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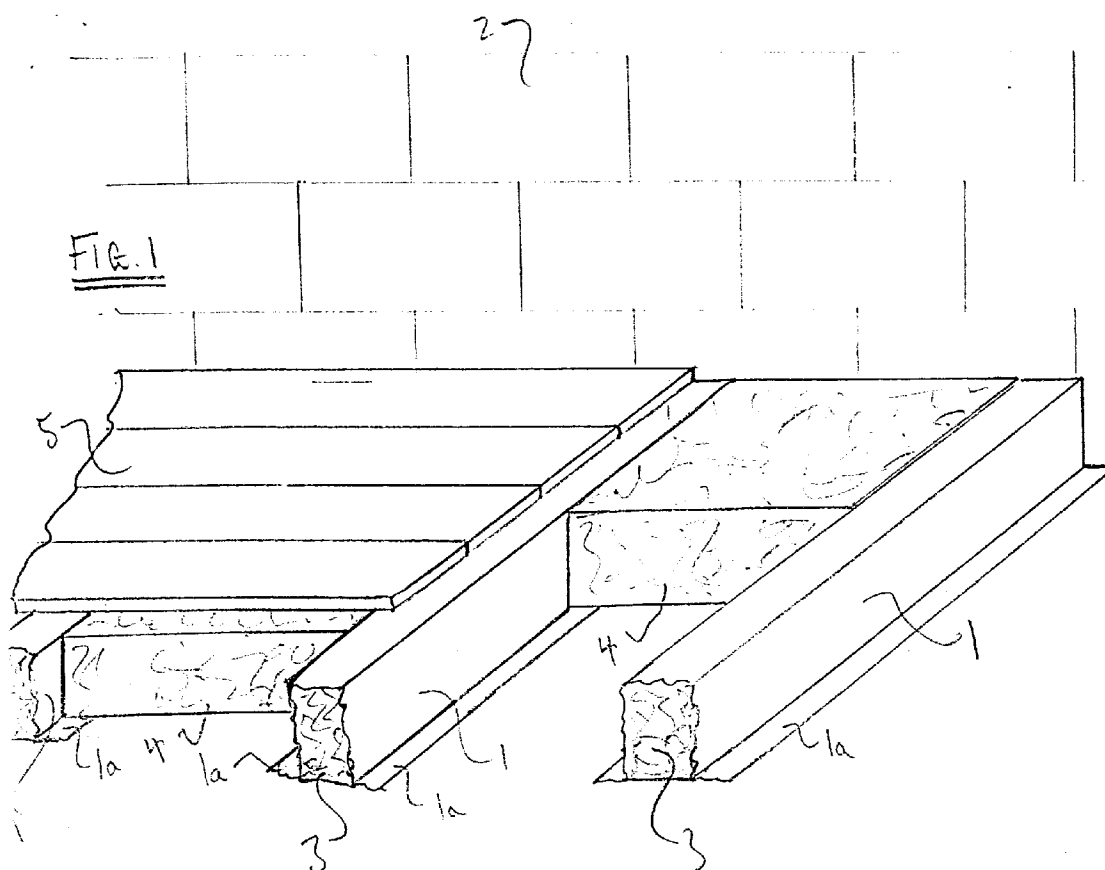
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(54) Flooring structure

(57) A flooring structure comprises beams (1) of box or inverted channel section, thermally insulating material (4) supported between adjacent beams (1), and

decking (5) supported by the beams (1). Also described are forms of beam (1) suitable for use in the flooring structure and methods of constructing the flooring structure.



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Description

[0001] This invention relates to a flooring structure, to structural components utilised in that flooring structure and to methods of forming such a flooring structure.

[0002] In the construction of buildings, timber beams were traditionally used to support floors. Timber is, however, relatively expensive and also liable to decay. For many years, therefore, concrete beams of inverted T-section have been used to support flooring structures. The lateral limbs of the beams provide support for inert infill material, typically dense concrete blocks of 100mm thickness. Lightweight blocks may also be used, for insulation purposes.

[0003] Flooring of the kind described above performs satisfactorily, but does suffer from numerous disadvantages. For instance, the concrete beams are heavy and difficult to handle. They are generally of pre-stressed construction, can be broken if handled incorrectly and do not lend themselves to spanning over intermediate supports. In addition, the weight of the beams (and, if present, of the concrete blocks which they support) means that a substantial proportion of the structural capacity of the beams is required to support the dead weight of the floor itself.

[0004] There has now been devised a flooring structure which overcomes or substantially mitigates the above and other disadvantages of known flooring structures.

[0005] According to the invention, a flooring structure comprises beams of box or inverted channel section, thermally insulating material supported between adjacent beams, and decking supported by said beams.

[0006] The flooring structure according to the invention is advantageous primarily in that the beams are relatively light in weight. They are therefore relatively easily handled, without the use of mechanical lifting gear, and their use is therefore accompanied by a lower risk of injury to those handling them. The beams are also readily cut to any desired length and can be joined to form extended beams. They can also be placed over a series of supports without detriment to the beams.

[0007] According to another aspect of the invention, there is provided a beam for use in a flooring structure, said beam being of box or inverted channel section.

[0008] In some preferred embodiments, the beams are of inverted channel section, and are preferably formed from sheet material, eg by cold-forming. The sheet material is most conveniently a metal sheet, eg of steel.

[0009] The beams are preferably protected against corrosion. For example, the beams may be galvanised or may have suitable paint or plastics coatings. When the beams are formed from metal sheet, the sheet may be galvanised prior to forming, with any exposed edges being treated subsequently.

[0010] The beams are preferably formed with flanges or the like which extend transverse to the longitudinal

axis of the beams. Such flanges serve to support thermally insulating material between pairs of beams.

[0011] The insulating material typically comprises rigid or semi-rigid boards, eg of expanded polystyrene. At least some of the insulating material is in the form of components of sufficient compressive strength to resist movement towards each other of the beams between which the insulating material is supported. The insulating material should be of sufficient depth to provide the completed flooring structure with the desired degree of thermal insulation. Most preferably, the insulation material has a depth substantially equal to the depth of the beams, but the depth of insulation material may alternatively be less than this, or greater.

[0012] The interior of the beams is preferably filled with thermally insulating material, eg of expanded polystyrene.

[0013] Typically, the beams will be supported at 600mm centres or less and will lie parallel to each other.

The ends of the beams are preferably supported by the walls of the building, eg by being received within the inner leaf of a cavity wall or supported on suitable fixtures attached to the wall.

[0014] According to a further aspect of the invention, there is provided a method of constructing flooring, which method comprises the steps of

- (a) supporting a plurality of beams across the area in which the flooring is to be constructed, said beams being of box or inverted channel section,
- (b) positioning thermally-insulating material between said beams, and
- (c) laying decking on said beams.

[0015] The decking supported by the beams may have any conventional form. For example, the decking may comprise tongued and grooved floorboards, particle board or plywood. The decking may be insulated, eg by being bonded to a thermally insulating material to form a laminate.

[0016] The beams are preferably of inverted channel section and may have a variety of forms. The beam may, for example, have a flat upper surface or the upper surface may be formed with an apex. In the latter case the weight of the decking may cause the upper surface of the beam to have a keying engagement with the underside of the decking, especially where the decking includes relatively soft thermal insulation material.

[0017] Preferred embodiments of the flooring structure according to the invention will now be described, by way of illustration only, with reference to the accompanying drawings, in which

Figure 1 is a partial, schematic view of a flooring structure according to the invention, in a partly constructed condition,

Figure 2 shows end views of alternative forms of

beam which can be utilized in the flooring structure of the invention,

Figure 3 shows (a) a detail, partially cut away, of a reinforced beam which can be utilized in the flooring structure of the invention, (b) an end view of another form of such a beam, (c) an end view of a further modified form of reinforced beam, and (d) a side elevation of the beam of Figure 3(c) mounted on a support;

Figure 4 is an end view of a further modified beam;

Figure 5 shows (a) a perspective view of the end of a further modified beam, (b) an end view of another form of such a beam, and (c) an end view of a further modification; and

Figure 6 shows how different thicknesses of insulating material may be supported by the beam in the flooring structure of the invention.

[0018] Referring first to Figure 1, a flooring structure comprises a plurality of identical beams 1 arranged parallel to one another at 60cm centres and supported at their ends in the inner leaf of a blockwork cavity wall 2. The ends of the beams 1 may be received within suitably formed recesses in the wall 2, or may be supported by suitable brackets fixed to the wall 2.

[0019] The beams 1 are formed by pressing galvanised steel sheet to form an inverted channel with lateral flanges 1a. The inverted channel is filled with a thermally insulating material 3, such as polystyrene foam. Blocks 4 of thermally insulating material are positioned between successive beams 1, being supported on the flanges 1a.

[0020] The flooring is completed by floorboards 5, eg tongued-and-grooved boards, laid on and supported by the beams 1.

[0021] Figure 2 shows several different profiles of beam which may be used in place of that shown in Figure 1. The upper surface of the beam may be formed with an apex (Figures 2a and 2b) or with a depression (Figure 2c). The top may alternatively be rounded (Figure 2d) or have bevelled edges (Figure 2e).

[0022] Figure 3(a) shows a modified form 10 of a beam which is generally similar to the beam 1 shown in Figure 1. The beam 10 differs from that described above in that steel reinforcements 11 of U-section are fitted sideways, internally of the inverted channel. Only one such reinforcement 11 is shown in the drawing, but in practice reinforcements would be fitted at intervals along the length of the beam 10. Figure 3(b) shows an alternative construction of a beam 10a, again with a U-shaped reinforcement 11a. In this embodiment the reinforcement 11a is inverted. In the further modification shown in Figure 3(c), an inverted U-shaped reinforcement 11b extends along substantially the whole length

of the beam 10b and extends below the soffit of the unit. The overall depth of the structure, its stiffness and spanning capability are thereby enhanced. As can be seen in Figure 3(d), the reinforcement 11b is stopped short of the end of the beam 10b with the result that these attributes are substantially retained whilst allowing the beam 10b to bear on a supporting structure 15.

[0023] In the further modified beam 20 shown in Figure 4, a soffit plate 21 is fitted to the underside of the flanges 20a. The soffit plate 21 may extend along the full length of the beam 20 or a number of soffit plates 21 may be fitted at intervals along the beam 20.

[0024] The beam 30 shown in Figure 5(a) differs from those previously described in that it is formed from two symmetrical wall components 31,32 which are held together by U-section spacers 33 positioned sideways between them. Each wall component 31,32 may be formed by pressing relatively narrow lengths of steel sheet. Such a construction may therefore utilise scrap lengths of sheet material. In the modified construction shown in Figure 5(b), the wall components 31a,32a are held together by spacers 33a of inverted U-section. Figure 5(c) shows a modification similar to that of Figure 3(c), in which the spacer 33b extends below the lower surfaces of the wall components 31b,32b.

[0025] Finally, Figure 6 shows how the space between beams 60 may be filled with insulating material 61 of depth equal to the depth of the beam 60 (as also shown in Figure 1), or with material 62 of greater thickness or material 63 of lesser thickness.

[0026] In all the embodiments of beams described above, the beam may be filled with insulating material similar to that incorporated into the beam 1 of Figure 1.

Claims

1. A flooring structure comprising beams of box or inverted channel section, thermally insulating material supported between adjacent beams, and decking supported by said beams.
2. A flooring structure as claimed in Claim 1, wherein the beams are of inverted channel section.
3. A flooring structure as claimed in Claim 2, wherein the beams are formed from sheet material.
4. A flooring structure as claimed in Claim 3, wherein the beams are formed by cold-forming.
5. A flooring structure as claimed in Claim 3 or Claim 4, wherein the sheet material is a metal sheet.
6. A flooring structure as claimed in Claim 5, wherein the metal sheet is a steel sheet.
7. A flooring structure as claimed in any preceding

- claim, wherein the beams are protected against corrosion.
8. A flooring structure as claimed in Claim 7, wherein the beams are galvanised.
9. A flooring structure as claimed in Claim 7, wherein the beams are coated with paint or plastics material.
10. A flooring structure as claimed in any preceding claim, wherein the beams have flanges which extend transverse to the longitudinal axis of the beams.
11. A flooring structure as claimed in any preceding claim, wherein the insulating material comprises rigid or semi-rigid boards.
12. A flooring structure as claimed in any preceding claim, wherein the insulating material has a depth substantially equal to the depth of the beams.
13. A flooring structure as claimed in any preceding claim, wherein the insulating material is expanded polystyrene.
14. A flooring structure as claimed in any preceding claim, wherein the interior of the beams is filled with a thermally insulating material.
15. A flooring structure as claimed in Claim 14, wherein the interior of the beams is filled with expanded polystyrene.
16. A flooring structure as claimed in any preceding claim, wherein the beams have an upper surface which is formed with an apex.
17. A flooring structure as claimed in any preceding claim, which is of inverted channel section and comprises one or more reinforcing members fitted within said channel.
18. A flooring structure as claimed in Claim 17, wherein said reinforcing members are of inverted U-section.
19. A flooring structure as claimed in Claim 18, wherein said reinforcing members extend below the side walls of said beams.
20. A flooring structure as claimed in any preceding claim, wherein the beams are supported by the walls of a building of which the flooring structure forms part.
21. A flooring structure as claimed in Claim 20, wherein the beams are received within the inner leaf of a cavity wall.
22. A flooring structure as claimed in Claim 20, wherein the beams are supported on fixtures attached to the wall.
23. A beam for use in a flooring structure, said beam being of box or inverted channel section.
24. A method of constructing flooring, which method comprises the steps of
- (a) supporting a plurality of beams across the area in which the flooring is to be constructed, said beams being of box or inverted channel section,
 - (b) positioning thermally-insulating material between said beams, and
 - (c) laying decking on said beams.
25. A method as claimed in Claim 24, wherein the decking comprises tongued and grooved floorboards, particle board or plywood.
26. A method as claimed in Claim 24 or Claim 25, wherein the decking is bonded to a thermally insulating material.

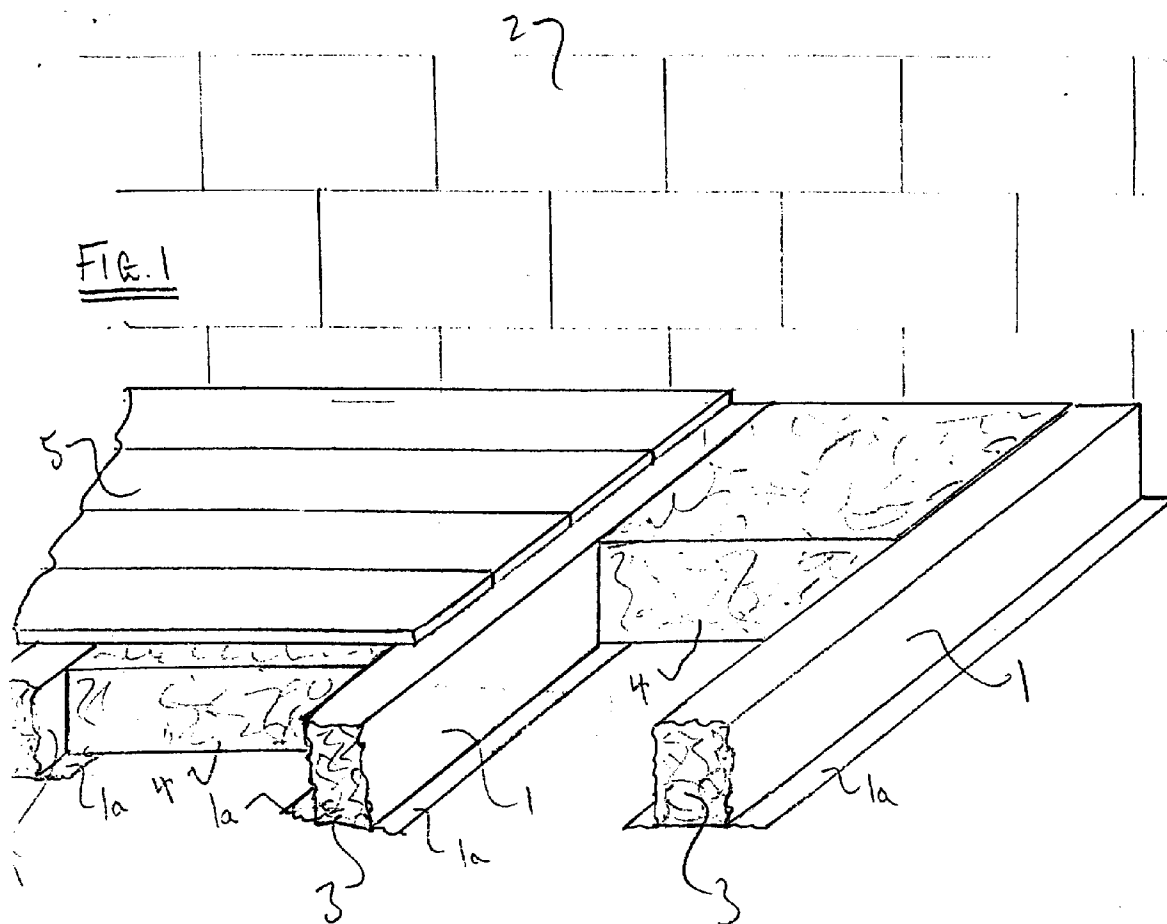


FIG. 2

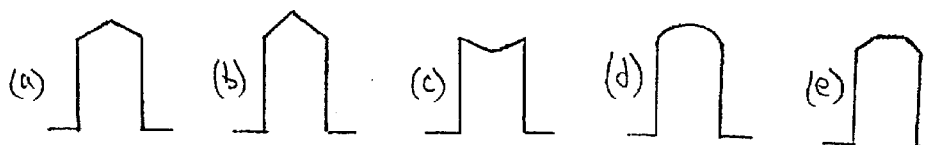
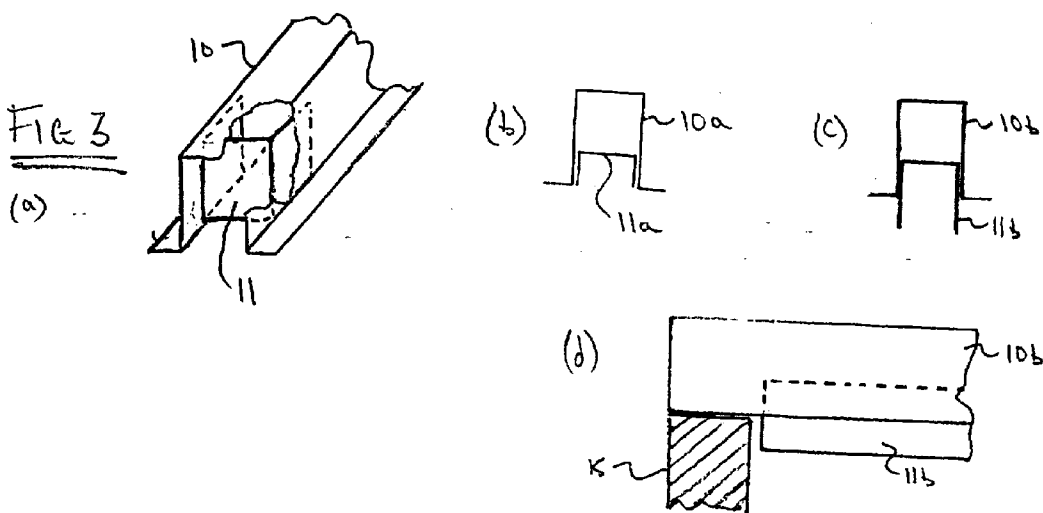


FIG. 3



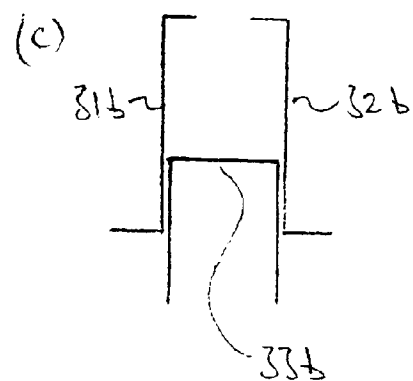
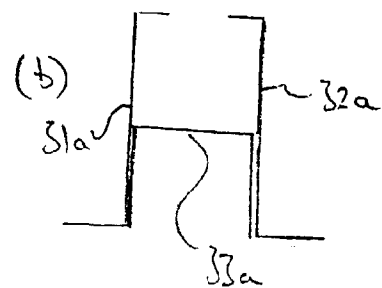
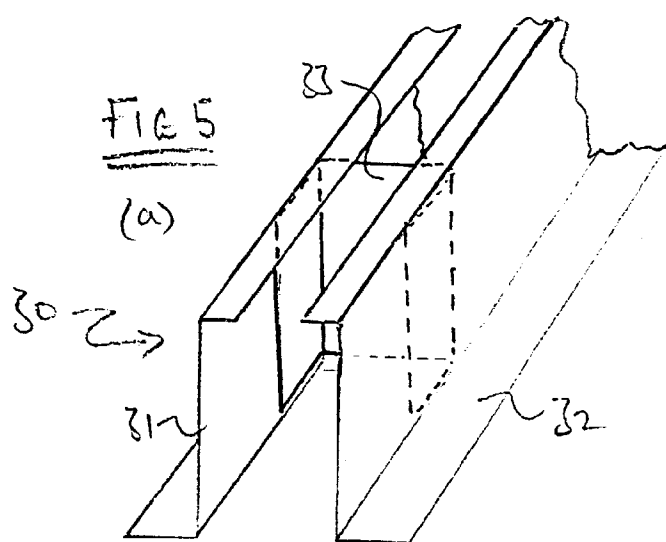
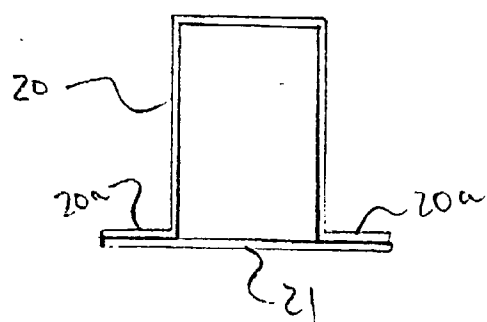


FIG 6

