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(54) Building structure with frames

(57) A building structure comprising a first frame edge and a second frame edge, the first frame edge comprising a first cross base defined by at least one cross batten and having a rail secured along an exterior end, the second frame edge having a second cross base defined by at least one cross batten and at least one cheek batten and a channel spacer associated with the cheek batten to define a channel, the rail enterable into the channel to align the first frame edge and the second frame edge with a gap between the cheek batten and the exterior end and having at least a plate extending between at least part of the first cross base and part of at least one cheek batten.

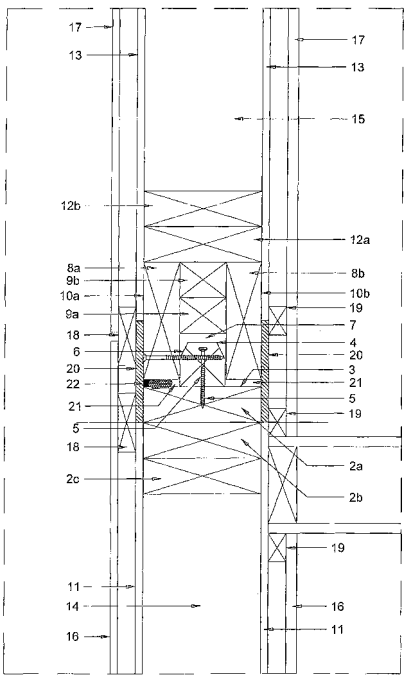

Figure 1

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Description

[0001] The present invention relates to building structures and more particularly to timber-framed, pre-formed or pre-fabricated building structures.

[0002] Traditional building structures have utilised bricks and mortar or stone in their constructions methods. More recently, in order to achieve improved efficiency of construction as well as to meet environmental standards with regard to energy consumption pre-formed or pre-fabricated building structures and techniques have been devised. It will be understood that rather than utilising materials such as bricks, which have high energy content in their manufacture and will require on-site provision of thermal insulation in other ways. Pre-fabricated structures can utilise panels which are formed off-site and can be formed from wood or recycled plastics so saving energy. Furthermore, high levels of thermal insulation can be incorporated to meet desirable objectives with respect to sustainability and thermal efficiency within the building structure. It will also be understood, particularly when utilising wood with respect to the structural framing, it is possible to achieve an effective zero carbon emissions target for the whole building structure or near zero when replacement trees are planted with respect to the timber or lumber used.

[0003] With regard to pre-fabricated or pre-formed structures, standard sized panels, typically of a single storey, are created and associated together in order to define a building. The panels are made of relatively small size in order to facilitate manipulation on assembly with minimal workforce and/or machinery on site. It will be appreciated that larger panels would be bulkier and therefore liable to problems with respect to on-site storage, have potential problems with regard to mis-alignment and distortion, along with potentially a more limited utility in terms of being more design specific. It will also be understood that limiting the size of the individual unitary panels as indicated, limits the potential problems with respect to tolerance stack-up within the manufacturing process. It unfortunately also limits the possibilities with respect to improving insulation levels and achieving the most desirable engineering structures for weight, strength and aesthetic appeal.

[0004] In accordance with aspects of the present invention there is provided a building structure comprising a first frame edge and a second frame edge, the first frame edge comprising a first cross base defined by at least one cross batten and having a rail secured along an exterior end, the second frame edge having a second cross base defined by at least one cross batten and at least one cheek batten and a channel spacer associated with the cheek batten to define a channel, the rail enterable into the channel to align the first frame edge and the second frame edge with a gap between the cheek batten and the exterior end and having at least a plate extending between at least part of the first cross base and part of at least one cheek batten.

[0005] Typically, the rail runs substantially the whole length of the exterior end of the first cross base.

[0006] Possibly, the cheek battens are substantially perpendicular to the first cross base. Alternatively, the cheek battens are substantially parallel to the first cross base.

[0007] Generally, each cross base is formed from a plurality of juxtaposed cross battens. Typically, each cross batten is of a similar size and cross section. Possibly, the number of cross battens is determined to provide a desired mechanical load capacity. Generally, the cross battens are formed from the same material. Possibly, the cross battens are formed from different materials. Typically, at least the exterior surface is wood.

[0008] Generally, the cross battens are formed from wood. Typically, the wood is at least partially seasoned. Possibly, the rail and the cheek battens are formed from wood. Possibly, the grain of the wood utilised in the rail and/or the cheek battens is orientated for alignment with each other upon entry of the rail into the channel.

[0009] Generally, the cross battens and/or the cheek battens are substantially of the same size.

[0010] Typically, the channel spacer is formed by at least one channel batten. Generally, the channel spacer occupies greater than 50% of the length of the channel defined by the cheek batten.

[0011] Typicaiiy, a seal element is provided between the exterior end and the cheek batten.

[0012] Normally, the channel has a width which is substantially the same as the rail. Typically, the rail has a chamfered or tapered end edge towards the channel.

[0013] Typically, the first frame edge and the second frame edge are part of a respective frame. Generally, each frame defines a cavity. Typically, the cavity is filled with a thermally insulating material. Generally, an outer surface of the frame comprises an inner skin and outer skin. Typically, the outer skin is made from vapour permeable external sheath board. The inner skin is typically plywood or OSB or particle board or MDF. One or both the inner or outer skins are mechanically fixed so that they improve the structural capacity of the frame as a whole. Possibly, a gap between the inner skin and the outer skin is filled with thermally insulating material.

[0014] Generally, the rail is secured to the first cross base utilising a fastener mechanism. Typically, the fastener mechanism comprises screws or bolts or dowel plugs. Typically, the fastener mechanism penetrate at least beyond the cross batten defining the exterior end.

[0015] Typically, the rail is secured in the channel beside the cheek batten by a fastening mechanism. Typically, the fastening mechanism comprises screws or bolts or dowel plugs. Possibly, the fastening means extends from exterior surface portions of the cheek batten into the rail.

[0016] Generally, there is a gap between an end of the rail and the channel spacer. Generally, there is a gap between the exterior end and the cheek batten in use.

[0017] Generally, the first frame edge and second

frame edge extend further than a single storey in a building structure. Typically, the first frame edge and the second frame edge define lateral floor beams extending perpendicularly to the frame edge. Typically, the floor beams incorporate a channel. Generally, a floor element incorporates a hook to extend into engagement with the respective floor beam. Generally, the floor element extends across the first frame edge and second frame edge to facilitate retention of association between the first frame edge and the second frame edge.

[0018] Aspects of the present invention will now be described by way of example and with reference to the accompanying drawings in which:-

Fig 1 is a plan view of a first embodiment of a building structure in accordance with aspects of the present invention;

Fig 2 is a plan view of a building construction in accordance with a second embodiment of aspects of the present invention about a corner in the structure;

Fig 3 is a plan view of a third embodiment of a building structure in accordance with aspects of the present invention;

Fig 4 provides a side view of part of a floor structure secured to a frame in accordance with aspects of the present invention;

Fig 5 is an illustration of part of an alternative approach to providing a floor or roof structure in accordance with aspects of the present invention;

Fig 6 is a schematic illustration of two frames in a building structure in accordance with aspects of the present invention;

Fig 7 is a schematic illustration of respective frame edges in accordance with aspects of the present invention;

Fig 8 is a schematic illustration of a plate adapted to urge frame edges into alignment in accordance with aspects of the present invention;

Figure 9 is a schematic cross-section of a further alternative structure in accordance with aspects of the present invention; and,

Figure 10 is a perspective view of the structure depicted in figure 9.

[0019] As indicated above provision of pre-fabricated or pre-formed building structures for erection on site has particular advantages with respect to achieving high levels of insulation and consistency in construction. However, traditional simple timber frames have limitations. Two frames are placed together in order to create a structure and then these frames have a screw or other fixing extending between the frames to ensure and retain location. In such circumstances, relatively small frames are utilised in view of the weight of the pre-formed insulation within the frame. It will also be appreciated that some pre-formed buildings incorporate plastics and metal to create structures but such plastics and metals, in view of their environmental impacts with regard to energy usage, will not enable achievement of near zero or zero carbon emission impact building structures. It is desirable to form most of the frames and panels from recycled and/or sustainable materials such as wood and in such circumstances as indicated, limitations upon frame sizes are forced upon a designer due to the mechanical and supply limitations of wood.

[0020] By aspects of the present invention robust and stable frame edges are created. These frame edges are achieved generally through cross bases formed typically by plies or layers of cross battens. The number of cross battens can be increased or decreased dependent upon the level of mechanical strength required. As will be described later with regard to Fig 7, the cross base components utilised in accordance with aspects of the present invention, may be formed from several battens in simple face to face abutment or in a staggered construction to achieve the desired multi-storey forms.

[0021] In accordance with aspects of the present invention a first cross base is associated with a rail. The rail extends along its length in order to provide further reinforcement at least on one side. A second cross base includes at least one side cheek batten which again will extend individually or collectively along the length of the second cross base to provide reinforcement. In such circumstances, the respective first cross base and the second cross base are relatively robust and capable of achieving stable and yet high mechanical strengths utilising natural materials such as wood. Generally, the frames of which the frame edges form a part, have inner and outer skin surfaces. These skin surfaces also add significantly to structural integrity and strength. Thus, the skins provide racking and bracing to the frame panels. Typically, the inner most skins will be formed from a suitable material such as OSB or plywood or MDF or particle board.

[0022] Although as described above preferably several layers of cross battens are utilised in order to provide the cross bases in accordance with aspects of the present invention it will be understood that in some circumstances a single component as a cross batten may be utilised. However, such a thick or widely dimensioned cross batten component particularly if that component is to remain dimensionally stable and is formed from a natural product such as wood may be difficult to achieve. Furthermore, although principally formed from wood, it will be appreciated that the cross battens may be formed from a number of materials and be augmented with some or part of some cross battens or elements being in the form of

metals or plastics but only where required. It will also be understood that different woods may be combined in the cross battens in order to create mechanical strength such as by cross plying or block boarding techniques.

[0023] Fig 1 provides a schematic illustration of a first embodiment of a building structure in accordance with aspects of the present invention. The structure 1 comprises a first cross base 2 formed from cross battens 2a, 2b, 2c. An exterior surface 3 of one cross batten 2a is associated with a rail 4 using fasteners 5. The fasteners 5 may comprise screws or dowel pegs or bolts extending through the rail 4 into at least the first cross batten 2a and possibly into other battens to provide for structural strength. It will be understood that a number of fasteners will be positioned with an appropriate spacing between them along the length of the rail 4. Thus, the fasteners 5 will extend along the length of the rail and may add to structural strength for both the cross base 2 and the rail 4. The fasteners 4 as indicated are typically bolts or screws formed from metals and may be recessed or countersunk into distal entrant end 6 of the rail 4. Generally, the rail 4 enters a channel 7 formed by cheek battens 8 with a channel spacer 9 formed by channel battens 9a, 9b between the cheek battens 8.

[0024] It will be noted that the cheek battens 8a, 8b are spaced such that side surfaces 10 are substantially at the same width as the cross battens 2. The cheek battens 8a, 8b extend from cross batten 12a. In such circumstances, a first frame edge is created by the cross base 2 and rail 4, whilst a second frame edge is created by the cross base 12, cheek battens 8 and channel battens 9.

[0025] In use the cross bases 2, 12 present skins 11, 13 of respective structural frames with cavities 14, 15. These cavities 14, 15 are typically filled with a thermal insulating material in order to render the building frames in a pre-formed state ready for assembly into a building structure. Typically, outer skins 16, 17 are also provided typically through spacer blocks 18, 19. The outer skins 16, 17 will have an appropriate aesthetic function such as with respect to internal walls to have a surface suitable for decorating and receiving wallpaper whilst external surfaces will be rendered water resistant. Typically, a gap between skins 11 and 16 along with skins 17 and 13 is kept open to facilitate external air movement.

[0026] In accordance with aspects of the present invention, plates 20 are located across the junction between the first frame edge and the second frame edge constituted by the exterior surface 3 and end parts of the cheek battens 8. These plates 20 are consistent with the inner skin 11, 13. The plates 20 may incorporate means to secure and/or just urge location between the first frame and the second frame edges by entry of the rail 4 into the channel 7. Alternatively, the plates 20 may simply be covers for consistency.

[0027] It will be understood that in view of the functional variability with respect to natural materials such as wood and such materials ageing, typically a gap 21 will be left between the first frame edge and the second frame edge. For weathering purposes, at least a seal 22 along with other sealants may be incorporated in the gap 21 to provide weather and wind proofing.

[0028] As will be described later, aspects of the present invention are particularly directed to providing frames which, although using natural materials such as wood, have sufficient structural strength to enable multi-storey panels and frames to be created. It will be appreciated particularly when the cavities 14, 15 are filled with thermal insulating material of sufficient depth to meet high thermal efficiency standards that the panels in such circumstances will have a significant weight. In such circumstances the panels not only need to be able to provide structural strength within the building structure once formed, but also to enable manipulation by cranes or other handling equipment. In such circumstances as described above, the cross bases 2, 12 will generally be formed from cross battens in a stack to create the necessary strength. The cross battens 2, 12 will generally be of the same dimensions as the cheek battens 8 to allow ease of consideration and design for necessary mechanical strength.

[0029] Generally, the rail 4 as illustrated will substantially have the same width as the battens 8 and enter centrally the channel 7. The channel 7 and the width of the rail 4 will be substantially the same. The channel spacer 9, formed again from blocks of wood, will generally extend for greater than 50% of the length of the cheek battens 8 to provide a robust and stable channel 7.

[0030] As illustrated, normally the rail 4 will have a chamfered or tapered end to facilitate entry into the channel 7. However, substantive side portions of the rail 4 will be of the same width as the channel 7. By use of the channel spacer 9 close regulation of the width of the channel 7 can be achieved. When the rail 4 is located within the channel 7, typically a fastener mechanism such as a screw or bolt or dowel peg may pass through one of the cheeks 8 into engagement with and retention of the rail 4.

[0031] It will be appreciated that external parts of the rail 4 as well as the surfaces of the cheek battens 8 define the channel 7 can be smoothed or be provided with a natural sawn grain surface. In such circumstances, the respective grain directions of the rail 4 and the battens 8 may be arranged to provide a degree of grip in use to initially retain the rail 4 within the channel 7 and therefore association between the edges and so their respective frames in a building structure.

[0032] In terms of entry of the rail 4 within the channel 7 it will be appreciated that the plates 20 are of assistance. In such circumstances the respective frame ends will be brought into near association and the plates 20 secured to one or the other frame edge. In such circumstances the other frame edge, due to the extension and overlap, will align the rail 4 with the channel 7 to enable urging of the rail 4 into the channel until an appropriate association is achieved. It will also be appreciated that the plates

themselves may be utilised through alignment mechanisms such as described in Fig 8 to achieve alignment.

[0033] The embodiment depicted in Fig 1 relates to a straight in line frame construction in a building structure. It will also be appreciated that it is necessary to generate corner constructions. Thus, as depicted in Fig 2, a building structure in accordance with aspects of the present invention is provided to define a corner as shown. Similar reference numerals are utilised for consistency and comparison. In such circumstances a first frame edge as previously defined by a cross base 2 with a rail 4 extends from an exterior surface 3. As previously, the first frame edge defines a cavity 14 which will typically be filled with thermal insulating material and is formed between inner skins 11.

[0034] In order to generate a corner, cross battens 22 form a cross base upon which channel spacers 29 are secured with a cheek batten 28 to define a channel 27. In such circumstances the cheek batten 28 and an uppermost cross batten 22a effectively define the cheek battens in accordance with this second embodiment to define a corner building structure.

[0035] As previously, the rail 4 is secured by a fastening mechanism 5 to enable presentation of the rail 4 within the channel 27. As previously a seal 32 may be provided in a gap 31 for environmental protection whilst a plate 30 extends from at least the first cross base 2 to the cheek batten 28.

[0036] In such circumstances as with Fig 1 the respective cross bases 2, 22 provide robust frame edges for the building structure. In use, the rail 4 will be presented to the channel 27 possibly using the plate 30 as a guide and so urged into entry within the channel 37 for a robust construction. Once appropriately located a fastening mechanism such as a bolt or screw or dowel plug can then be presented across the cheek batten 28 to secure location. As previously, surface graining of the respective battens 28, 22a and the rail 34 may be utilised to facilitate assembly and location.

[0037] In some circumstances, in order to accommodate a conduit or pipe or otherwise, additional building structures may be required. Fig 3 provides a further example in which again a first frame edge is provided by cross battens 2 to present a rail 4. The rail 4 is secured through a fastening mechanism such as a screw 5. The cross base formed by the battens 2a, 2b, 2c defines a cavity 14 within which thermal insulating material may be presented between skins 11.

[0038] In accordance with the third embodiment of aspects of the present invention, a staggered construction is achieved to accommodate a conduit such as a pipe 40. As previously a channel 37 is created by cheek battens 38 extending between cross base 39. The cheek battens 38 are secured to a cross base formed by cross base battens 32 configured to form a stable structure to present the cheek battens 38 and therefore the channel 37 to the rail 4. In such circumstances the first frame edge formed by the cross base 2 and rail 4 and the second frame edge formed by the cheek battens 38, spacers 39 and cross battens 32 are both robust and rigid in order to enable stable presentation between the rail 4 and the channel 37. As previously, a plate 50 is utilised to extend across a gap between an end of the cross base to either side of the rail 4 and the cheek battens 38. This plate 50 can also be attached to one or other of the frame edges to provide guiding. It will be understood that external outer skins presented on spacer blocks can be added subsequently for decorative or other purposes.

[0039] As described above generally vertical end frame edges are defined such that upon assembly, frames incorporating these frame edges will be brought together in a vertical orientation typically using a crane or otherwise. Internally within the frames in accordance with aspects of the present invention, generally floor elements will be incorporated. To incorporate such floor elements as well as to provide frame rigidity typically floor suspender beams are provided. In such circumstances, as depicted in Fig 4, a frame 51 is defined by a lateral base batten or floor beam 52, robustly located within the frame 51 between further cross based battens 53, 54 and having insulation 55 installed at the time of frame manufacture. Secured to the base batten or beam 52 is a floor hanger 56 which presents a ledge 57 upon which a floor element 58 is located. The floor element 58 typically comprises a joist to which a reciprocal floor hanger is secured to enable association with a ledge 57 in use. The floor element will include appropriate ceiling surfaces 59 and floor surfaces 60. The floor surface 60 is typically fixed to the floor elements such that the structural capacity of the building as a whole is improved. The surface 60 may be formed from plywood or chipboard for stiffening. In use, particularly the base battens to form the floor beam assembly 52, 53, 54 will provide further structural integrity to the frame 51 incorporating the section depicted in Fig 4.

[0040] Fig 4 depicts an intermediate positioning of a floor element 58. However, it will also be understood that floor elements will be required typically along a top edge of a frame in accordance with aspects of the present invention. In such circumstances a frame is again defined with lateral base battens or floor beams 62 to provide a robust top end for a frame incorporating a cavity 63 within which insulating material will be provided. In accordance with Fig 5 a floor hanger element 64 is secured to the cross batten or beam 62 in order to allow a floor element 65 to be present itself through a cross batten 66 and hanger element 67. In such circumstances a ceiling surface 68 is presented in the remaining parts of the frame as well as the floor element 65 utilised to enable provision of a further frame above that depicted or to allow creation of a roof structure.

[0041] In view of the above it will be appreciated that aspects of the present invention allow provision of multi-storey frames through construction of respective first frame edges and second frame edges and again robust construction from wood whilst enabling penetrative inter-

action between a rail and a channel. Fig 6 provides a schematic front view of a respective first frame 71 and second frame 72 secured together along a first frame edge 73 and a second frame edge 74. As can be seen the frames 71, 72 are multi-storey A, B, C with respective floor elements 75, 76 presented at each floor level. To provide further integration between the frames 71, 72 it will be understood that a floor element 76 may extend across the junction between the edges 73, 74 and as illustrated previously hook into respective lateral base battens or floor beams in the frames 71, 72. The depiction in Fig 6 is with front skins removed from the frames 71, 72 to expose the lateral structures 75, 76 upon which the floor will be secured. Typically, the space between these floors, as described above has cavities which will be filled with thermal insulating material along with conduits and channelling for utilities.

[0042] In use, the edges 73, 74 will be brought into close abutment with engagement between the rail in one edge 73 and the channel in the other edge 74 or vice versa. The respective dimensions of the rails and the channels will be chosen to provide sufficient structural strength and mechanical load capability.

[0043] Fig 6 only indicates the external bases and edges and the lateral battens that connect to floor elements. As necessitated by structural consideration, further intermediate, both vertical and horizontal, rails are typically fixed within each frame. These rails are typically the same size and material as the frame edges. The rails add to strength and frame integrity.

[0044] As indicated above, aspects of the present invention have particular applicability with regard to wooden building structures. By the nature of such wooden materials there will be variability and limitation in the lengths and thicknesses available. Nevertheless, as indicated, aspects of the present invention relate to providing a building structure in which multi-storey constructions can be achieved. Multi-storey constructions with regard to wooden materials will generally require materials which are either uneconomic in such sizes or unavailable. In such circumstances, as depicted in Fig 7 with outer and inner skins removed respective first frame edge 81 and second frame edge 82 are provided. It will be appreciated that wooden cross battens can generally be achieved through appropriate planking over techniques. However, length may be difficult and limited to the available heights of trees. In such circumstances, as depicted in Fig 7, respective cross bases formed by cross battens 83, 84 can be provided by respective wood sections appropriately secured together as well as by the addition of a rail which extends the length of the edge 81 for reinforcement. The rail 84 itself may be sectioned but the respective joints between the sections in the rail 84 and cross battens 83 will not coincide and therefore a robust structural edge 81 is achieved. Similarly with regard to the second frame edge 82, cross battens 86 can be provided to form the cross base with cheek battens 87 utilised to define the channel. Again a multi-storey structure can be achieved utilising available wood, which has a robust edge to present the respective rail and channel for robust engagement.

[0045] Close location between the respective frame edges, in accordance with aspects of the present invention, is important. It will be understood that being multi-storey preformed components, the frames incorporating edges in accordance with aspects of the present invention, will be heavy. In such circumstances the edges may be brought in to close association but difficulty presented in final adjustment. Thus, as indicated above, generally plates may be utilised to act as guides for such final adjustment. It will also be appreciated that these plates may incorporate urging slots to align final location between the edges. In such circumstances, as depicted in Fig 8, a respective frame edge 91 and frame edge 92 are brought into close association with the respective rail entering a channel. The plate to one side will incorporate an urge slot 93 with respect to one edge and its respective frame slightly raised possibly on chocks and a peg inserted into the cross base and extending through the slot 93. It will be appreciated that once the chocks or other form of retaining elevation is moved, the edges will be slowly brought into association by sliding of the peg along the slot 93. In such circumstances again a plate 94 can be utilised to guide as well as retain association between the respective edges 91, 92. A number of such urging slot and peg associations may be provided along the edges for balance and control of entry of the rail into the channel or slot formed in the other frame edge.

[0046] Figure 9 and figure 10 provide respectively plan and perspective views of a further structure in accordance with aspects of the present invention. It will be appreciated in some circumstances increased width or depth of insulation will provide significant benefits with regard to thermal efficiency within a building structure. However, increasing the depth of the structure may result in requirements for a rail and a channel which are inappropriate due to material capabilities. It will be understood that the convenient width of a rail which can be provided by a length of wood is limited by the thickness of that wood. In such circumstances as illustrated in figure 9 and figure 10 a structure can be created by interlocking rails 103, 104 secured upon cross battens 105, 106, 205. In such circumstances with seals 102 it will be understood that respective frames defined by the edges including the rails 103, 104 can be brought together in order to create a structure in accordance with aspects of the present invention. Plates 101, 107 will extend across a gap 110 between the opposed edges to allow the edges to be secured together once an initial location procedure has been performed between the rails 103, 104. It will also be noted that elements 100, 108 act as spacer blocks upon which respective inner and outer skins can be secured in a panel in accordance with aspects of the present invention. In the above circumstances through the interlocking rails 103, 104 it will be understood structures in accordance with aspects of the present invention can be

created which allow rails 103, 104 to be formed conveniently with appropriate materials with sections between rails 103, 104 acting as a channel to receive an opposed rail from an opposed edge in the structure. In such circumstances cavities 201 in each frame or panel can have a greater width and therefore greater thermal depth through insulation located within the cavities 201.

[0047] As previously the rails 103, 104 may be formed from a wood or other suitable material and as described previously may incorporate facilities for urged alignment through rail to rail interaction.

[0048] Modifications and alterations to aspects of the present invention will be appreciated by those skilled in the art. For example as indicated, generally natural materials such as wood will be utilised with regard to the building structure. However, where more appropriate instead of wood, a plastic material may be utilised, at least in part to provide one of the cross battens and/or the cheek battens and/or the spacer members. Generally, there will at least be a wood to wood or similar material to similar material association for the rail and the components forming the channel to avoid asymmetric wear problems. Furthermore, although described above with regard to substantially vertical wall panels, it will be understood that aspects of the present invention can also be used with respect to frames which are presented at any angle such as with respect to pitched roofs. Frames, in accordance with aspects of the present invention, may be used as cladding panels to improve insulation or have an exterior wall formed of brick associated with the frame through the elements.

Claims

1. A building structure comprising a first frame edge and a second frame edge, the first frame edge comprising a first cross base defined by at least one cross batten and having a rail secured along an exterior end, the second frame edge having a second cross base defined by at least one cross batten and at least one cheek batten and a channel spacer associated with the cheek batten to define a channel, the rail enterable into the channel to align the first frame edge and the second frame edge with a gap between the cheek batten and the exterior end and having at least a plate extending between at least part of the first cross base and part of at least one cheek batten.

2. A structure as claimed in claim 1 wherein the rail runs substantially the whole length of the exterior end of the first cross base.

3. A structure as claimed in claim 1 or claim 2 wherein the cheek battens are substantially perpendicular to the first cross base.

4. A structure as claimed in claim 1 or claim 2 wherein the cheek battens are substantially parallel to the first cross base.

5. A structure as claimed in any preceding claim wherein each cross base is formed from a plurality of juxtaposed cross battens.

6. A structure as claimed in any preceding claim wherein each cross batten is of a similar size and cross section.

7. A structure as claimed in any preceding claim wherein the number of cross battens is determined to provide a desired mechanical load capacity.

8. A structure as claimed in any preceding claim wherein the cross battens are formed from the same material.

9. A structure as claimed in any of claims 1 to 7 wherein the cross battens are formed from different materials.

10. A structure as claimed in claim 9 wherein at least the exterior surface is wood.

11. A structure as claimed in any preceding claim wherein the cross battens are formed from wood.

12. A structure as claimed in claim 11 wherein the wood is at least partially seasoned.

13. A structure as claimed in any preceding claim wherein the rail and the cheek battens are formed from wood.

14. A structure as claimed in claim 13 wherein the grain of the wood utilised in the rail and/or the cheek battens is orientated for alignment with each other upon entry of the rail into the channel.

15. A structure as claimed in any preceding claim wherein the cross battens and/or the cheek battens are substantially of the same size.

16. A structure as claimed in any preceding claim wherein the channel spacer is formed by at least one channel batten.

17. A structure as claimed in claim 16 wherein the channel spacer occupies greater than 50% of the length of the channel defined by the cheek batten.

18. A structure as claimed in any preceding claim wherein a seal element is provided between the exterior end and the cheek batten.

19. A structure as claimed in any preceding claim wherein the channel has a width which is substantially the

same as the rail.

20. A structure as claimed in any preceding claim wherein the rail has a chamfered or tapered end edge towards the channel.

21. A structure as claimed in any preceding claim wherein the first frame edge and the second frame edge are part of a respective frame.

22. A structure as claimed in any preceding claim wherein each frame defines a cavity.

23. A structure as claimed in any preceding claim wherein the cavity is filled with a thermally insulating material.

24. A structure as claimed in any preceding claim wherein an outer surface of the frame comprises an inner skin and outer skin.

25. A structure as claimed in any preceding claim wherein the outer skin is made from vapour permeable external sheath board.

26. A structure as claimed in any preceding claim wherein the inner skin is typically plywood or OSB or particle board or MDF.

27. A structure as claimed in any preceding claim wherein one or both the inner or outer skins are mechanically fixed so that they improve the structural capacity of the frame as a whole.

28. A structure as claimed in any preceding claim wherein a gap between the inner skin and the outer skin is filled with thermally insulating material.

29. A structure as claimed in any preceding claim wherein the rail is secured to the first cross base utilising a fastener mechanism.

30. A structure as claimed in claim 29 wherein the fastener mechanism comprises screws or bolts or dowel plugs.

31. A structure as claimed in claim 29 or claim 30 wherein the fastener mechanism penetrate at least beyond the cross batten defining the exterior end.

32. A structure as claimed in any preceding claim wherein the rail is secured in the channel beside the cheek batten by a fastening mechanism.

33. A structure as claimed in claim 32 wherein the fastening mechanism comprises screws or bolts or dowel plugs.

34. A structure as claimed in claim 32 or claim 33 wherein the fastening means extends from exterior surface portions of the cheek batten into the rail.

35. A structure as claimed in any preceding claim wherein there is a gap between an end of the rail and the channel spacer.

36. A structure as claimed in claim 35 wherein there is a gap between the exterior end and the cheek batten in use.

37. A structure as claimed in any preceding claim wherein the first frame edge and second frame edge extend further than a single storey in a building structure.

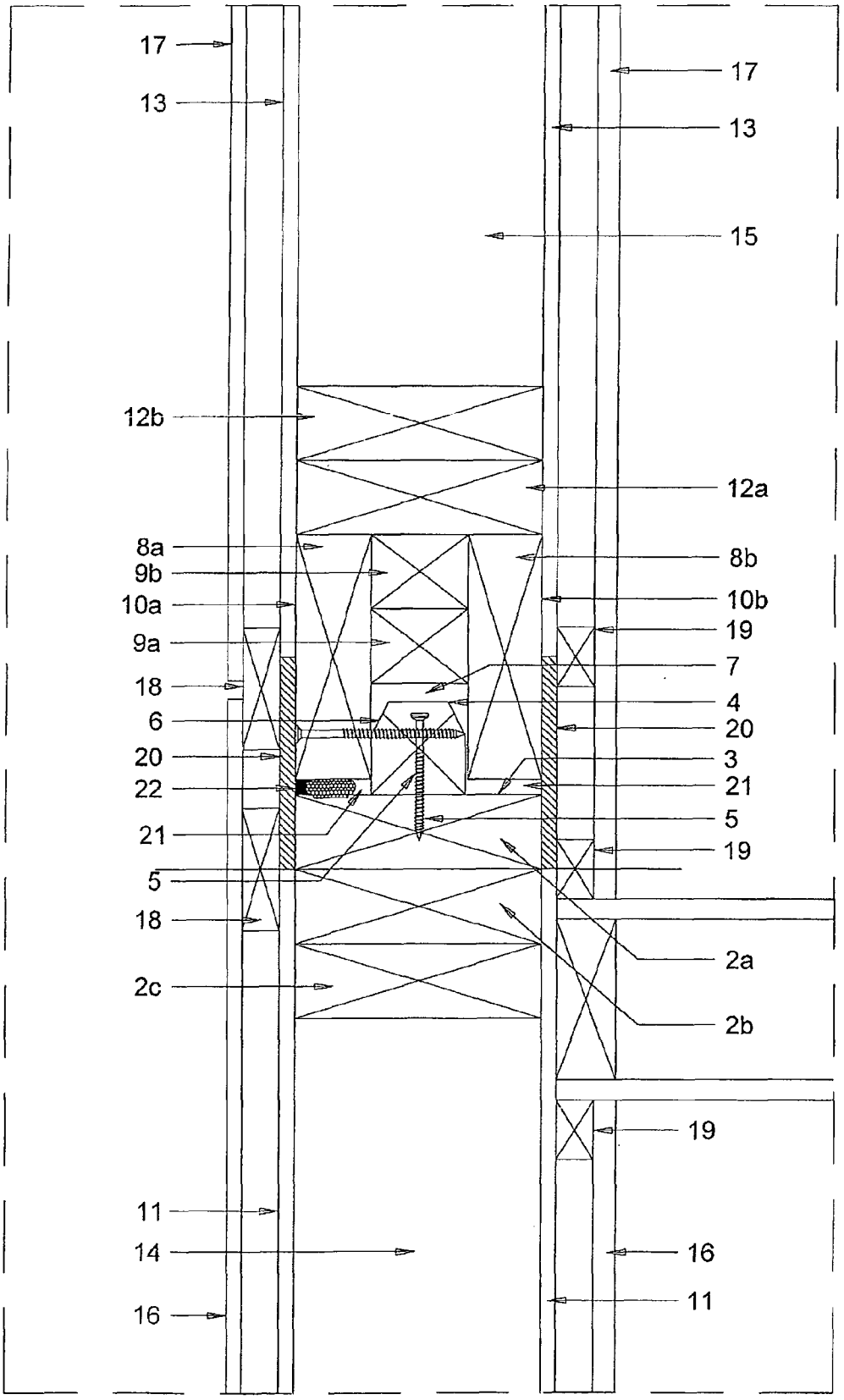
38. A structure as claimed in any preceding claim wherein the first frame edge and the second frame edge define lateral floor beams extending perpendicularly to the frame edge.

39. A structure as claimed in claim 38 wherein the floor beams incorporate an channel.

40. A structure as claimed in any preceding claim wherein a floor element incorporates a hook to extend into engagement with the respective floor beam.

41. A structure as claimed in claim 40 wherein the floor element extends across the first frame edge and second frame edge to facilitate retention of association between the first frame edge and the second frame edge.

42. A building structure substantially as hereinbefore described with reference to the accompanying drawings.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8a
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10a
9a
18
6
20
22
21
5
18
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11
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16
17
13
15
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3
21
5
19
2a
2b
19
16
11

Figure 1

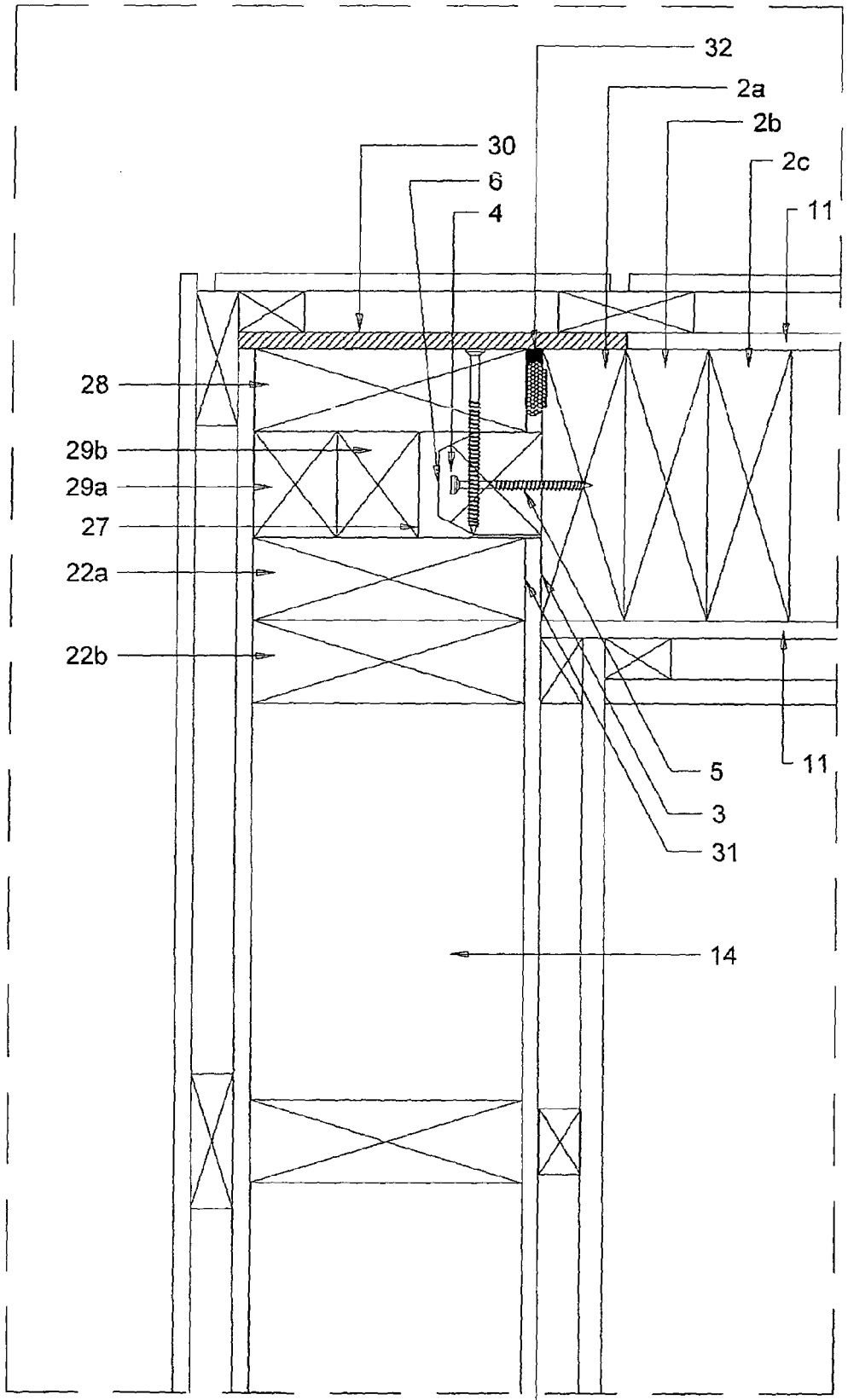


Figure 2

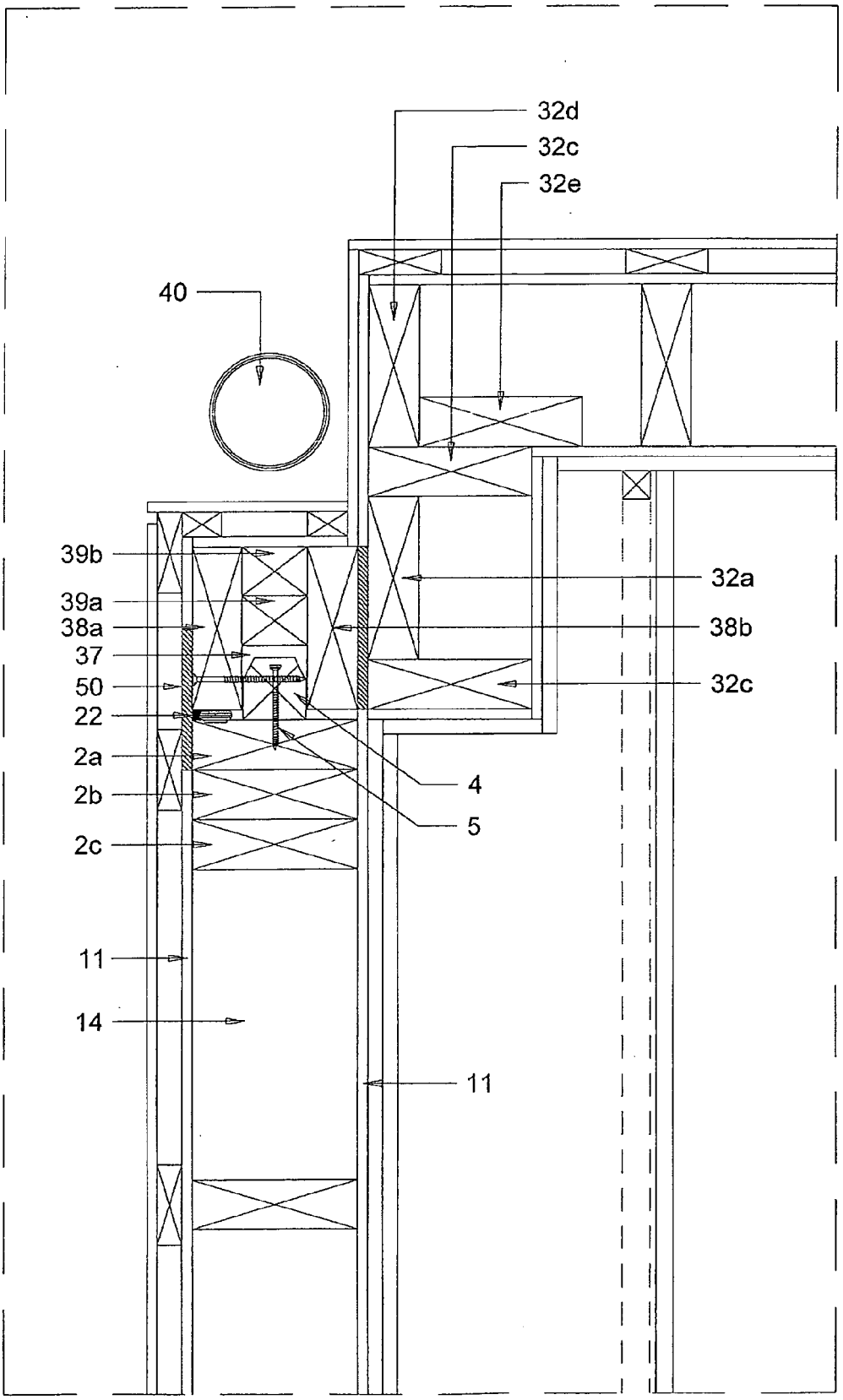


Figure 3

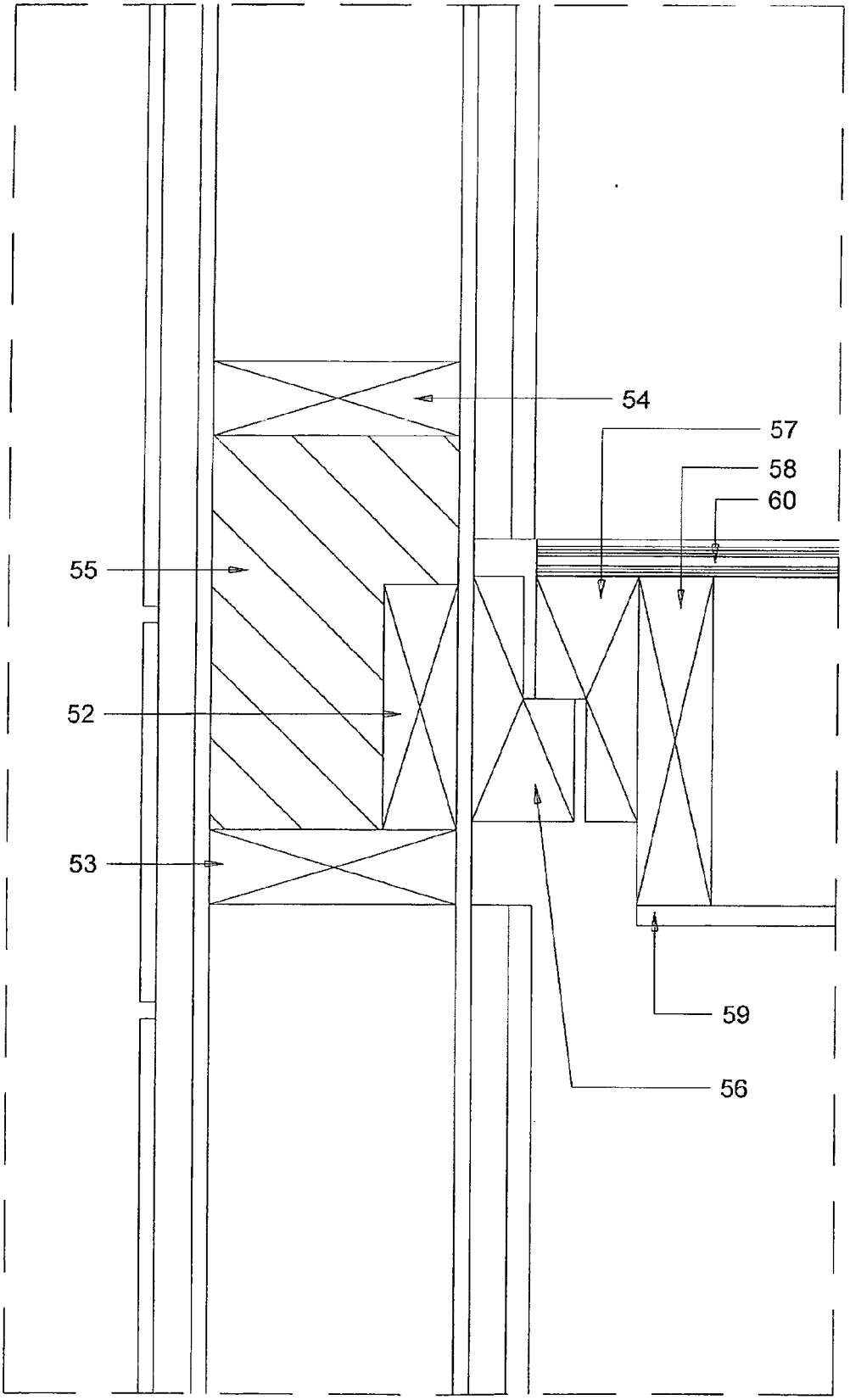


Figure 4

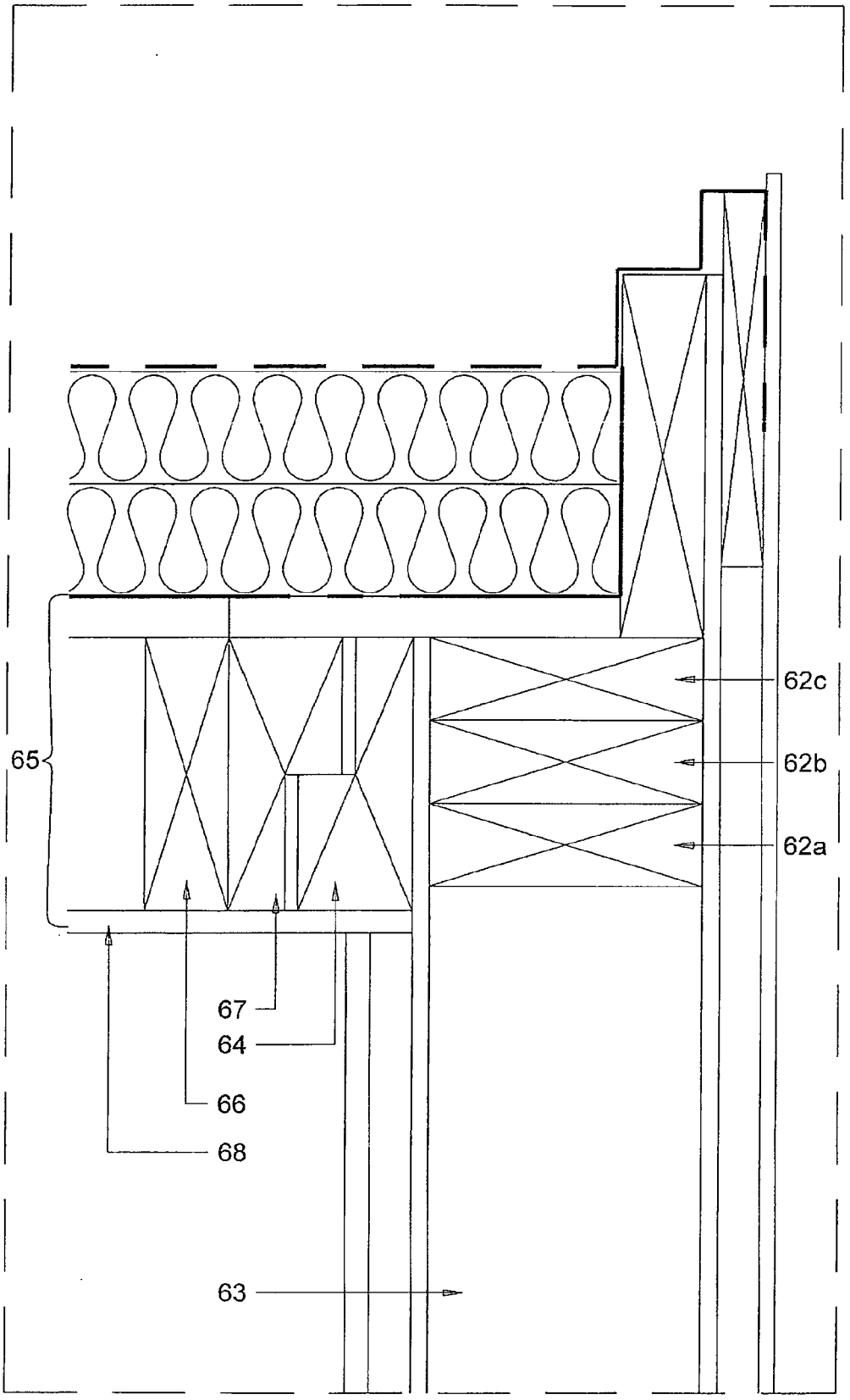


Figure 5

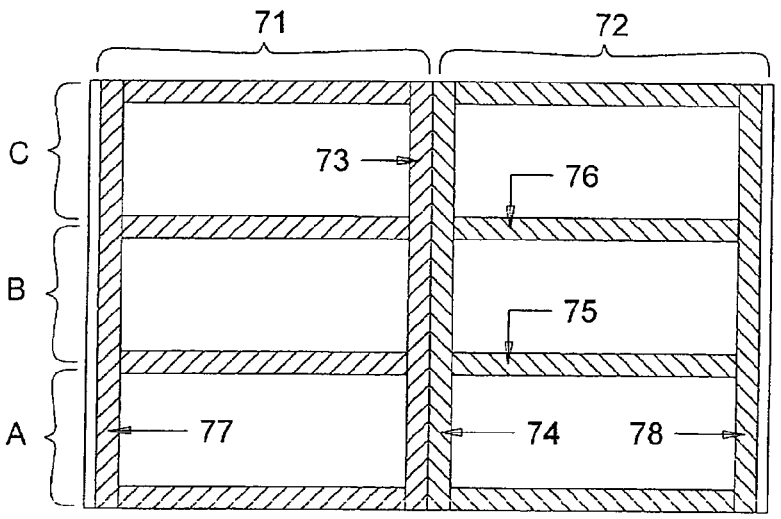


Figure 6

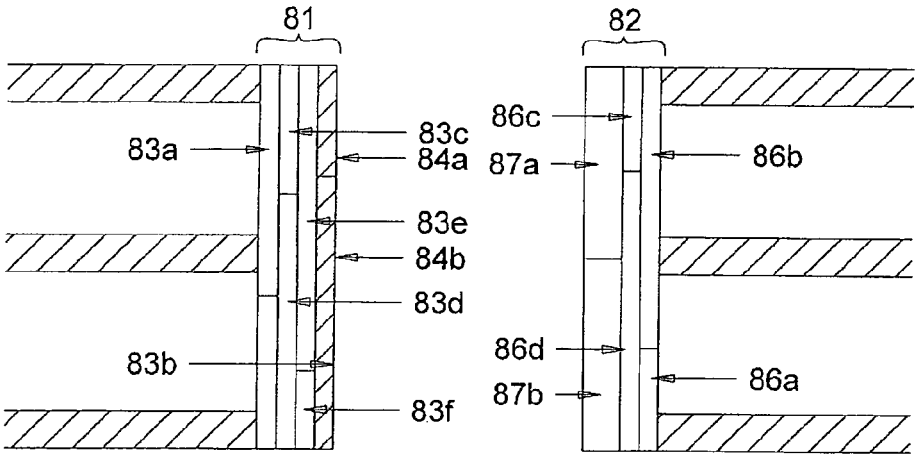


Figure 7

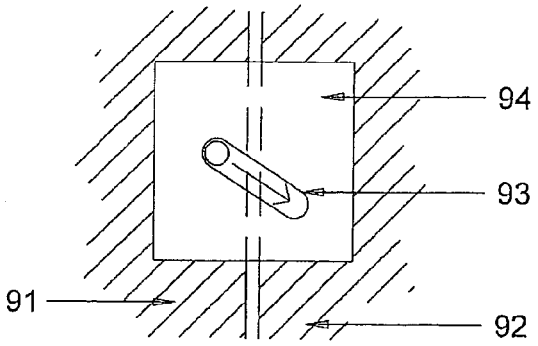
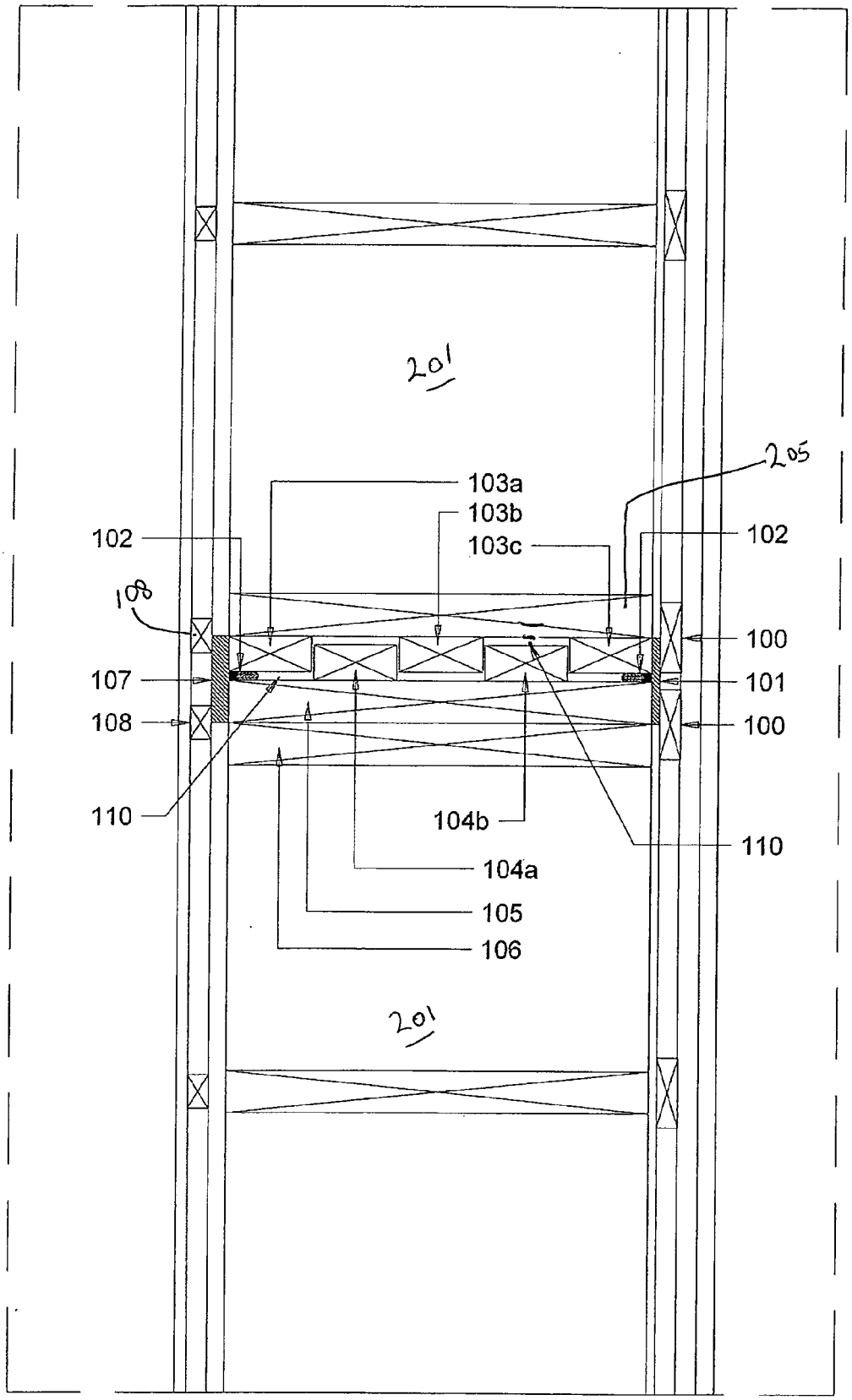


Figure 8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100
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104b
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104a
105
106
201

Figure 9

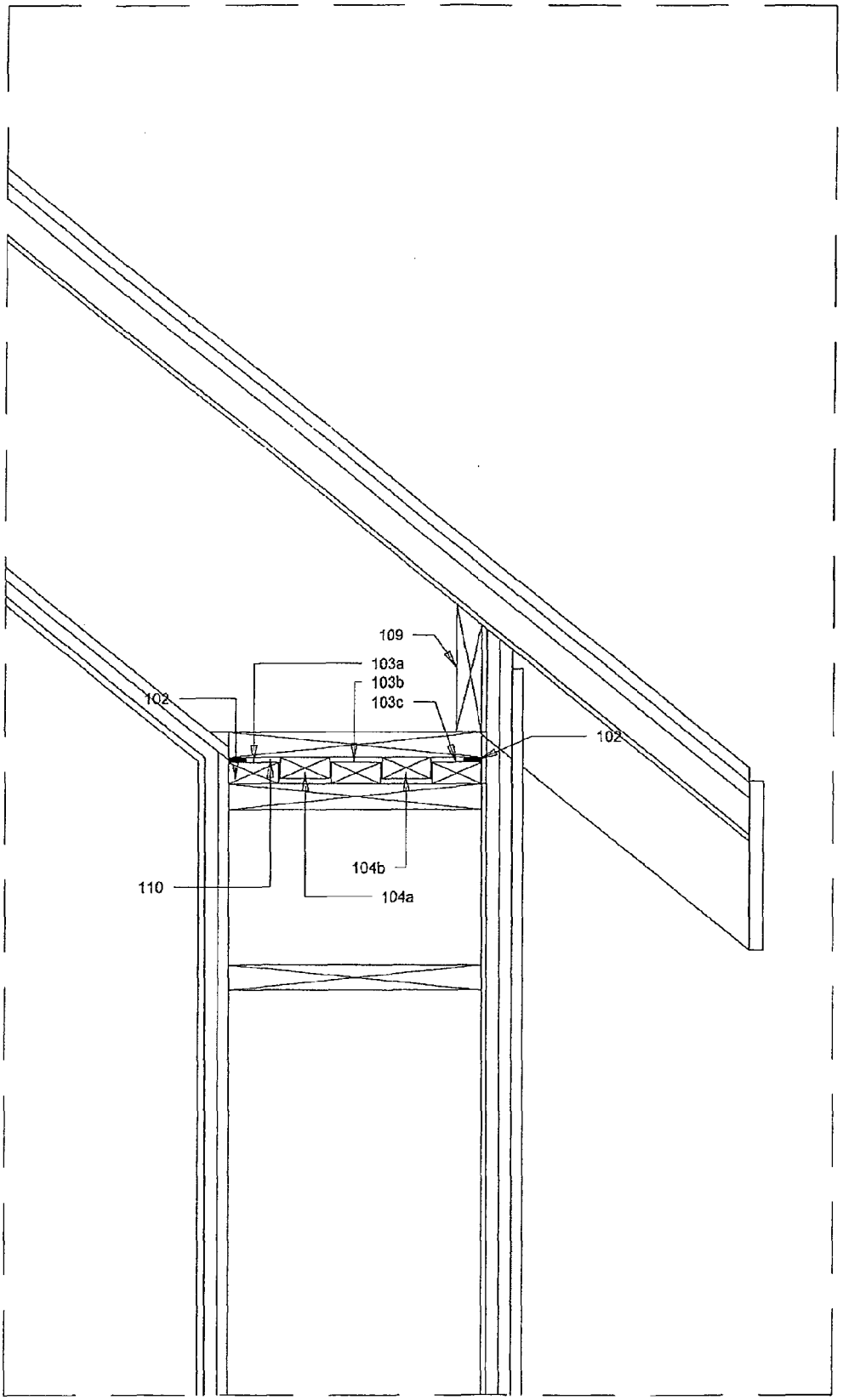

Figure 10