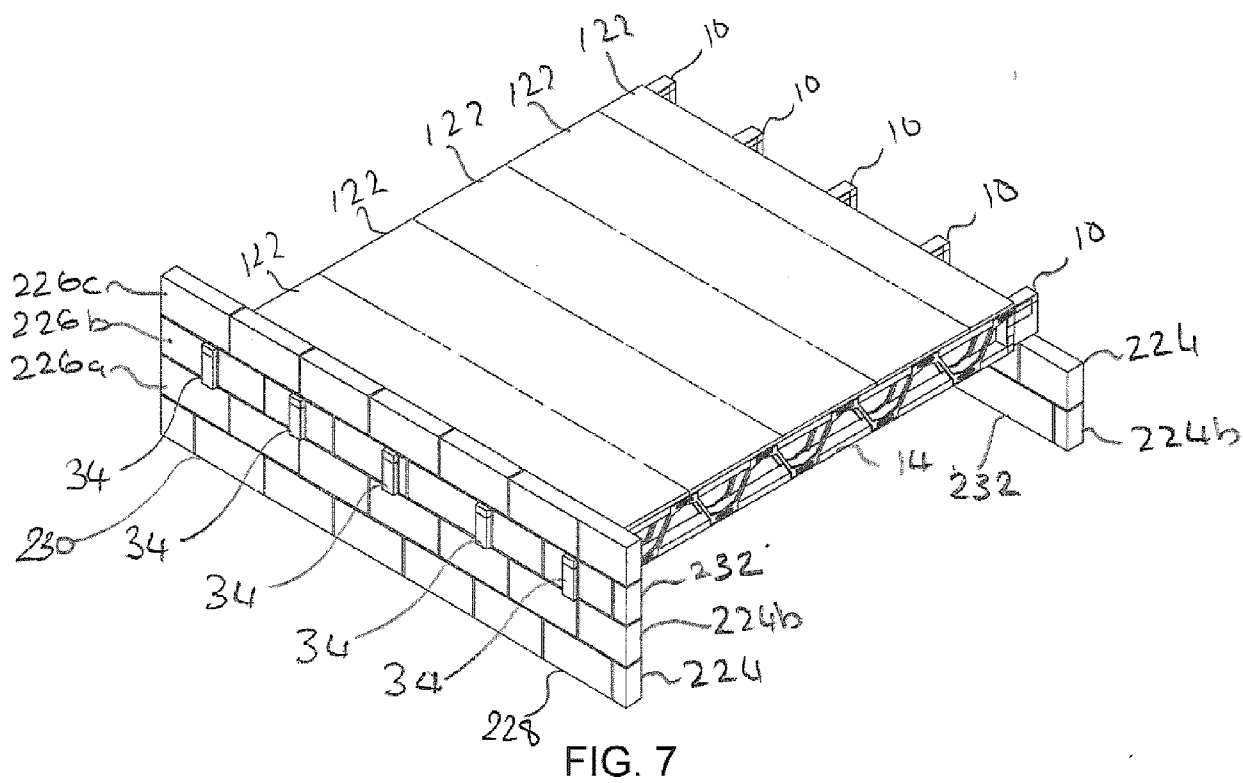


FIG. 6





EUROPEAN SEARCH REPORT

Application Number

EP 24 19 0987

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (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
The Hague		19 November 2024	Petrinja, EtieI
CATEGORY OF CITED DOCUMENTS			
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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