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(54) **A WALL FOR A BUILDING, AND A METHOD OF ASSEMBLING SUCH A WALL**

(57) A wall with at least two building components, each comprising the following: a first pair of parallel panels (P1, P2) at a first distance (d1) from each other; a second pair of parallel panels (P3, P4), placed at a second distance (d2) from each other; the panels of the first pair being perpendicular to the panels of the second pair, and the panels being interconnected by means of con-

necting elements and positioned with respect to each other such that two panels (P3, P4) of the second pair protrude beyond the panels of the first pair, the two building components being placed against each other, and interconnected by means of fasteners (31, 32) through the connecting elements and through the projecting portions.

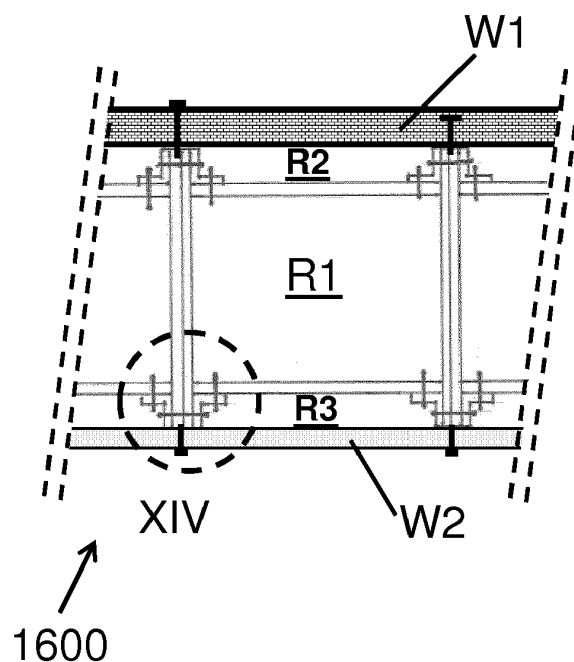


FIG 16

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Description**Field of the invention**

5 [0001] The present invention relates to the field of walls of buildings. In particular, this invention relates to a wall with building components that include a tube and projecting portions. The present invention also relates to a wall, and a building that includes at least one such wall.

Background of the invention

10 [0002] There are many types of construction panels or building components that can be used for forming walls or floor panels or roofs of buildings. Such building components may or may not be filled with a material to insulate thermally and/or acoustically.

15 [0003] US2007193169A1 discloses hollow building components, provided to be mounted against each other, to subsequently be filled with concrete. However, concrete is heavy, and it is not always desirable to use concrete for every building.

[0004] DE842539 discloses a building component in the form of an oblong tube having a varying cross-section, and aesthetic roof structures constructed therefrom.

20 [0005] Bridges having a plurality of elements for forming an oblong tube and with projecting portions for forming a road surface (a so-called 'box girder') are known, but a bridge is not a wall of a building.

Brief summary of the invention

25 [0006] It is an object of the present invention to provide a wall for buildings, such as, for example, homes, flats and industrial buildings, the wall being composed of prefabricated building components, which need not be filled on the site with concrete or with a different filler material.

[0007] It is an aim of embodiments of the present invention to provide such a wall, wherein the prefabricated building components can be connected to each other in a simple and fast manner.

30 [0008] It is an aim of embodiments of the present invention to provide such a wall, which is easily and to a large extent recyclable.

[0009] It is an aim of embodiments of the present invention to provide a wall with prefabricated panels, having a relatively high structural strength (for example, compression strength and/or flexural strength).

[0010] It is an aim of embodiments of the present invention to provide a wall to which an outer wall (for example, a facade with bricks) and/or an inner wall (for example, a gyproc wall) can be attached in a simple manner.

35 [0011] These and other objects are achieved by a building component according to the present invention.

[0012] According to a first aspect, the present invention provides a wall comprising at least a first and a second building component, the first and a second building component being a prefabricated building component comprising the following: a first pair of flat panels comprising a first panel and a second panel, each having a first length and a first width, which are at a first distance from each other and parallel with each other; a second pair of flat panels comprising a third panel and a fourth panel, each having a second length and a second width, which are at a second distance from each other and parallel with each other; the panels of the first pair being perpendicular to the panels of the second pair to form a first, hollow space; the four panels being interconnected by means of connecting elements; and the four panels being positioned with respect to each other such that the third and fourth panel each have a first projecting portion that projects beyond the first panel by a first distance and each have a second projecting portion that projects past the second panel by a second distance; the first and second building component being placed against each other in such a way that the first panel of the first building component is located in the same plane as the first panel of the second building component; and the first and second building component are interconnected by means of fasteners which extend through the connecting elements and through corresponding projecting portions of the fourth panel of the first building component, and the third panel of the second building component.

50 [0013] It is an advantage of a wall containing such building components that the third and fourth panel project on either side of the beam-shaped space, as it allows two such building components to be connected to each other in a simple manner by means of these projecting portions to form a wall, and because these projecting portions can function as a spacer with a predetermined distance H1 and H2, respectively, with respect to a contact surface at the ends of the projecting portions, and because they can be used to attach an external wall structure against these spacers, without the spacers cracking or shattering, and because they may serve at the same time as a stud wall for receiving cables or pipes. As far as known to the inventors, orienting such structures in such a way and using the projecting portions for this purpose is not known in the art.

55 [0014] In other words, such building components are particularly suitable for forming load-bearing walls, which can

be attached against each other, and against which an inner wall or an outer wall can subsequently be attached, for example, by screwing them onto the 'projecting portions' and/or onto the connecting elements.

[0015] It is an advantage of such a building component that it has a relatively large bending moment, as a result of which this structure is suitable both for forming an upstanding wall, as well as for forming a lying floor or a sloping roof.

[0016] It is an advantage of such a building component, and thus of such a wall, that it forms a tube having a square or rectangular cross-section. Such a tube may receive both rigid, beam-shaped insulating structures, as well as flat insulation structures, as well as insulation flakes or rock wool or glass wool and the like. Such a tube may also be filled with a foam insulation material which is allowed to harden in the tube itself.

[0017] The building component may, for example, include four such connecting elements applied outside the first hollow space.

[0018] It is an advantage if the connecting elements extend over substantially the entire length of the relevant building component, because in this way the connection between the panels can be divided across a larger surface area.

[0019] It is an advantage that the connection profile thus applied can contribute to the structural strength of the building component, and therefore also of the wall.

[0020] It is an advantage if connecting elements are applied over substantially the entire length, because in this way the projecting panels are clamped firmly against each other over substantially their entire length, so the risk of a building component being pulled apart or pulled out of position, and/or a connection being torn out can be reduced.

[0021] It is also an advantage that due to the projecting portions which are pressed against each other, a spacer is created, into which screws can be screwed in a transverse direction, without it cracking, and this over the entire length of the building component. This also allows that an outer wall or an inner wall can be attached over the entire length of the building component against the projecting portions.

[0022] It is an advantage that there are projecting portions both on the inside of such a wall, as well as on the outside of such a wall, because this allows neighbouring building components on both sides of the wall to be formed to be connected.

[0023] It is an advantage of such a wall that it can be formed easily on site by the simple placing next to and against each other of two building components and by attaching these to each other in a simple manner.

[0024] It is an advantage if the connecting elements are already pre-drilled or pre-punched. It is a further advantage that by means of such connecting elements, the two building components can be firmly drawn against each other, and that two projecting panel portions are clamped in between them, so that the clamped material has a total thickness equal to the double panel thickness, wherein, for example, in case of wood, a screw can easily be inserted in a transverse direction between the profiles, without the wood cracking or splintering.

[0025] In an embodiment, the first width and the second width are in a ratio of at least 1.0, or at least 1.25 or at least 1.50 or at least 2.0.

[0026] In an embodiment, the first and the second building component further comprise an insulation material, applied in the first hollow space.

[0027] This insulation material may be introduced into the first, hollow space during the production of the building components, or may be introduced in-situ, at the site where a building is constructed.

[0028] It is an advantage to fill the hollow space with an insulation material, such as, for example, natural insulation material such as straw bales or hemp, or cork, or artificial insulation material such as, for example, glass wool, rock wool, or rigid foam insulation boards, or EPS boards, or 'isomo' boards, or polystyrene boards, or the like, because they further lower the thermal conductivity of such a building component, and greatly improve the acoustic insulation. In this way, the thermal and acoustic insulation of a wall is containing a plurality of such panels increased. In embodiments wherein the construction panel is closed by a fifth and sixth panel, it is even possible to use loose insulation materials, for example, non-compressed straw, or isomo flakes, or flakes of any given pre-foamed insulation material, or other insulation materials.

[0029] In an embodiment, the insulation material is selected from the group consisting of: straw, glass wool, rock wool, and a pre-foamed plastic material.

[0030] It is an advantage if an insulation material with structural strength is used, which can further increase the structural strength of the building components and therefore also of such a wall, and greatly reduce or even eliminate the risk of collapsing.

[0031] It is an advantage of straw, and, in particular, a bale of compressed straw, that it is readily available, inexpensive, and provides a good insulation rating. Moreover, it is a natural product, which is biodegradable when it is desired to recycle the building component.

[0032] It is an advantage of pre-foamed boards, that they have a high insulation rating in relation to their weight.

[0033] In an embodiment, the first and the second building component further comprise a fifth and a sixth panel for closing of the first, hollow space, the fifth and sixth panel being positioned perpendicular to the first, second, third and fourth panels.

[0034] It is an advantage of such a building component that the first hollow space is closed off at six sides, so that the

space can be used to receive an insulation material, and so that heat transfer by convection through the tube can be avoided. The seal may, but need not be, hermetic. If desired, for example, silicone or sealing strips or other means can be applied to increase the seal.

[0035] In an embodiment, at least the third and fourth panel of the first and second building component are made of a material selected from the group consisting of: wood, fibreboard, plastic, MDF, composite material, plywood and OSB, or combinations thereof.

[0036] Preferably, all panels of the building component are made from such a material.

[0037] It is an advantage that the building component includes panels of one or more of such materials, since such materials can easily be drilled and/or screwed into, because they are fairly light in weight, because they are readily available in different sizes, and because such materials are not a good thermal and/or electrical conductor, and are thus suitable for forming an insulated wall.

[0038] It is an advantage of at least some embodiments of building components according to the present invention that they have a large degree of recyclability, or are even 100% recyclable.

[0039] In an embodiment, the connecting elements of each building component are located outside of the first, hollow space of the relevant building component.

[0040] In an embodiment, the connecting elements are wooden beams with a rectangular or square cross-section.

[0041] In an embodiment, the connecting elements are L-shaped profiles, made of a metal or a metal alloy.

[0042] The building component may, for example, include four such wooden beams or four metal L-profiles, applied outside of the first, hollow space.

[0043] The L-profile may be a pleated metal strip, for example, with a 'rounding on the outside', which can be advantageous when, for example, a sealant such as silicone or a resin or the like is applied in the seam. Thanks to the rounding, the L-profile may nevertheless be securely attached with its flat portions against the panels, without disturbing the seal.

[0044] The L-profile can also be a rolled metal profile.

[0045] Suitable metals are, for example, steel, stainless steel, or aluminium, or an aluminium alloy, due to their relatively high strength, good machinability, and relatively low weight.

[0046] In an embodiment, the fastening means are selected from the group consisting of: nails, staples, bolts, nuts, screws, and glue.

[0047] In an embodiment, the wall further comprises an inner wall and/or an outer wall, such as, for example, a gyproc wall or a facade wall and/or floorboards and/or ceiling panels, which is/are attached to the projecting portions and/or to the connecting elements of the building components by means of nails or screws or staples or by means of glue.

[0048] In an embodiment, the wall further comprises at least one door opening or at least one window opening.

[0049] According to a second aspect, the present invention provides a building that comprises at least one wall according to the first aspect.

[0050] In an embodiment, the building comprises at least a first wall according to the first aspect, which is positioned vertically, and at least a second wall according to the first aspect, which is in a lying or inclined position.

[0051] According to a third aspect, the present invention provides a method of assembling a wall of a building, the method comprising the following steps: a) providing a first and a second prefabricated building component comprising the following: a first pair of flat panels comprising a first panel and a second panel, each having a first length and a first width, which are at a first distance from each other and parallel with each other; a second pair of flat panels comprising a third panel and a fourth panel, each having a second length and a second width, which are at a second distance from each other and parallel with each other; the panels of the first pair being perpendicular to the panels of the second pair to form a first, hollow space; the four panels being interconnected by means of connecting elements; and the four panels being positioned with respect to each other such that the third and fourth panel each have a first projecting portion that projects beyond the first panel by a first distance and each have a second projecting portion that projects past the second panel by a second distance; b) the placing against each other of the first and second building component, in such a way that the first panel of the first building component is located in the same plane as the first panel of the second building component; c) connecting the first and second building component by means of fasteners which extend through the connecting elements and through corresponding projecting portions of the fourth panel of the first building component, and the third panel of the second building component.

[0052] In an embodiment, the method further comprises the following steps: d) providing a plurality of wall panels; e) attaching the wall panels by means of screws inserted into the projecting portions, and/or the connecting elements of the building components.

[0053] Particular and preferred aspects of the invention are set out in the appended independent and dependent claims. Features of the dependent claims may be combined with features of the independent claims and with features of other dependent claims as appropriate and not merely as explicitly set out in the claims.

Brief description of the drawings

[0054]

FIG. 1 shows a building component such as may be used in embodiments of the present invention, which comprises four flat panels or boards, which are interconnected two by two to form a tube, and wherein two of the four panels or boards protrude further than the tube on both sides.

FIG. 2 shows an embodiment of the building component according to **FIG. 1**, in cross-sectional view, the inner space containing an insulation material.

FIG. 3 shows a particular embodiment of a building component such as may be used in embodiments of the present invention, four panels or boards being interconnected by L-profiles and bolts with nuts.

FIG. 4 is a schematic combined drawing in exploded view, wherein four different connecting elements (3 profiles and 1 timber section) are shown together in a single drawing (for illustrative purposes).

FIG. 5(a) to **FIG. 5(i)** schematically illustrate various ways in which four panels or boards can be interconnected to form a building component such as may be used in embodiments of the present invention.

FIG. 6 and **FIG. 7** show a building component with two flat panels, and two pleated metal plates, wherein the tube is filled with polyurethane, in perspective view and in cross-sectional view.

FIG. 8 and **FIG. 9** show a variant of the building component of **FIG. 6** and **FIG. 7**.

FIG. 10 shows an exploded view of a building component such as may be used in embodiments of the present invention, wherein the building component further comprises a fifth and sixth board or panel for closing the tube (in the front and rear in the figure).

FIG. 11, **FIG. 12** and **FIG. 13** show three variants of the building component of **FIG. 10**.

FIG. 14 is a schematic representation of a method and a number of intermediate products that can be used in the production of a building component as described above.

FIG. 15 shows an example of how two (or more) building components can be connected to form an upstanding wall or a floor or a roof according to the present invention.

FIG. 16 shows a wall according to **FIG. 15** in top view, wherein on one side of the wall a facade is fixed, separated from said wall by a space with air, and on the other side of the wall an inner wall is fixed (e.g. a gyproc panel), also separated from the wall by a space with air.

FIG. 17 shows a close-up view of an example of how an inner wall of, for example, gyproc, can be connected to the projecting portions of the wall of the present invention. In the case of two L-irons, the available thickness to screw screws into is twice the thickness of the panels.

FIG. 18 shows a variant of **FIG. 17**, where wooden beams are used as connecting elements instead of L-profiles. In this case, the available thickness to screw screws into is twice the thickness of the panels, plus twice the thickness of the wooden beams.

FIG. 19 and **FIG. 20** show that two building components according to the present invention can be placed and connected not only in parallel, but also transversely with respect to each other.

FIG. 21 shows a wall according to the present invention, formed by multiple building components placed next to and against each other. The wall shown also has an opening for a window.

FIG. 22 shows a cross-sectional view of a building, where building components according to the present invention may be used as upright wall elements and/or as horizontal beams and/or as roof elements.

[0055] The drawings are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. Any reference signs in the claims shall not be construed as limiting the scope. In the different drawings, the same reference signs refer to the same or analogous elements.

Detailed description of the embodiments

[0056] Although the present invention will hereinafter be described with respect to particular embodiments and with reference to certain drawings, the invention is not limited thereto but only by the claims.

[0057] Reference throughout this specification to 'one embodiment' or 'an embodiment' means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases 'in one embodiment' or 'in an embodiment' in various places throughout this specification may, but do not necessarily, all refer to the same embodiment. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner, as would be apparent to one of ordinary skill in the art from this disclosure, in one or more embodiments.

[0058] Similarly it should be appreciated that in the description of illustrative embodiments of the invention, various features of the invention are sometimes grouped together in a single embodiment, figure, or description thereof for the

purpose of streamlining the disclosure and aiding in the understanding of one or more of the various inventive aspects. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the claims following the detailed description

are hereby expressly incorporated into this detailed description, with each claim standing on its own as a separate embodiment of this invention.

[0059] Furthermore, while some embodiments described herein include some but not other features included in other embodiments, combinations of features of different embodiments are meant to be within the scope of the invention, and form different embodiments, as would be understood by those in the art. For example, in the following claims, any of the claimed embodiments can be used in any combination.

[0060] Furthermore, the terms 'first', 'second' and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequence, either temporally, spatially, in ranking or in any other manner. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0061] Moreover, the terms 'top', 'bottom', 'above', 'front' and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other orientations than described or illustrated herein.

[0062] It is to be noticed that the term 'comprising', used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It is thus to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression 'a device comprising means A and B' should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0063] In the description provided herein, numerous specific details are set forth. However, it is understood that embodiments of the invention may be practiced without these specific details. In other instances, well-known methods, structures and techniques have not been shown in detail in order not to obscure an understanding of this description.

[0064] In the present invention, the terms 'boards' and 'flat panels' are used as synonyms.

[0065] In the present invention, the terms 'tube' and 'first, hollow space' are used as synonyms.

[0066] In a first aspect, the present invention provides a wall comprising at least two building components, such as the building component 100 shown in **FIG. 1**. The shown building component 100 comprises four flat panels or boards P1-P4, which are interconnected, and which form a tube, or in other words, which enclose a beam-shaped hollow space R1. Specific to building components 100 for forming walls according to the present invention is the fact that some panels P3, P4 protrude further than the beam-shaped space, which offers very interesting advantages, as will further become apparent.

[0067] The building component 100 shown in **FIG. 1** includes a first pair of parallel panels P1, P2. These panels have a length L1, width B1, thickness T1, and are at a distance d1 from each other. The building component 100 also includes a second pair of parallel panels P3, P4. These panels have a length L2, width B2, thickness T2, and are at a distance d2 from each other. The panels P3, P4 are perpendicular to the panels P1, P2. The thickness T1 can be the same as T2, and the invention will be further explained assuming that T1 = T2, or simply 'T', but this is not necessary for the invention, and embodiments of the present invention are not limited thereto. Furthermore, the panel thickness of the panels P3, P4 can also be equal to those of the panels P1, P2, or different.

[0068] In principle, the building components may have any suitable dimensions, but for the construction, the following dimensions, for example, can be chosen, although the invention is not limited thereto:

The length L1, L2 may be in the range of 0.5 m to 12.0 m, for example, in the range of 0.5 m to 6.0 m, and can, for example, be approximately 50 cm, or approximately 80 cm, or approximately 100 cm, or approximately 280 cm, but other lengths may also be used. The panels or boards P1 to P4 may be, for example, compressed boards, or may be laminated panels or boards, allowing such large lengths to be possible. If the building components are installed in an upright position (such as, for example, for an upright wall), the length L1, L2 will correspond to the height of the wall. This height is dependent on the application, and can, for example, be the height of one or more floors of a building (for example, approximately 2.2 m to 3.0 m per floor). However, the building components for a wall of the present invention may also be mounted horizontally, as a joist or as a floor panel (see **FIG. 19** and **FIG. 20**), or even at an angle (see **FIG. 22**).

[0069] The width B1 may be in the range of 0.2 m to 2.0 m, for example, in the range of 0.35 m to 1.5 m. The width B1 can, for example, be approximately 35 cm, or approximately 45 cm, or approximately 70 cm, or approximately 90

cm, or approximately 120 cm, or approximately 150 cm. When the building components are used for forming an upstanding wall 1500, 1600, which comprises a series of multiple building components 100 (see FIG. 15 and FIG. 16 and FIG. 21), then it is mainly the width B1 that determines the number of building components to achieve a total wall width.

[0070] The width B2 of the panels P3, P4 corresponds to the 'thickness' of such an upstanding wall, including the thickness of the space R2, R3, as shown in FIG. 16.

[0071] Referring back to FIG. 1, according to an aspect of the present invention, the distance d1 is deliberately chosen smaller than the width B2, so that the panels P3, P4 protrude beyond the panels P1, P2. In FIG. 1, the distance the panels P3, P4 project is shown as 'H1' at the top of the figure, and as 'H2' at the bottom of the figure. The distance H1 and H2 may be equal to each other (indicated by the letter 'H'), or may be different, but in embodiments of the present invention, they are both different from zero. Preferably, H1 and H2 are in the range of 2.0 to 20.0 cm, for example, in the range of 5.0 to 15.0 cm. When H1 is equal to H2, it is herein further represented by 'H', and may have a value of, for example, approximately 5 cm, or approximately 8 cm, or approximately 10 cm, or approximately 12 cm, although the invention is not limited thereto, and are also possible.

[0072] FIG. 16 shows some of the advantages offered by the projecting portions of the panels P3, P4. This figure shows a top view of a wall, and illustrates how these projecting portions define the half open spaces R2 and R3, which in this example can be used as a 'cavity wall' (on the outside of a building), and as 'stud wall' (on an inside of a building). The latter can, for example, conveniently be used for applying cabling (for example, electric cables, coaxial cables, telephone cables, etc.) and/or pipes (for example, water pipes), for example, hidden behind a gyproc wall.

[0073] As far as known to the inventors, this advantage is not provided by known building components, and additional spacers need to be fitted and mounted on existing building components in order to achieve this effect.

[0074] In other words, as far as is known, no standard element or standard beam or standard tube is offered in the construction industry, which has been insulated in advance, with which one can form roofs, walls and floors by connecting together the projecting portions of the elements to produce a home or office building or another closed shell of a building, wherein the projecting portions also serve as spacers to which panels or boards can be mounted as a floor or ceiling or inner wall or the like. With existing systems, separate spacers must always be fitted, which takes more work, and they are not integrally formed with the wall.

[0075] FIG. 17 is an enlargement of a portion of FIG. 16, and shows another advantage of the projecting portions U3, U4' of the panels P3, P4', particularly if the panels are made of a material which can be screwed into, such as, for example, wood, particle board, MDF, plywood, OSB, and the like. As shown, the panels P3 of the one building component and P4' of the neighbouring building component are clamped between the L-shaped profiles 11' of the one building component and 11" of the other building component, as a result of which, as it were, a wooden beam with a double panel thickness 2xT is created between the L-profiles 11', 11", which can be easily screwed into, for example, with screws 33, in particular in a transverse direction with respect to the panels P3, P4, without these panels cracking or splintering. As far as known to the inventors, this advantage is not provided by known building components, and it is absolutely not obvious to have the panels P3, P4' protrude for this purpose, because it is a very well-known problem that the panels would crack if a screw 33 would be inserted in a direction parallel with the plane of the panel (perpendicular to the wall). However, this problem is resolved in a surprising manner by means of the connecting elements (for example, the connection profiles 11 shown in FIG. 17, or the connecting beams 14 in FIG. 18), which press the panels P3, P4' against each other, so that the problem of cracking or splintering does not occur. At the same time, the connecting elements ensure a solid connection between the various building components, so that the wall forms one solid whole. Thus, by clamping the panels against each other in this way, three effects are obtained: 1) the neighbouring building components are joined together to form a wall (without gaps), and 2) the projecting panel cannot crack when a screw 33 is inserted laterally (perpendicular to the wall, for example, for the attachment of a gyproc panel), and 3) by interconnecting the connecting elements (for example, wooden beams, or metal profiles), the structure becomes significantly firmer. These are important advantages of preferred embodiments according to the present invention. Although FIG. 17 is shown with L-shaped profiles 11, it will be appreciated that the U-shaped profile 12 and the L-shaped profile 13 with rounding of FIG. 4 can also be used, with the same advantages.

[0076] FIG. 18 shows a variant of FIG. 17, where wooden beams 14 are used as connecting elements 11 instead of L-profiles, for example, with a rectangular or square cross-section. These can also act as spacers, and may be even more convenient to attach a gyproc wall (or the like) against, because the screws 33 then do not need to be inserted between the L-sections (width 2xT, see FIG. 17), but the available width is then increased by twice the thickness D of the wooden beams to 2xT + 2xD (see FIG. 18). If T = 1.0 cm and D = 5.0 cm, then the width of the strip into which the screws 33 are to be inserted is thus increased from 2.0 cm to 12.0 cm. This makes it even easier to insert such screws 33. Also in this case, neighbouring building components can be attached to each other, and drawn against each other by means of, for example, bolts 31 and nuts 32.

[0077] FIG. 2 shows an embodiment of a building component 200 for forming a wall according to the present invention, with the features as described above, but with different relative dimensions, in cross-sectional view, where, moreover, the inner space R1 includes an insulating material (shown shaded). This can be any type of insulation material, for

example, rock wool, or a pre-foamed and cured foam material, cut to appropriate size. Alternatively, natural or organic insulation materials may also be used, such as, for example, straw or hemp. In a particular embodiment, 'compressed straw', for example, in the form of a so-called 'rectangular bale', is used as insulation material. In this case, the dimensions of the panels P1-P4 are preferably selected according to the standard dimensions of such straw bales, for example, approximately 35 cm x 45 cm x 100 cm, or multiples of this, although this is not strictly necessary, because it is of course also possible (although more laborious) to saw a straw bale in two or more parts, and to use, for example, half a straw bale. However, a lot of time can be saved in the assembly if standard sizes are used, so that no sawing needs to be done. Alternatively, it is also possible to apply loose insulation material, for example, uncompressed straw or hemp.

[0078] For the sake of completeness, it should be noted that the advantageous effects of the projecting portions U3, U4 that serve as a spacer for inner wall W2 and/or outer wall W1, and which serve to interconnect neighbouring building components, are also achieved if the building component is not insulated, although good insulation is of course an additional advantage. Non-isolated building components can, for example, conveniently be used for forming a wall for a garage, or for industrial buildings (for example, a warehouse), or the like, while, insulated building components are of course better suited for walls of homes and flats.

[0079] FIG. 3 shows an example of how the panels P1-P4 may be interconnected using connecting means. In this case, the connecting means consist of connecting elements 11, for example, four or more elongated profiles, and fastening elements 21, 22, such as for example, nuts and bolts, screws, nails, staples, etc. In a preferred embodiment, four L-profiles are used, which extend along substantially the entire length of the panels, although this is not strictly necessary, and several shorter L-profiles can also be used (although one long profile is of course stronger, and therefore preferable). The L-profiles have 'wings' at an angle of 90°, which are preferably the same width as the dimension 'H' by which the panels protrude, for example, an L-profile with two wings of, for example, 30 mm, or, for example, two times 40 mm, or two times 50 mm. The L-profile is preferably made of a metal, or metal alloy, for example, steel or an aluminium alloy. The metal profiles can be pre-drilled or pre-punched. In the example of FIG. 3, corresponding holes were drilled through the panels (for example, wooden boards), and the openings in the panels were countersunk for receiving a bolt or screw with conical head (although this is not strictly necessary). The bolt 21 can be fastened by means of a nut 22, with or without a washer (not shown), or in any other suitable manner. Alternatively or additionally, the profile elements can also be connected to one or two panels by means of glue.

[0080] In the example of FIG. 3, L-profiles are used as connecting elements, but other connecting elements can also be used, such as, for example, the connection profiles 11-13 and/or the wooden beams 14 shown in FIG. 4 (exploded view), or combinations of two or more of these connecting elements. In the example of FIG. 4, four different profiles are shown in one figure for illustrative reasons, namely: a U-profile 12, an L-profile with an acute angle 11 (on the outside), an L-profile with rounded corner 13 (for example, obtained by pleating a metal strip), and a wooden or plastic beam 14 with a square or rectangular cross-section. In practice, preferably only one type of connecting element will be used for each building component, for example, four L-profiles 11 or 13, or four bars 14 with a square or rectangular cross-section, and not a mix. Other fasteners 21, 22 than a bolt with nut are also possible. For example, the profiles of FIG. 3 and FIG. 4 can also be fixed with screws (for example, so-called wood screws), such as, for example, schematically represented in FIG. 5(a).

[0081] In preferred embodiments of the present invention, the distance d2 between the third and fourth panel P3, P4, which are the panels with the projecting portions U3, U4, is greater than the distance d1 between the first and second panel P1, P2, for example, at least by a factor of 1.2 times greater, or at least a factor of 1.5 greater, or at least a factor of 2.0 greater, or at least a factor of 3.0 greater, or, for example, at least greater by a factor of 4.0, or even at least a factor of 5.0. The reason for this is that, when such a building component is used as a wall element (see FIG. 15 and FIG. 16), the direction in which the projecting portions U3, U4 extend is the direction which is perpendicular to the 'thickness' of the building component used as a wall panel, wherein the width of the wall panel is preferably much larger than its 'thickness' (thus, preferably, B1 is greater than B2, and d2 is greater than d1).

[0082] In the example of FIG. 3 and FIG. 4, the connecting elements 11-14 are all located on the outside of the tube or hollow space R1, although this is not strictly necessary, and one or more of the connecting elements may be located on the inside of the tube. Although not shown, it is also possible to provide connecting elements at particular or all edges, both inside the tube and outside the tube.

[0083] FIG. 5(a) to FIG. 5(i) show some examples of how four panels or boards P1-P4 can be interconnected to form a building component.

[0084] FIG. 5(a) and FIG. 5(b) show a first example, wherein initially in each case one beam 14 is attached to each panel, after which the panels are attached to each other for forming a building component which comprises a tube with projecting portions. It is noted that after assembly, some of these beams 14 are located on the inside of the tube, rendering a connection with bolt and nut difficult, if not impossible, at least for some of the edges. For a connecting element located inside the tube, such as, for example, the beam 14 with a square cross-section, a screw, for example, may then be used, whether or not countersunk, which can be inserted through the panel (as shown). When such building components are attached to each other (as shown in FIG. 15), some projecting portions U3a, U4b, will of course not be clamped between

the two fastening elements (for example, two fastening profiles 11 as shown in FIG. 3, or two beams 14 as shown in FIG. 18), but that need not be a problem, since the beam provides sufficient space for receiving a screw 33, even if one of the two wooden beams 14 would be located on the inside of the tube.

[0085] FIG. 5(c) and FIG. 5(d) show a second example, wherein all beams 14 (but that also applies to profiles) are located outside the tube R1. In this case, for example, nuts and bolts can be used, or screws, or both. Two such building components can, for example, be attached to each other in the manner as shown in FIG. 18. An advantage of such an embodiment is, for example, that the space suitable for receiving screws 33 for the attachment of, for example, a gyproc wall, is not limited to two times the panel thickness T, but is widened to $2xT + 2xD$, wherein T is the thickness of the panels, and D is the thickness of the wooden beam 14. The advantages that in this way the panels P1-P4 of one building component can be interconnected easily without additional profiles or brackets or the like, and that two adjoining building components can be drawn against each other through these profiles (for example, by means of a bolt 31 and nut 32) also continue to exist.

[0086] FIG. 5(e) and FIG. 5(f) show the example of FIG. 3 with four L-profiles, which are located on the outside of the tube.

[0087] FIG. 5(g) and FIG. 5(h) show an example in which all connecting elements are located in the tube R1. Instead of square wooden beams 14, wooden beams with a triangular cross-section can also be used, for example, with an angle of 90° and two angles of 45° (not shown).

[0088] FIG. 5(i) shows an example of a building component wherein the panels P1-P4 are interconnected without the above-mentioned L- or U-profiles or beams, but by means of a slot 16 recessed in P3 and P4, the panels P1 and P2 being inserted into the slot, and the panels being attached to each other by gluing, the adhesive preferably being introduced into the slot, in a known manner. A thicker thickness of the panels P3 and P4 can here be chosen than the thickness of the panels P1 and P2, for example, two times as thick, although this is not strictly necessary. The embodiment of FIG. 5(i) has an advantage that it is easier and quicker to produce, but has the disadvantage that it can fold closed easily. However, when this tube is filled with a suitable insulation material, for example, with a compressed bale of straw, the risk of collapsing is greatly reduced or even practically non-existent. The risk of collapsing is also drastically reduced when a fifth and sixth panel P5, P6 are applied to the ends, as will be further discussed by means of FIG. 10 to FIG. 13. This is actually true for all embodiments of FIG. 5. To connect two building components according to FIG. 5(i) for the construction of a wall, one can either directly introduce nuts and bolts (with washer) into the projecting portions U3, U4, or one can, which is preferable, add profiles, such as flat profiles or L-profiles or beam-shaped profiles, in order to clamp neighbouring projecting portions against each other.

[0089] Although not explicitly shown, it is also possible in a particular embodiment, to provide both the slot of FIG. 5(i), as well as four connecting elements, such as FIG. 5(a) to FIG. 5(h), which basically results in the panels of the embodiments of FIG. 5(a) to FIG. 5(h) not simply being placed against each other, but connected both with a slot as well as with connecting means.

[0090] Embodiments such as FIG. 5(d) and FIG. 5(f), wherein all connecting elements 11 are located on the outside of the tube, or to a lesser extent, such as FIG. 5(b), wherein some connecting elements 11 are located on the outside of the tube, are preferable, because they 1) allow two building components to be connected through the connecting elements, so that 'the projecting portion' U3, U4 is clamped between the connecting elements, 2) the connecting elements do not constitute an additional hindrance for the insulating material (if present as a solid whole, such as for example, a straw bale).

[0091] FIG. 6 and FIG. 7 show another embodiment of a building component according to the present invention. This building component comprises four panels P1, P2, P3, P4, which define a beam-shaped tube.

[0092] Two of these four panels P3, P4 are flat panels, for example, made of wood or fibreboard, or plastic, or MDF, or plywood, or OSB or the like. These panels have dimensions such that they project beyond the tube, having projecting portions U3 and U4. By not using a metal plate for the panels P3, P4, thermal bridges are avoided, when these panels are used for forming a wall.

[0093] The two other panels P1, P2 are preferably pleated metal plates, for example, cold-rolled steel sheets with a thickness in the range of 0.3 mm to 3.0 mm, preferably in the range of 0.5 mm to 2.5 mm, for example, a thickness of 0.5 mm or 1.0 mm or 1.5 mm or 2.0 mm. The panels P1, P2 of FIG. 7 are pleated over four edges at an angle of 90° , in such a way that they have a first flat portion S1a that closes the tube, a second flat portion S1b that adjoins against panel P3, a third flat portion S1c that adjoins against panel P4, and two flat flaps S1d, S1e having a width W, which are parallel to the first flat portion S1a. These flaps S1d, S1e can be advantageously used for the attachment of, for example, an exterior facade or a gyproc wall, for example, by stapling into it, or by shooting a screw or pin or the like into the flap, or by drilling and/or by making use of a self-drilling and self-tapping screw. Or in other words, the metal plates P1, P2 can on both sides (left and right in the figure) have U shape, which extends over the entire length of the plate (in the depth direction of FIG. 7).

[0094] These flat portions S1a, S1b, S1c, S1d, S1e are shown separately in the dashed oval, for illustrative purposes only.

[0095] Such a building component 600 can, for example, be formed by cutting and pleating the metal plate in advance, then positioning the four panels P1, P2, P3, P4 relative to each other to form a hollow tube, if desired, temporarily and/or partially sealing one or both ends of the tube, bringing raw materials into the tube (in a known manner), and allowing them to foam. Instead of cutting and pleating the metal plate in advance, it could also be unrolled from a roll, and pleated on the spot. By allowing the foam to foam in the tube, the insulating material will adhere well, for example, stick to the four panels. Preferably, the foam material will be polyurethane (PUR) or polyisocyanurate (PIR), but other foam insulation materials can also be used. By letting the foam insulation material foam in the tube, it will adhere very well against the walls, contributing significantly to the structural strength of the construction panel, in spite of the relatively thin metal plates. Of course, the insulation material also ensures a high thermal and acoustic insulation.

[0096] As described above, two or more of such building components 600 can be placed next to each other, and connected to each other by making use of connecting means, for example, bolts 31 and nuts 32, for example, in a similar way as shown in FIG. 15 to FIG. 17.

[0097] FIG. 8 and FIG. 9 show a variant of the building component of FIG. 6 and FIG. 7, the metal plates P1, P2 each having only two edges, and a U-shaped cross-section. Comparison of FIG. 9 with FIG. 7 shows that the metal plates of the building component 800 have no 'flaps' S1d, S1e, parallel to the first wall portion S1a. Multiple building components 800 can be connected to each other in the same or similar manner as shown in FIG. 17, and the projecting portions U3, U4 can still be used as a spacer, and screws 33 can still be inserted into (for example, wooden) panels P3, P4 in a transverse direction (as shown in FIG. 17).

[0098] FIG. 10 shows an exploded view of a building component 1000 according to the present invention, the building component further comprising a fifth and sixth board or panel P5, P6 for closing the tube (in the front and rear in the figure). By closing the tube, air flow can be prevented, and heat transfer by convection restricted, and the insulation material contained, and shielded from environmental influences (for example, rain). As already mentioned above, this fifth and sixth panel P5, P6 may, however, also significantly increase the structural strength of the building component, in particular by reducing the risk of collapsing. These effects (the reduction of air flow and reduction of the risk of collapsing) can be further strengthened by the addition of one or more intermediate panels P7 as shown in FIG. 14. This is especially advantageous when the length L1 of the panels P1-P4 becomes large, for example, greater than 2.0 m, or, for example, greater than 3.0 m. Of course, several such partitions P7 can be applied. These partitions P7 may also be secured with L-profiles 11" screwed against one or more of the panels P1-P4, although this is not strictly necessary. For example, if the tube is insulated with bales of straw or another solid insulation material, the partition P7 can be applied between such straw bales without attachment, and further reduce the risk of deformation (for example, collapsing) of the building component.

[0099] FIG. 11, FIG. 12 and FIG. 13 show three variants of how the building element of FIG. 10 can be closed (in these figures, only P5 is shown). In FIG. 11, the fifth panel P5 has dimensions: $(B1+2T) \times B2$ (wherein T represents the thickness of the panels). The panel P5 can be attached in a similar manner (for example, with L- or U-profiles or with wooden beams) to the other panels P1-P4 (see, for example, P5 of Figure 14, which has a frame of L-profiles, attached to the edge thereof). In FIG. 12, the panel P5 has dimensions: $B1 \times B2$. In FIG. 13, the panel P5 has dimensions: $d1 \times B1$, where $d1 = B2 - 2 \times T - 2 \times H$. However, other embodiments than the ones shown are also possible. For the same dimensions of the panels P1 to P4, the embodiment of Fig. 13 is generally the strongest, then that of Fig. 12, followed by that of Fig. 11.

[0100] In each of the examples of FIG. 11 to FIG. 13, the sixth panel P6 can be attached in a similar way as P5, although this is not strictly necessary. Thus, the dimensions of P5 and P6 need not be the same, and, for example, the technique of FIG. 12 can be applied with P5, and, for example, the technique of FIG. 13 can be applied with P6. Or, for example, the technique of FIG. 13 can be applied with both P5 and P6.

[0101] This last example is also illustrated in FIG. 14. A possible method in which such a building element can be made is as follows: for example, by connecting P2, P3 and P4 in a tub shape (as shown) as a first intermediate product; by providing P5 and P6 with four L-profiles (for example, mitre-sawed, that is, less than 45°), as a second intermediate product; by applying two profiles on P1 as a third intermediate product; by then attaching the panels P5 and P6 to the tub formed by P2, P3, P4; by then (albeit optionally) applying an insulation material in the tub; and finally attaching the panel P1 on the tub. It will be understood that the same method can be applied if other profiles, or beams 14, are used instead of L-profiles.

[0102] FIG. 15 shows, in top view, an example of how two building elements 100 can be connected to form a wall 1500 of a building, although building elements 600 or 800 with pleated metal plates and filled with PUR can of course also be used, or a combination of building components with four wooden boards on the one hand, and building components with metal plates and PUR on the other hand. As shown, two building elements according to the present invention, with the same width B2 (= thickness of the wall 1500), but possibly a different width B1 and possibly a different length L1, L2, are placed next to and against each other, and interconnected, for example, by means of bolts 31 and nuts 32 that extend through two connecting elements (here: L-profiles 11' and 11") and through the projecting portions U3, U4 of adjoining panels P3, P4' (see FIG 16 and FIG. 17 and FIG. 18 for more details).

[0103] In particular embodiments, the ratio of the width B1 to the width B2 is a number greater than 1.0, for example, greater than 1.2, for example, greater than 1.5, for example, at least 2.0, or at least 3.0, or at least 4.0 or at least 5.0. In an example, the width B2 is approximately equal to 40 cm and the width B1 is approximately equal to 80 cm (a factor of 2), or approximately equal to 100 cm (a factor of 2.5) or approximately equal to 120 cm (a factor of 3). Such building components are particularly suitable for forming load-bearing walls, which can be attached against each other, and against which an inner wall (for example, gyproc boards) or an outer wall (for example, a facade wall) can subsequently be attached, for example, by screwing them onto the 'projecting portions' and/or onto the connecting elements.

[0104] Referring to **FIG. 17** and **FIG. 18**, when the bolts 31 and nuts 32 are tightened, the panels P3 and P4' are drawn towards one another, and drawn against each other, and thus the 11' and 11" are pressed together between the connection profiles. It will be understood that in the event of building elements with pleated metal profiles (as shown in **FIG. 6** to **FIG. 9**), the segments S1b and S1c will perform the same function when a screw is introduced through these segments. In this way, it is achieved that: 1) two neighbouring building components are firmly connected to each other, in a way that permits no (or no significant amount of) air flow between the building elements or through the building elements, and 2) the protruding portions U3, U4 are perpendicular to the wall, are thereby naturally securely attached, and can themselves act as a spacer to mount, for example, a finishing plate, for example, a gyproc board, against, and 3) if the material of the panels, is, for example, wood or particle board or MDF or the like, screws 33 can also be introduced into the projecting portion U3, U4, without this cracking or splintering, because the projecting portions are clamped between the connecting elements, for example, the profiles 11' and 11" or the segments S1b and S1c. If a higher airtightness is desired, optionally, a sealing agent or a sealant such as, for example, silicone or the well-known 'TEC7' or some other 'mastic' or resin can be used. There are several products on the market that are suitable for this purpose, for example, on the basis of acrylic or PU (polyurethane).

[0105] **FIG. 16** shows how against this wall 1600, by way of example, on the one hand, a facade W1 can be attached, separated by a space R2 with air (functioning as cavity wall), and on the other hand, an inner wall W2 of, for example, 'gyproc', also separated by a space R3 with air. This space R3 can moreover act as 'stud wall', into which pipes or cables or the like can be introduced.

[0106] **FIG. 17** shows a possible connection between the various building components in more detail. Note that instead of the screws 23, nuts and bolts may be used as shown in **FIG. 3**.

[0107] On the basis of **FIG. 16**, it is also to be understood that the wall 1600 according to the present invention does not contain 'thermal bridges, because there is no metal which extends from wall W1 to wall W2. In the case of P5 and P6, and optionally P7 according to **FIG. 14**, a L-profile is indeed present, which extends in a direction perpendicular to the wall, but heat losses through such profiles can be avoided by using wood or plastic profiles for these profiles (which are perpendicular to the wall), instead of metal, for example, L-shaped fibre-reinforced plastic profiles. Of course, fibre-reinforced plastic profiles can also be used for the connecting elements 11 of **FIG. 3**, if desired.

[0108] **FIG. 19** and **FIG. 20** show that two building components 1901, 1902 according to the present invention cannot only be mounted next to each other (parallel to each other), but can also be mounted transversely with respect to each other. **FIG. 19** is a side view of an upright 1901 (for example, vertical) and a lying 1902 (for example, horizontal) building component. In a similar manner as shown in **FIG. 15** and **FIG. 13**, a plurality of such upright building components can be arranged next to each other and attached to each other to form an upstanding wall, and the lying building components 1902 may also be arranged next to each other and interconnected to form a floor panel. The interconnection can be done in a similar manner as described above (see **FIG. 17** and **FIG. 18**), as shown schematically in **FIG. 20** (left).

[0109] **FIG. 20** shows an example in perspective view of how the two mutually perpendicular building components of **FIG. 19** can be connected. As shown, both building components 2001, 2002 can be insulated. Of course, additional reinforcements may still be provided (if necessary) in order to connect these components 2001, 2002, in any suitable manner known to the skilled person.

[0110] On the basis of **FIG. 19** and **FIG. 20**, it is also to be understood that building components according to the present invention exhibit a very high mechanical strength, even when relatively thin panels are used (for example, wooden boards with a thickness in the range of 8 mm to 15 mm). A person skilled in the art will immediately recognise the double L-shape, and it is generally known that a single L-shape has a large bending moment, which in the structure of the building component as described herein, translates to a large extent to tensile forces and compressive forces in the connecting elements, in particular the connection profiles and/or the beams. If the space in the tube is also filled with a solid, for example, hard to compress or non-compressible material, for example, straw bales, or cured insulation boards, the chance of buckling of the mutually perpendicular panels, i.e., the collapsing of the tube, is greatly reduced. Of course, the connecting elements, for example, connection profiles 11-13 or connecting beams 14, also help to prevent such buckling. In the case of L-profiles, in particular a larger width and/or thickness of the 'wings' can be chosen in order to reduce this risk.

[0111] **FIG. 21** shows an example of a wall 2100 according to the present invention, formed by multiple building components placed next to each other according to the present invention. The shown wall 2100 includes building components of three different lengths: X, Y, Z. It is an advantage that the wall 2100 can be easily assembled on site, with very simple

tools (see for example, FIG 17: in principle, two open-end spanners or ring spanners or the like suffice to apply and fasten the nuts and bolts). Indeed, the holes can already be pre-drilled or punched in the connecting elements (for example, profiles or beams) and through the projecting portions (for example, wooden boards), or in the case of building components with pleated metal plates, through the segments S1b, S1c. Of course, it is also possible that some of the building components are already attached to each other in the factory, and that a complete wall is transported to the place of destination. As shown in the example of FIG. 21, a window or a door opening or any other opening (for example, for a roof window) may be formed easily by omitting a number of building components, and/or using shorter building components. It will be understood that constructing such a wall will not require highly skilled personnel, nor will big investments be needed in terms of tools. This also makes the building components as described above very suitable for DIY'ers

[0112] FIG.22 shows a cross-sectional view of a building 2200, wherein building components 2201, 2202, 2203 are used, as upright building components 2201, as horizontal building components 2202 (for example, as floor component), and as inclined building components 2203 (for example, roof elements). Obviously, this is just an example, and buildings with multiple floors, or only one single floor, can be built with building components according to the present invention.

[0113] As mentioned above, the wall as described is also especially suited for forming a lying floor or for forming a ceiling, or for forming an inclined roof wall. In the case of a floor, preferably floor elements (for example, laminated boards) are attached to the projecting portions at the top of the wall, for example, by screws or nails. At the bottom, a suitable ceiling covering or attic covering, can be attached, for example, ceiling boards or gyproc.

[0114] The foregoing description details certain embodiments of the invention. It will be appreciated, however, that no matter how detailed the foregoing appears in text, the invention may be practised in many ways. It should be noted that the use of particular terminology when describing certain features or aspects of the invention should not be taken to imply that the terminology is being re-defined herein to be restricted to include any specific features or aspects of the invention with which that terminology is associated.

REFERENCES:

100, 200, 300, 600, 800, 1000, 1100, 1200, 1300,	building component
1400	
1500, 1600, 2100	wall
2200	building
P1, P2, P3, P4	first, second, third, fourth panel
U3, U4	projecting portion of third, fourth panel
P5, P6	fifth, sixth panel
P7	intermediate panel (optional)
d1, d2	first, second distance
L1, L2	first, second length
B1, B2	first, second width
H1, H2	first, second height
W1, W2	first, second wall
11-14	connecting elements
11, 12, 13	connection profiles
14	connecting beams, herein also referred to as 'wooden beams'
16	recess, for example, slot
21	bolt (for example, with countersunk head)
22	nut
23	screw
31	bolt
32	nut
33	screw

Claims

1. A wall (1500, 1600, 2100) comprising at least a first and a second building component (100; 600; 800), the first and a second building component being a prefabricated building component comprising the following:

- a first pair of flat panels (P1, P2) comprising a first panel (P1) and a second panel (P2), each having a first length (L1) and a first width (B1), arranged at a first distance (d1) from each other and parallel with each other;
- a second pair of flat panels (P3, P4) comprising a third panel (P3) and a fourth panel (P4), each having a second length (L2) and a second width (B2), arranged at a second distance (d2) from each other and parallel with each other;
- the panels (P1, P2) of the first pair being perpendicular to the panels (P3, P4) of the second pair to form a first, hollow space (R1);
- the four panels (P1, P2, P3, P4) being interconnected by means of connection elements (11-14);
- and the four panels (P1, P2, P3, P4) being positioned with respect to each other such that the third and fourth panel (P3, P4) each have a first projecting portion (U3, U4) that projects beyond the first panel (P1) by a first distance (H1) and each have a second projecting portion (U3', U4') that projects past the second panel (P2) by a second distance (H2);

the first and second building component (100; 600; 800) being placed against each other in such a way that the first panel (P1) of the first building component is located in the same plane as the first panel (P1) of the second building component; and wherein the first and second building component (100; 600; 800) are interconnected by means of fasteners (31, 32) which extend through the connection elements (11-14) and through corresponding projecting portions of the fourth panel (P4) of the first building component, and the third panel (P3) of the second building component.

2. A wall according to claim 1, wherein a ratio of the first width (B1) and the second width (B2) is at least 1.0, or at least 1.25 or at least 1.50 or at least 2.0.
3. A wall according to any of the preceding claims, the first and second building component further comprising an insulation material, applied in the first hollow space (R1).
4. A wall according to claim 3, the insulation material being selected from the group consisting of:
straw, glass wool, rock wool, a pre-foamed plastic material, or other insulation materials.
5. A wall according to any of the preceding claims, the first and the second building component further comprising a fifth and a sixth panel (P5, P6) for closing of the first, hollow space (R1), the fifth and sixth panel (P5, P6) being positioned perpendicular to the first, second, third and fourth panels (P1-P4).
6. A wall according to any of the preceding claims, wherein at least the third and fourth panel (P3, P4) of the first and the second building component are made of a material selected from the group consisting of: wood, fibreboard, plastic, MDF, composite material, plywood and OSB, or combinations thereof.
7. A wall according to any of the preceding claims, wherein the connecting elements of each building component are located outside of the first, hollow space (R1) of the relevant building component.
8. A wall according to any of the preceding claims,
* wherein the connection elements (14) are wooden beams with a rectangular or square cross-section; or
* wherein the connecting elements (11) are L-shaped profiles, made of a metal or a metal alloy.
9. A wall according to any of the preceding claims, wherein the fastening means (21-23) are selected from the group consisting of: nails, staples, bolts (21), nuts (22), screws (23), and glue.
10. A wall according to any of the preceding claims, further comprising an inner wall and/or an outer wall, such as, for example, a gyproc wall or a facade wall and/or floorboards and/or ceiling panels and/or roof panels, which are attached to the projecting portions (U3', U4') and/or to the connecting elements (11-14) of the building components by means of nails or screws or staples or by means of glue or other attachment means.
11. A wall (2100) for a building, the wall further comprising at least one door opening or at least one window opening.

12. A building (2200) comprising at least one wall according to any of the preceding claims.

13. A building (2200) according to claim 12,
comprising at least a first wall according to any of claims 1 to 11, which is vertically positioned; and comprising at
least a second wall according to any of claims 1 to 11, which is in a lying or inclined position.

14. A method of assembling a wall of a building, comprising the following steps:

a) providing a first and a second prefabricated building component comprising the following:

- a first pair of flat panels (P1, P2) comprising a first panel (P1) and a second panel (P2), each having a first length (L1) and a first width (B1), arranged at a first distance (d1) from each other and parallel with each other;
- a second pair of flat panels (P3, P4) comprising a third panel (P3) and a fourth panel (P4), each having a second length (L2) and a second width (B2), which are at a second distance (d2) from each other and parallel with each other;
- the panels (P1, P2) of the first pair being perpendicular to the panels of the second pair (P3, P4) to form a first, hollow space (R1);
- the four panels (P1, P2, P3, P4) being interconnected by means of connection elements (11-14);
- and the four panels (P1, P2, P3, P4) being positioned with respect to each other such that the third and fourth panel (P3, P4) each have a first projecting portion (U3, U4) that projects beyond the first panel (P1) by a first distance (H1) and each have a second projecting portion (U3', U4') that projects past the second panel (P2) by a second distance (H2);

b) the placing against each other of the first and second building component, in such a way that the first panel (P1) of the first building component is located in the same plane as the first panel (P1) of the second building component;

c) connecting the first and second building component by means of fasteners (31, 32) which extend through the connecting elements (11-14) and through corresponding projecting portions of the fourth panel (P4) of the first building component, and the third panel (P3) of the second building component.

15. A method according to claim 14, further comprising the following steps:

d) providing a plurality of wall panels;

e) attaching the wall panels by means of screws inserted into the projecting portions (U3', U4'), and/or the connecting elements (11-14) of the building components.

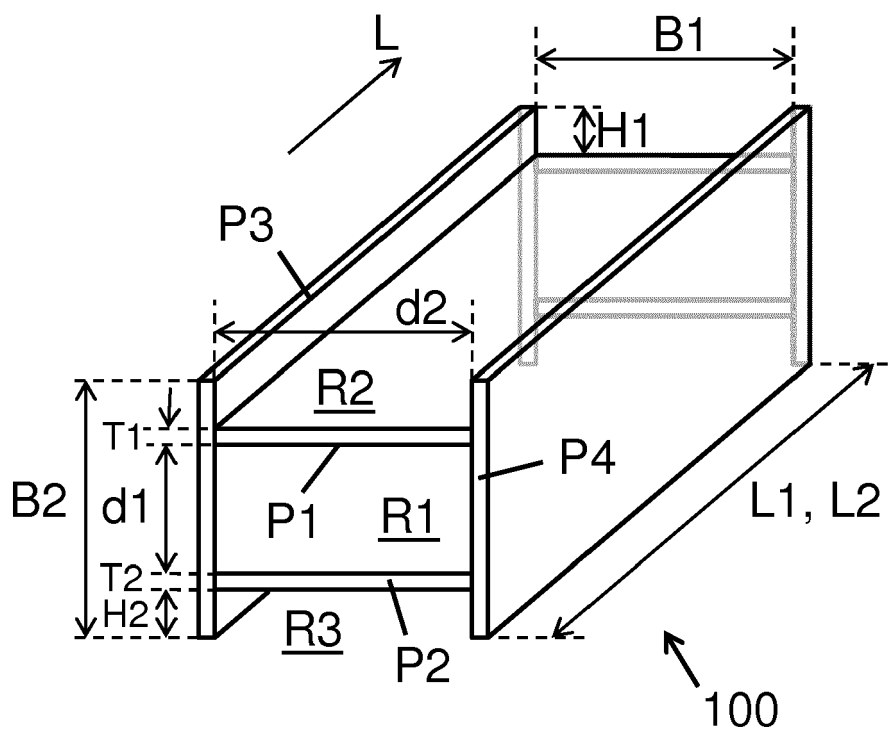


FIG 1

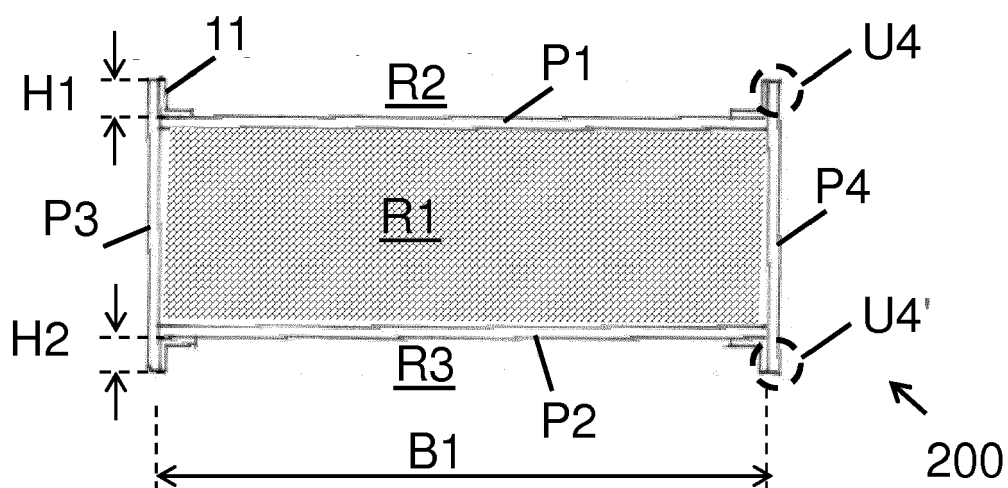
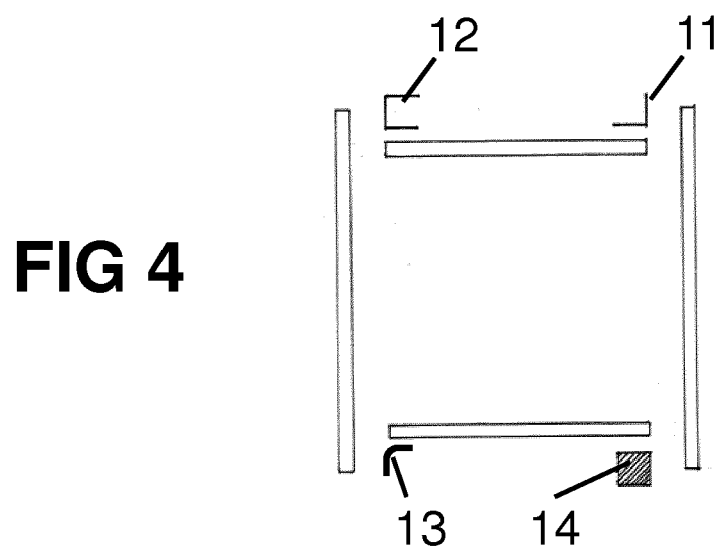
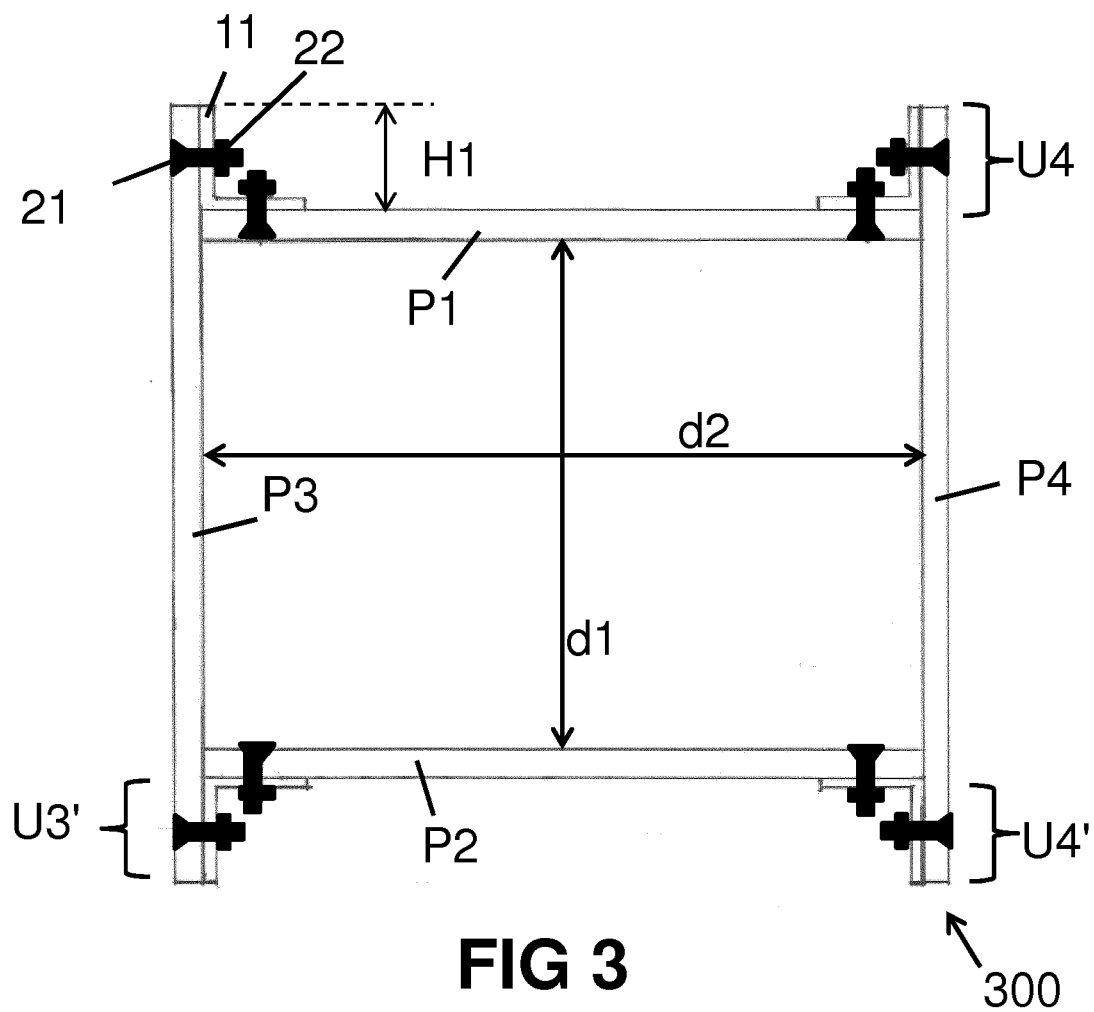
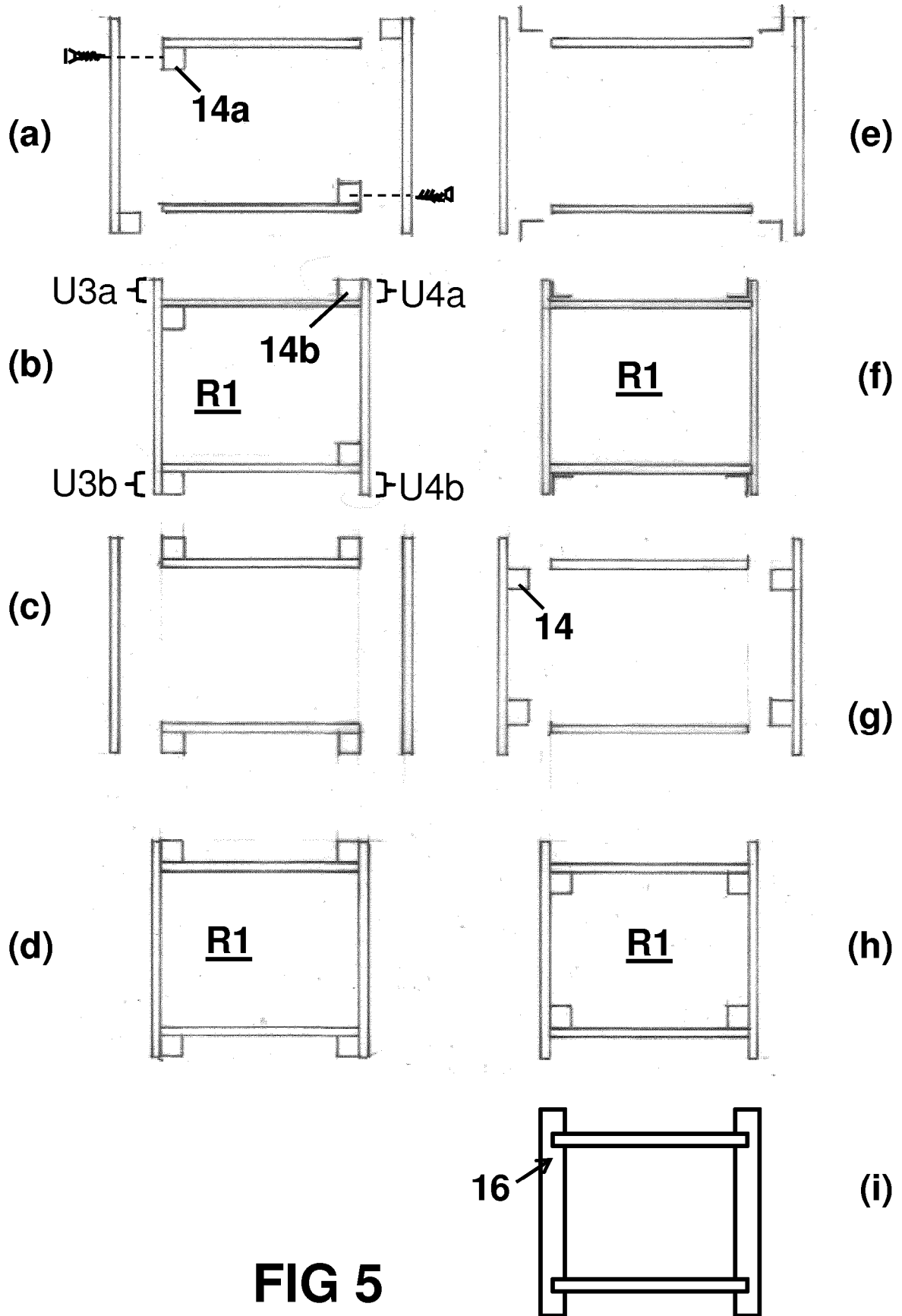


FIG 2





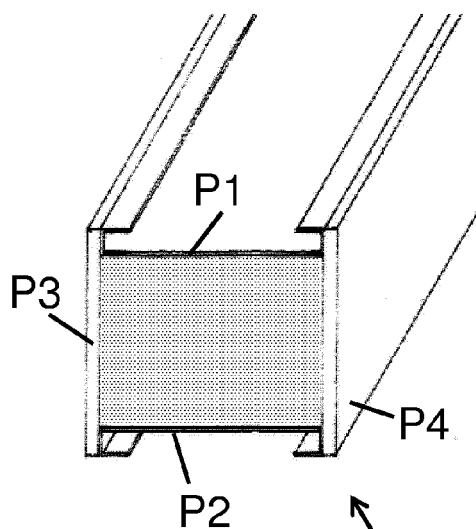


FIG 6

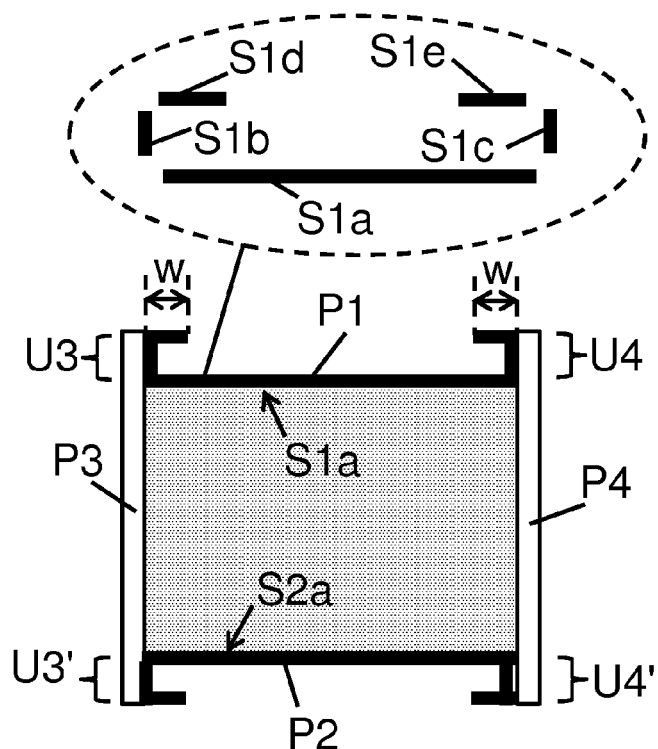


FIG 7

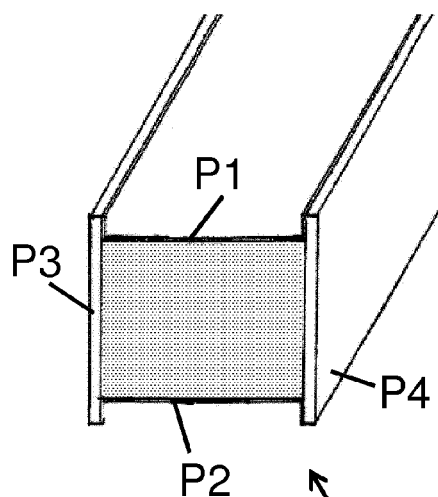


FIG 8

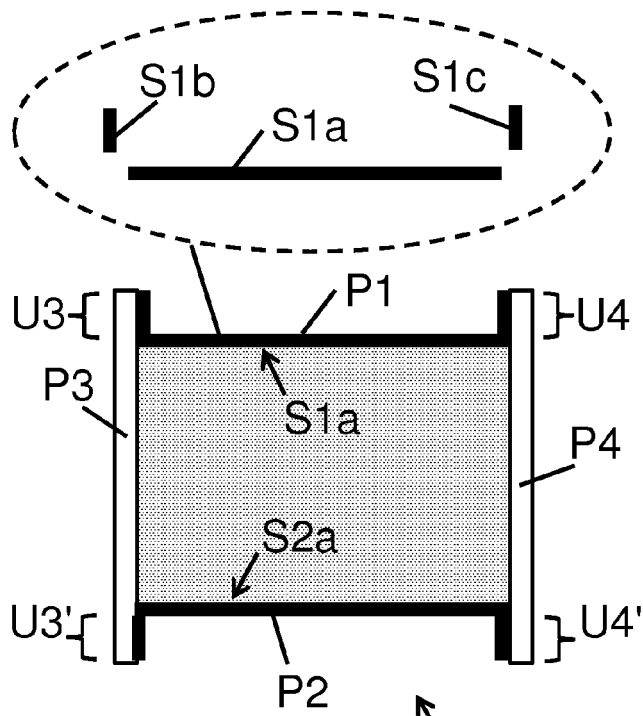
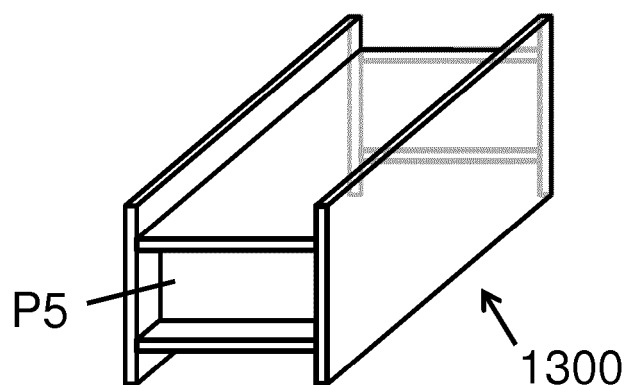
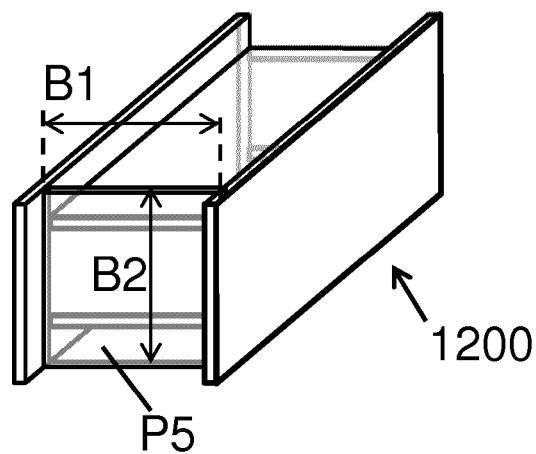
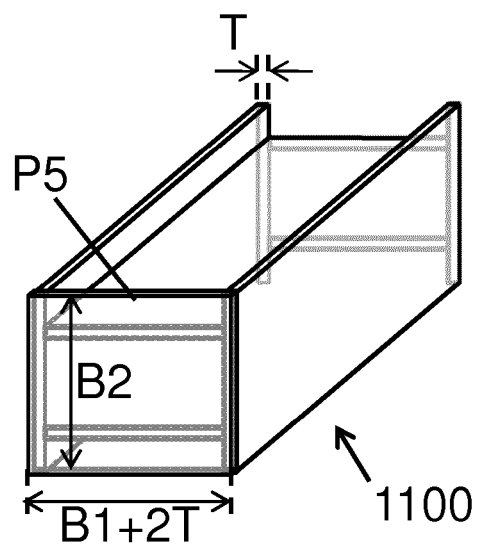
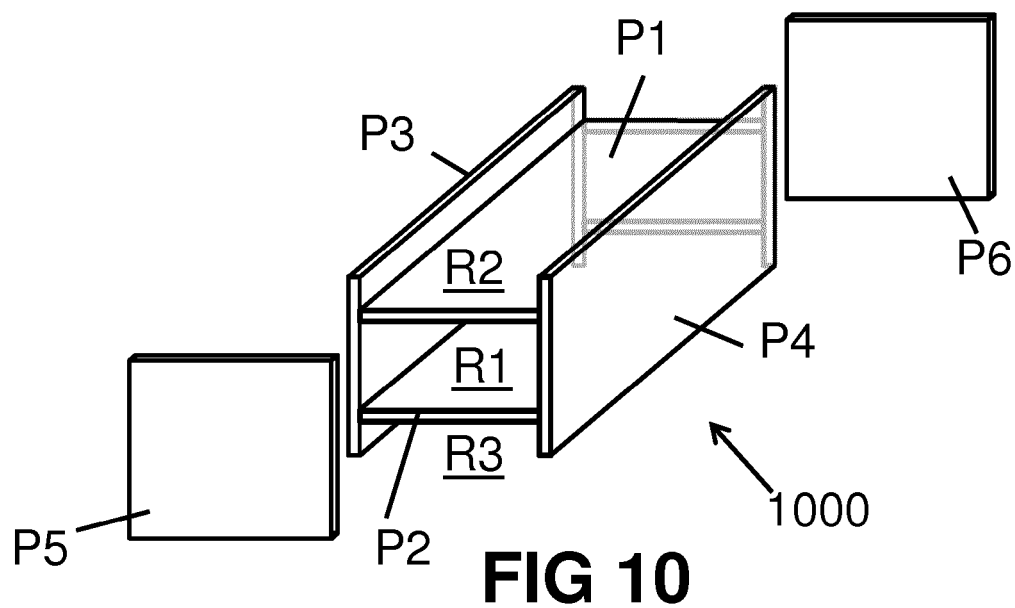


FIG 9



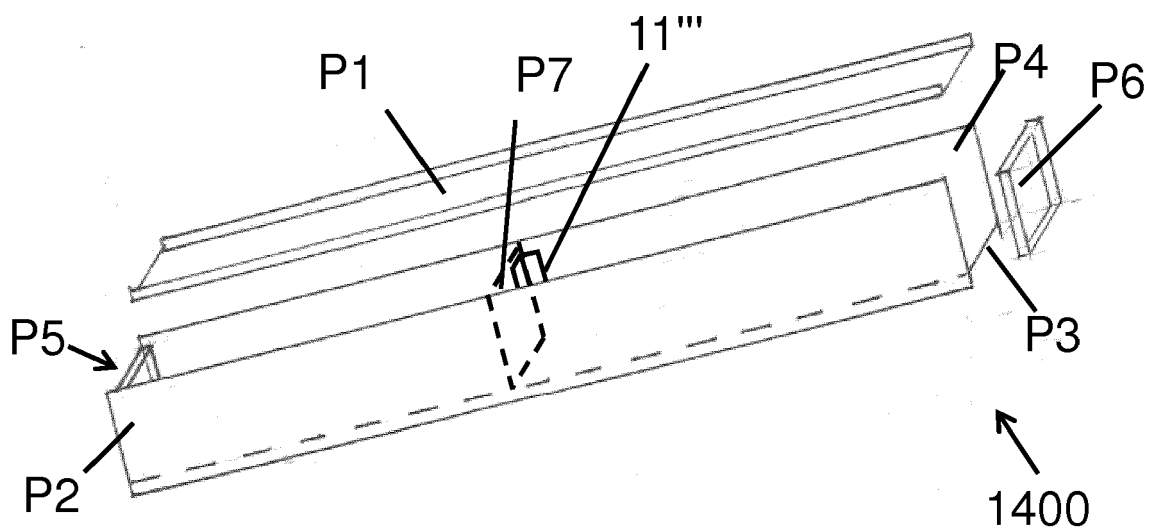


FIG 14

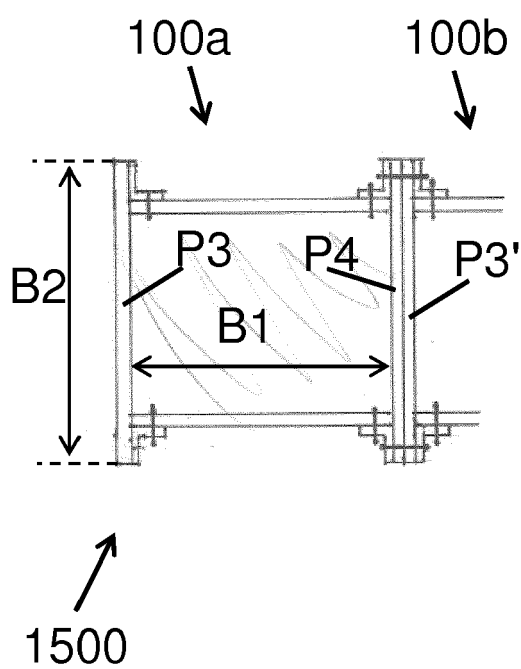


FIG 15

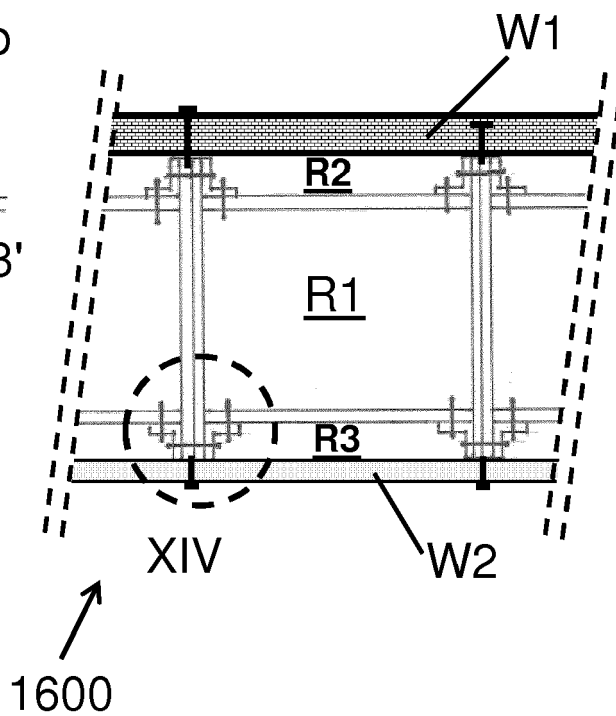


FIG 16

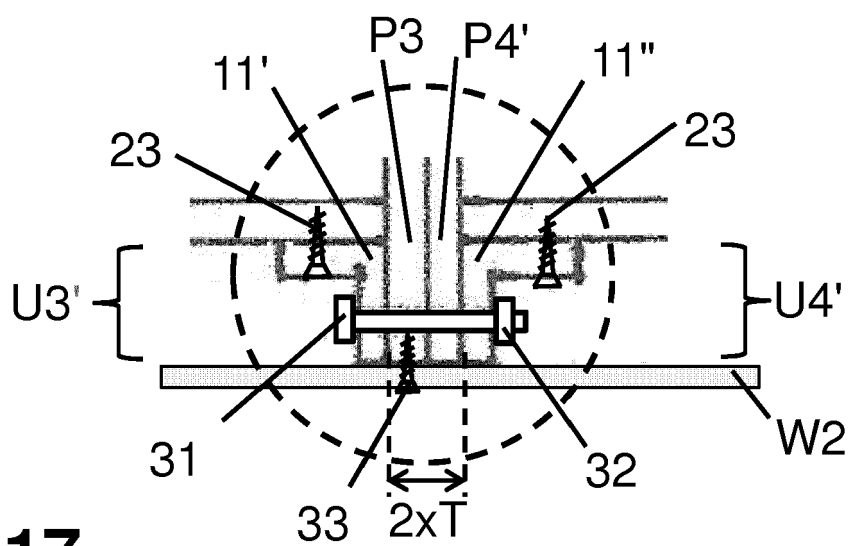


FIG 17

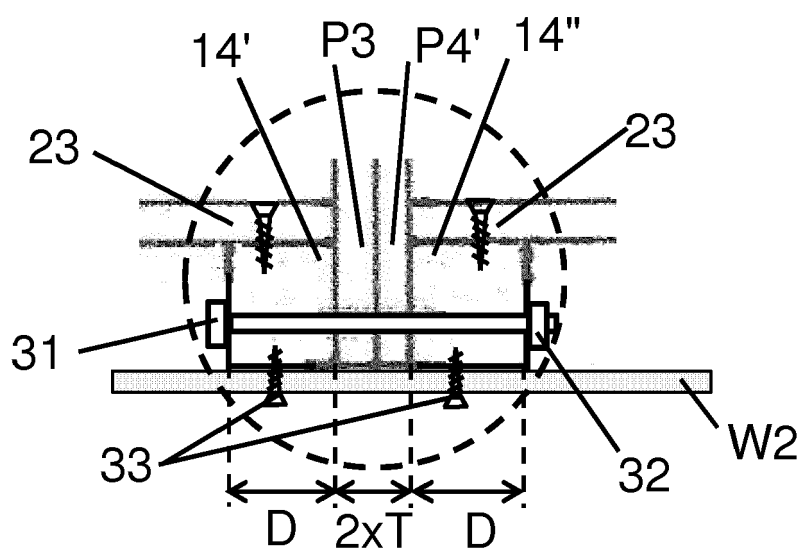


FIG 18

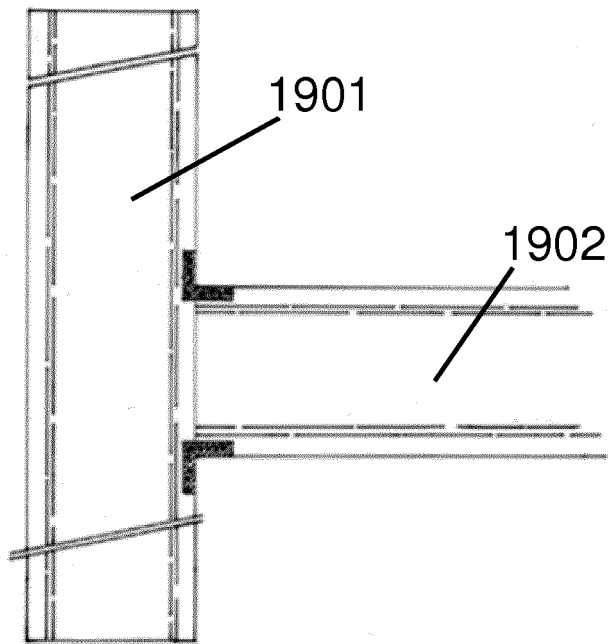


FIG 19

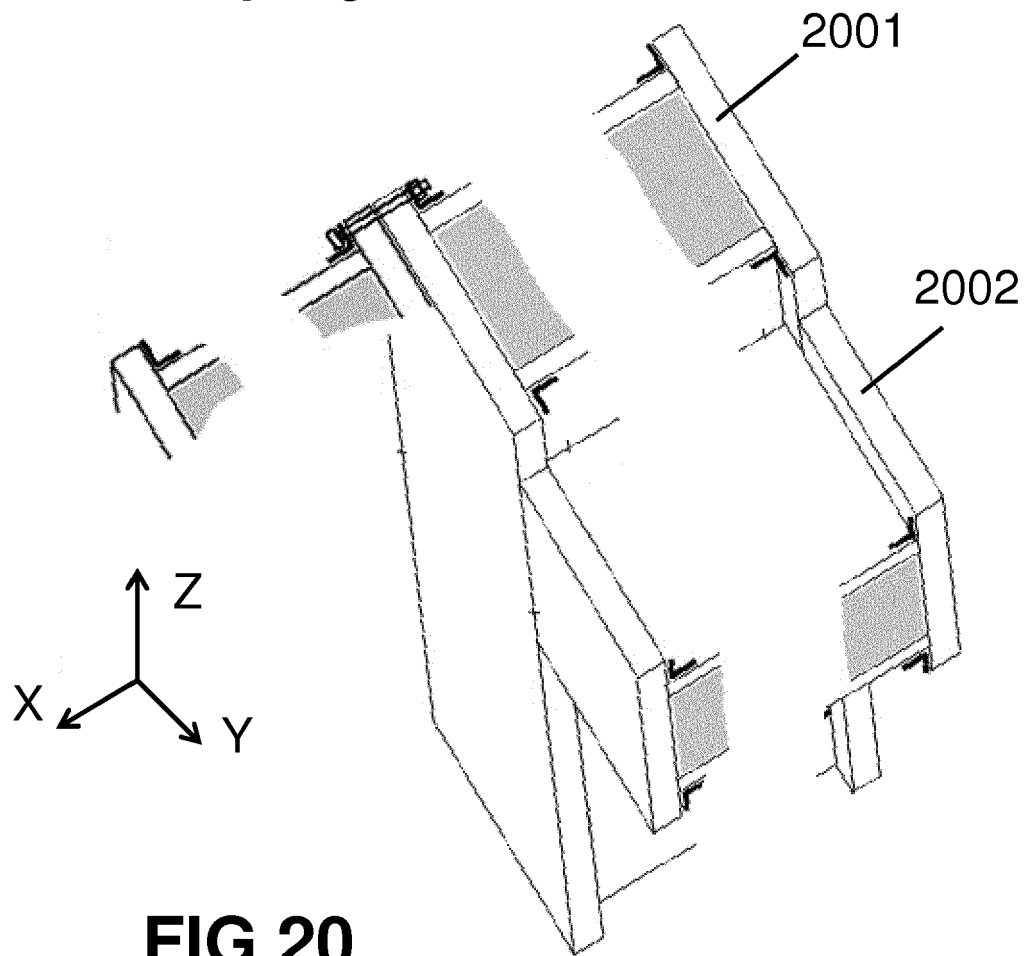


FIG 20

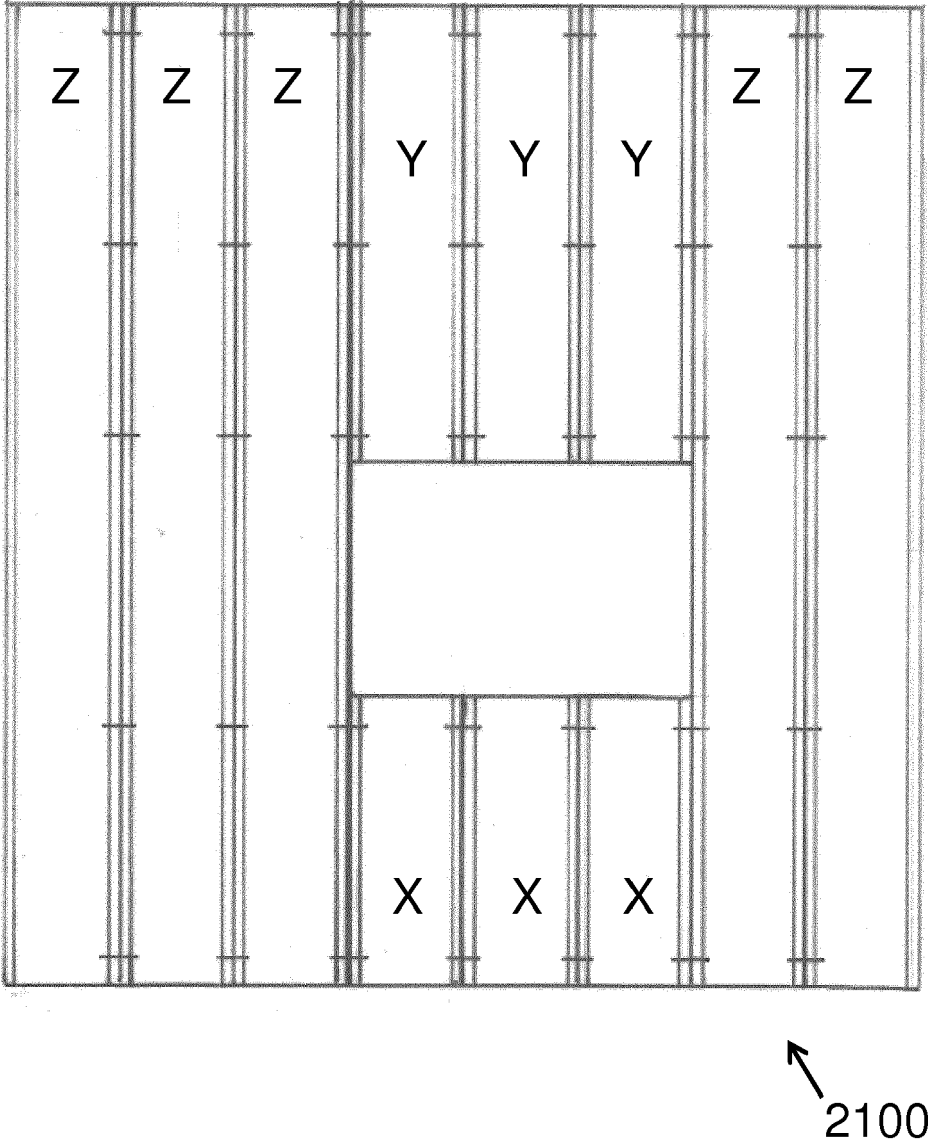


FIG 21

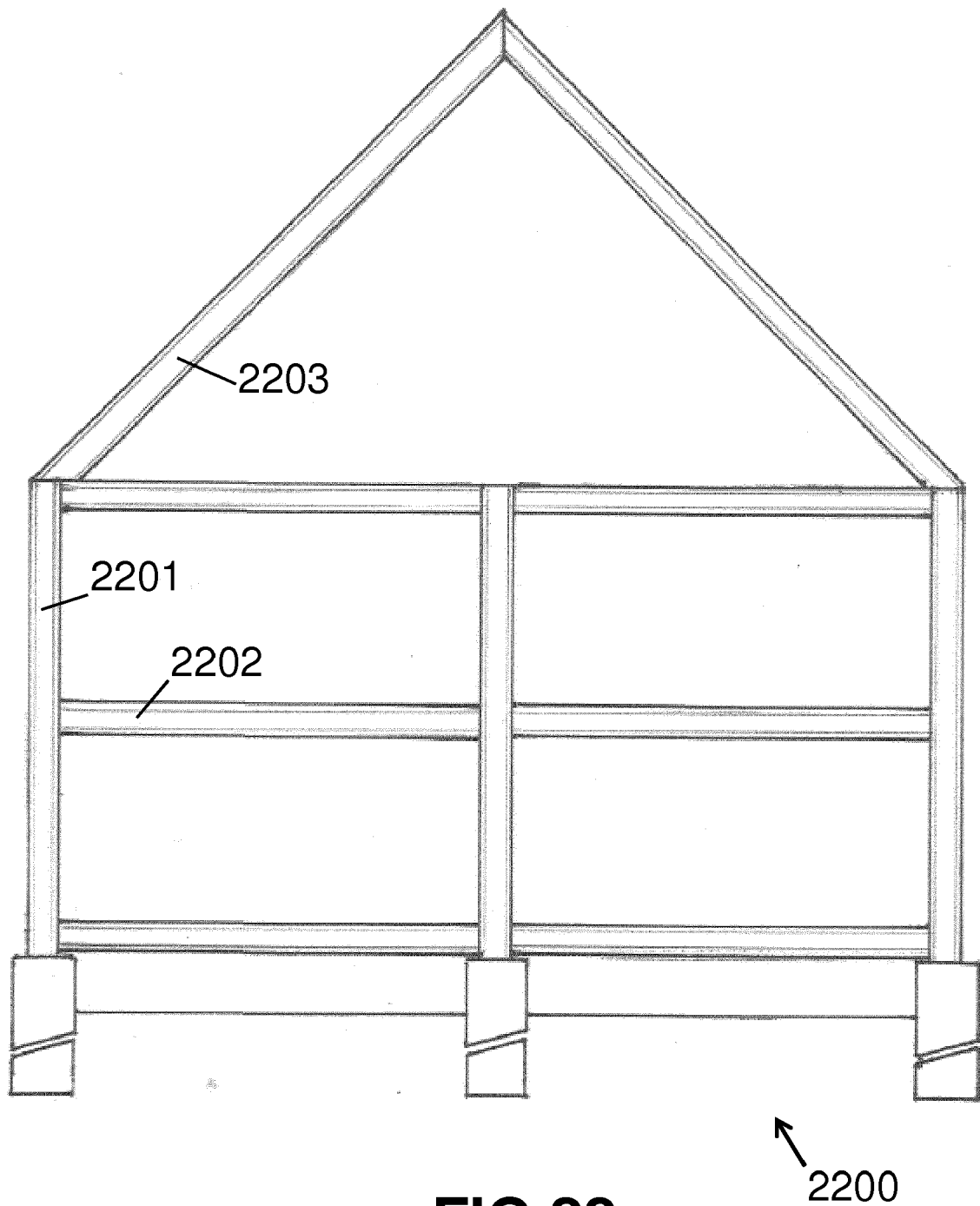


FIG 22



EUROPEAN SEARCH REPORT

Application Number
EP 16 17 5147

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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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A	US 6 460 309 B1 (SCHNEIDER DALE [US]) 8 October 2002 (2002-10-08) * column 5, lines 58-67; figure 11 *	1,14	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 October 2016	Examiner Vratsanou, Violandi
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

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