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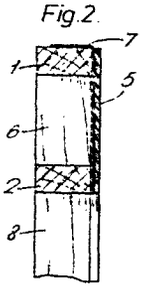
(54) **A building panel, a method of constructing the panel, a method of constructing a building and a building.**

(57) A method of constructing a panel for use in the construction of a wall of a building, the method comprising the steps of: constructing a panel having an opening therein for a door, window or the like, the portion (1, 2, 3, 4) of the panel lying across the top of the said opening having a predetermined load-bearing capacity; and, where the actual load to be carried by the panel exceeds the said predetermined load-bearing capacity, attaching a reinforcing member (7) to the panel to increase the load-bearing capacity of the said portion of the panel.

Because the reinforcing member 7 is used only where the load-bearing capacity is to be increased, for example when the panel forms part of a lower storey of multi-storey building, the wastage which is created by constructing all of the panels of the building to have the higher load-bearing capacity is avoided.

Variations in the shape and position of the reinforcing member 7 are disclosed. Claims are also directed to the panels *per se*, to a method of constructing a building and to the building itself.

Fig.2



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"A building panel, a method of constructing the panel, a method of constructing a building and a building".

THIS INVENTION relates to a method of a building panel, a method of constructing the panel, a method of constructing a building, and a building.

It is frequently desirable to construct a house from timber panels which may be made within a factory and then assembled on site. Some of the timber panels will be provided with openings for doors and/or windows and, as is known in the art, some form of lintel must be provided to span the top of such an opening when the panel has a load-bearing function, which would be the case, for example, if the panel were part of the ground storey wall of a multi-storey building.

In order to save production time and cost, most such panels are currently produced with lintels which are capable of bearing a relatively large load. However, where the panel in question is not required to carry a significant load in the erected building, it can be seen that there is a wastage of material since the lintel in that panel will have been constructed to be stronger than is necessary.

It is an object of the present invention to provide a method of constructing a panel in which such wastage is reduced.

Accordingly one aspect of the present invention provides a method of constructing a panel for use in the construction of a wall of a building, the method comprising the steps of: constructing a panel having an opening therein for a door, window or the like, the portion of the panel lying across the top of the said opening having a predetermined load-bearing capacity; and, where the actual load to be carried by the panel exceeds the said predetermined load-bearing capacity, attaching a reinforcing member to the panel to increase the load-bearing capacity of the said portion of the panel.

Preferably the reinforcing member is an angle member comprising a longitudinal member having a non-linear transverse section.

Conveniently the said portion of the panel comprises two generally level vertically spaced-apart beams adapted to lie across the top of the opening in the erected building, and the angle member is attached to the upper of the said two beams.

A second aspect of the invention provides a panel for use in the construction of a building, the panel being constructed by a method according to the first aspect of the invention.

A third aspect of the invention provides a panel for use in the construction of a building, the panel comprising: an opening for a door, window or the like; a portion lying across the top of the opening (when the panel is in an erected orientation), the said portion having a low load-bearing capacity; and a reinforcing member attached to the said portion to increase the load-bearing capacity of the said portion.

A fourth aspect of the invention provides a method of constructing a building from a plurality of pre-fabricated panels, at least some of which panels comprise openings for doors, windows and the like, the top of each opening being bounded by a portion of the panel having a pre-determined load-bearing capacity, the method comprising the steps of assembling the panels in a desired arrangement and re-inforcing the said portions of the panels only where the load to be carried by that portion exceeds the respective said load-bearing capacity.

A fifth aspect of the invention provides a building constructed from panels according to the second or third aspects of the invention or by a method according to the fourth aspect.

So that the invention may be more readily understood and so that further features may be appreciated, a known form of panel construction and several embodiments of the present invention will now be described by way of example and with reference to the accompanying drawings, in which:

FIGURE 1 is a vertical section through a known timber lintel at the top of a door or window opening in a wooden panel;

FIGURE 2 is a vertical section through the top of a door or window opening in a wooden panel, the form of construction being in accordance with the invention;

FIGURE 3 is a schematic perspective view of the form of construction shown in Figure 2, with the plywood sheathing removed; and

FIGURES 4 to 9 are similar to Figure 2, but respectively show alternative forms of construction in accordance with the invention.

Figure 1 shows a known form of construction of a lintel such as is provided across the top of the opening for a door or window in a timber building panel. In each of Figures 1, 2 and 4 to 8 the inside of the building is on the left of the Figure and the outside of the building is on the right.

The lintel shown in Figure 1 comprises two wooden beams 1, 2 running horizontally across the top of the door or window opening (hereinafter referred to as "the opening"), the wider side of each beam lying in a substantially horizontal plane. These two horizontal beams 1, 2 are spaced vertically from one another by two further beams 3, 4 (herein referred to as "vertical beams"), which run horizontally across the top of the opening but which have their wider sides arranged to lie in substantially vertical planes. Such a lintel can be arranged to have a considerable load-bearing capacity.

A plywood sheathing 5 is commonly applied to the outside of the panel surrounding the opening in order to conceal the construction of the lintel.

Figure 2 illustrates a preferred method of construction of a lintel in accordance with the invention. It can be seen that the two horizontal beams 1, 2 shown in Figure 1 are present, but that the two vertical beams 3,4 are absent. The two horizontal beams 1, 2 are spaced vertically apart from one another by means of horizontally spaced members 6, which can be seen more clearly in Figure 3. This form of construction is less strong than the known construction illustrated in Figure 1, and, unless the components of the panel were individually to be strong, the panel could not be used in a position where it was required to bear a significant load. The panel thus has a low load-bearing capacity.

In order to modify the panel so that a load may be supported, a steel angle member 7 having an "L" section and orientated with the "L" inverted is added to the panel, before the plywood sheathing 5 is applied to form a lintel. The short leg of the "L" of the angle member 7 lies along the top surface of the upper 1 of the two horizontal beams 1, 2 and the longer leg of the "L" from the upper horizontal beam 1 to cover the outside face of the upper beam 1. The downward extent of the longer leg of the "L" may be sufficient to cover the outside face of the lower horizontal beam 2. The angle member 7 is wide enough for each end to be supported by a respective one of the side pillars 8 which define the lateral extent of the opening.

In practice, the panel is constructed in a factory and is shipped to the construction site before the angle member is added. The addition of the angle member is carried out on site only on the panels which are to bear a load, and the waste of using load-bearing lintels where they are not necessary is avoided.

A convenient way to attach the angle member 7 to the panel is by means of nails passing through the angle member 7 (commonly at 400 or 600 mm centres) into the horizontal beams 1 and 2, the upright members 6 and the side pillars 8. The positions of the nails 9 are illustrated schematically in Figure 3.

It is possible for the vertical members 6 to be dispensed with, the separation of the upper and lower horizontal beams 1, 2 then being achieved by the attachment of these two beams to the upright pillars 8, in which case substantially vertical stiffening ribs (not shown) may be provided throughout the length of the longer leg of the angle member 7.

It is to be appreciated that, not only does the lintel have a low load-bearing capacity in the absence of the angle member 7, but also that the angle member 7 itself need not be capable in its own right of supporting the loads to be carried, since it is the combination of the lintel and the angle member which provides the strength of the finished article and which has a "high load-bearing capacity" sufficient to support superimposed storeys of the building. Thus, the angle member 7 may be of relatively light construction.

In the embodiment illustrated in Figure 2, the usual plywood sheathing 5 is applied to the finished article to cover the angle member 7 and thus, as in the known construction illustrated in Figure 1, serves to conceal the manner of construction of the lintel. It will be appreciated that the sheathing 5 is therefore added on site and not in the pre-fabricating factory.

Figures 4 to 9 illustrate alternative forms of construction of a lintel in accordance with the invention, in which the location and form of the angle member 7 are varied. A brief description of each Figure will suffice for the man skilled in the art to appreciate the mode of construction.

In Figure 4, the angle member 7 is the same as the angle member 7 illustrated in Figure 2, but is applied over the plywood sheathing 5 and thus at least some of the nails 8 which attach the angle member 7 to the panel will pass through the plywood sheathing. Therefore, in this embodiment, and in those shown in Figures 5-9, the sheathing may be applied in the factory if desired.

Figure 5 illustrates a mode of construction employing a modified angle member 7a provided with two angles to form a channel-section member. A further modification consists of the modified angle member 7a lying between the upper and lower horizontal beams 1, 2 and embracing a relatively small vertical beam 10. The channel of the angle member 7a faces inwards. It is to be noted that the vertical beam 10 in this form of construction is not equivalent to either of the two vertical beams 3, 4 illustrated in Figure 1, since there is no great load-bearing capacity in the construction shown in Figure 5 unless the angle member 7a is present.

Figure 6 shows a form of construction in which the angle member 7 is once again the same as the angle member 7 illustrated in Figure 2, but in this form of construction the angle member 7 is located with the longer leg of the "L" on the inside of the panel instead of on the outside. The shorter leg of the "L" remains on top of the upper horizontal beam 1, and the plywood sheathing 5 is applied to the panel in the conventional manner.

Figures 7 and 8 illustrate further modifications in which a saw kerf 11 (in other words a pre-made saw cut) is provided in the upper horizontal

beam 1, the kerf 11 running along substantially the entire span of the upper horizontal beam 1 across the opening. The angle member 7 is the same as in Figure 2 and the shorter leg of the "L" lies on top of the upper horizontal beam 1. However, the longer leg of the "L" passes downwards through the kerf 11 into the space between the upper horizontal beam 1 and the lower horizontal beam 2. Depending upon the downward extent of the longer leg of the "L", it may be necessary to provide a second saw kerf 12 in the lower horizontal beam 2.

Finally, Figure 9 illustrates a modified form of construction similar to that shown in Figure 5, in that the angle member 7a is in the form of a channel-section member, is located between the upper horizontal beam 1 and lower horizontal beam 2 and embraces a relatively small vertical beam 10a. However, in the construction shown in Figure 9 the channel of the angle member 7 faces outwardly and the small vertical beam 10a is adjacent the inside face of the plywood sheathing 5.

It will be appreciated that in all of these embodiments the panel has a low load-bearing capacity in the absence of the angle member 7 or 7a, and thus, since the angle member is inserted only where a load-bearing capacity is required, cost savings can be made.

CLAIMS:

1. A method of constructing a panel for use in the construction of a wall of a building, the method comprising the steps of: constructing a panel having an opening therein for a door, window or the like, the portion of the panel lying across the top of the said opening having a predetermined load-bearing capacity; and, where the actual load to be carried by the panel exceeds the said predetermined load-bearing capacity, attaching a reinforcing member to the panel to increase the load-bearing capacity of the said portion of the panel.

2. A method according to claim 1, wherein the reinforcing member is an angle member comprising a longitudinal member having a non-linear transverse section.

3. A method according to claim 2 wherein the said portion of the panel comprises two generally level vertically spaced-apart beams adapted to lie across the top of the opening in the erected building, and the angle member is attached to the upper of the said two beams.

4. A method according to claim 2 or 3 wherein the angle member is made of steel.

5. A method according to claim 3 or 4 wherein at least one upright member is provided between the upper of the said two beams and the lower of the said two beams.

6. A method according to any one of claims 2 to 5 wherein the angle member has a substantially "L" cross-section.

7. A method according to claim 6 wherein the short leg of the "L" is attached to the upper surface of the upper of the said two beams and the longer leg of the "L" depends therefrom.

8. A method according to claim 7 wherein the longer leg of the "L" lies adjacent the side of the panel adapted to be on the outside of the building.

9. A method according to claim 8, wherein a layer of plywood sheathing is applied to the panel to sandwich the said longer leg of the "L" of the angle member between the said sheathing and the panel.

10. A method according to claim 8 wherein a layer of plywood sheathing is applied to the panel before the said angle member is attached.

11. A method according to claim 7, wherein the longer leg of the "L" of the angle member lies adjacent the side of the panel which is intended to be on the inside of the building.

12. A method according to claim 6, wherein a saw kerf is provided in the upper of the said two beams and the angle member is inserted at least partially into the said kerf.

13. A method according to any one of claims 2 to 5 wherein the angle member has a channel cross-section and is located between the said two beams.

14. A method according to claim 13 wherein the channel of the angle member embraces a third beam.

15. A method according to any one of the preceding claims wherein the panel is substantially made of wood.

16. A panel for use in the construction of a building, the panel comprising: an opening for a door, window or the like; a portion lying across the top of the opening (when the panel is in an erected orientation), the said portion having a low load-bearing capacity; and a reinforcing member attached to the said portion to increase the load-bearing capacity of the said portion.

17. A method of constructing a building from a plurality of prefabricated panels, at least some of which panels comprise openings for doors, windows and the like, the top of each opening being bounded by a portion of the panel having a pre-determined load-bearing capacity, the method comprising the steps of assembling the panels in a desired arrange-

ment and re-inforcing the said portions of the panels only where the load to be carried by that portion exceeds the respective said load-bearing capacity.

18. A panel for use in the construction of a building, the panel being constructed by a method according to any one of claims 1 to 15.

19. A building constructed using panels according to claim 16 or 18 or by a method according to claim 17.

Fig.1.

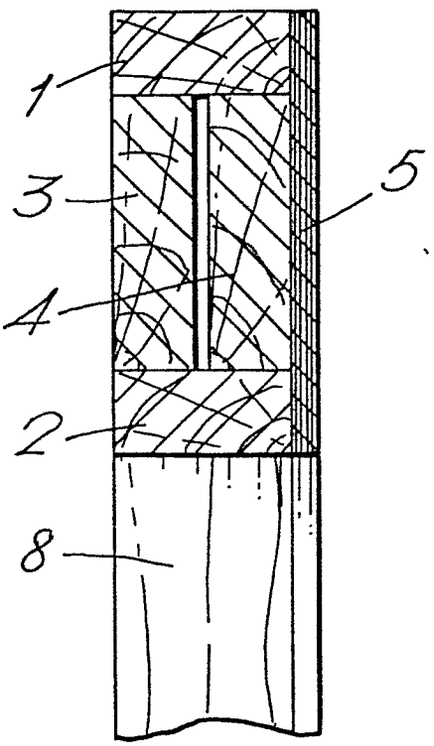

Fig.2.

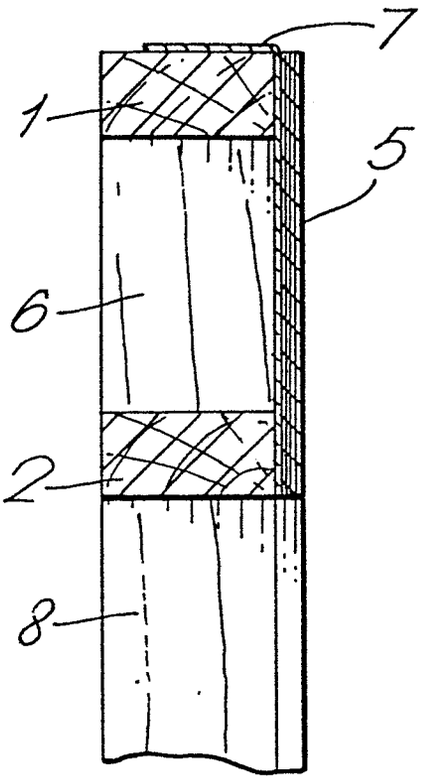

Fig.3.

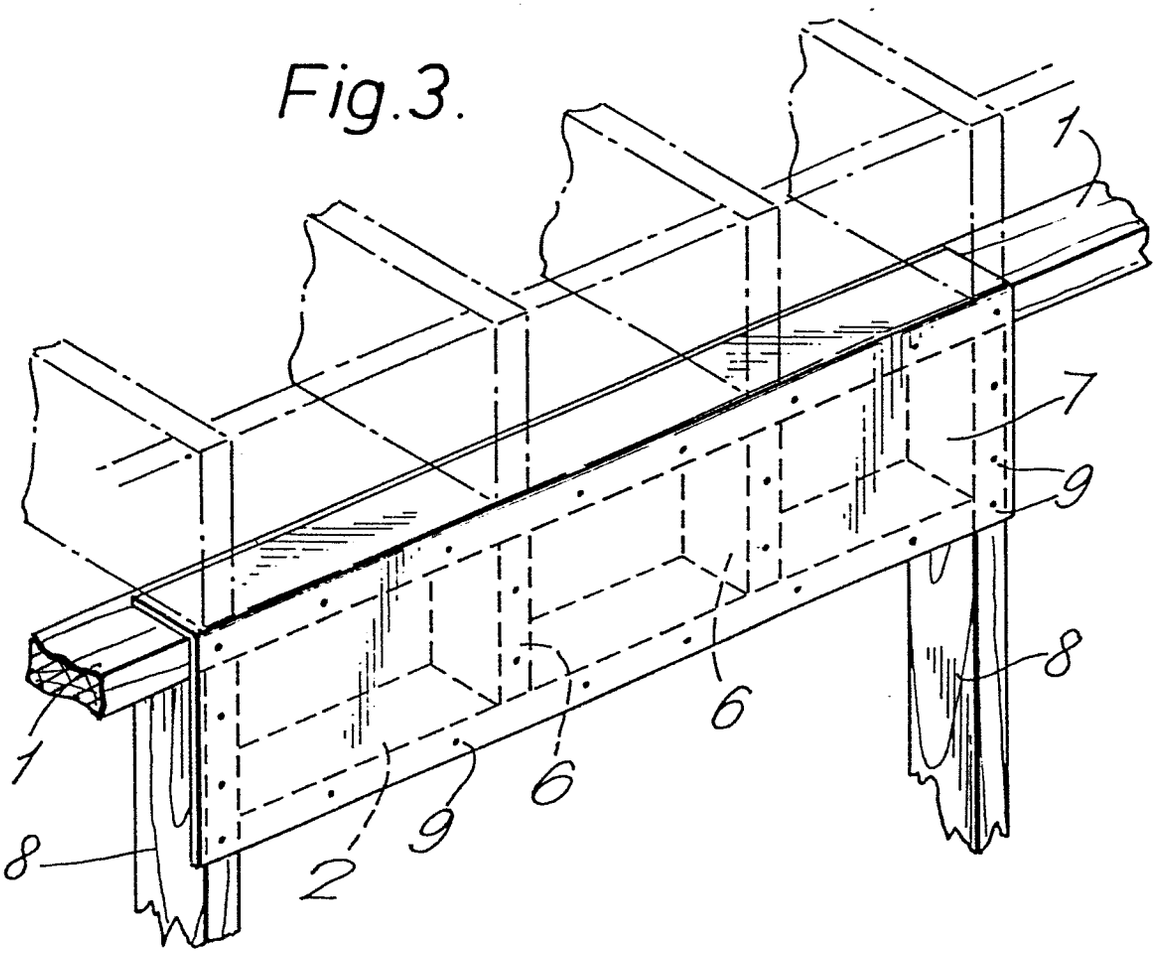

Fig.4.

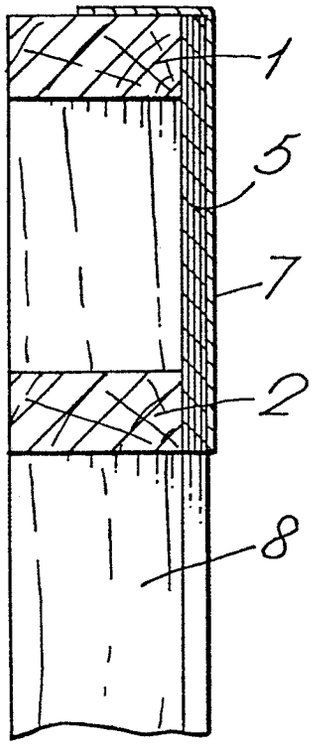

Fig.5.

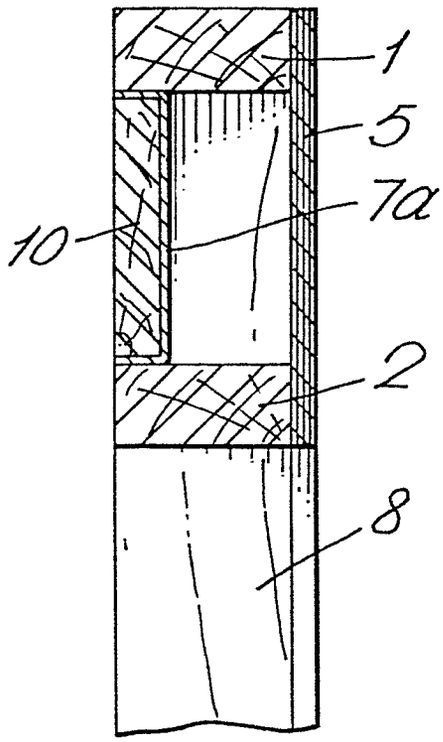

Fig.6.

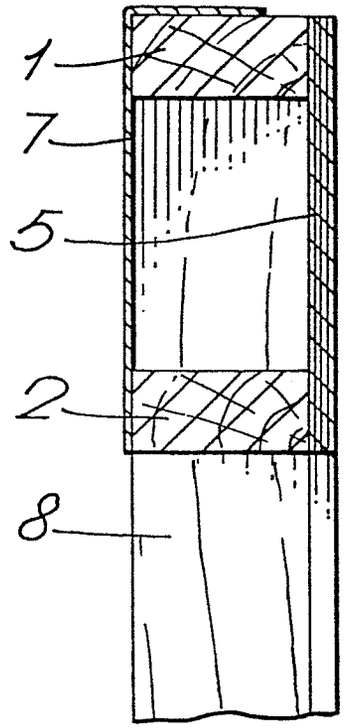

Fig.7.

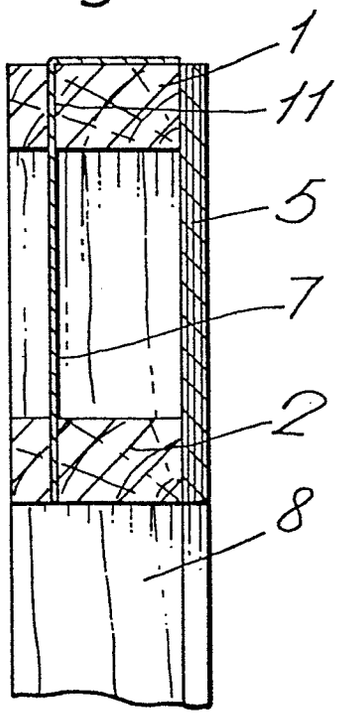

Fig.8.

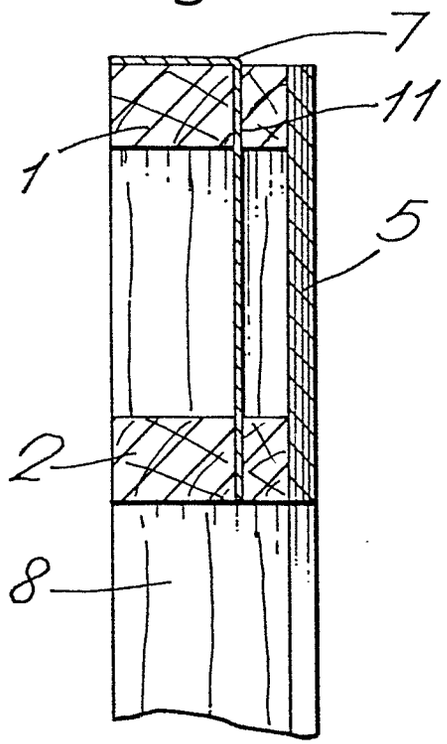

Fig.9.