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US 3040479 A US 20030217521 A1

(71) Applicant(s):
SIMPSON STRONG-TIE INTERNATIONAL INC.
(Incorporated in USA - Delaware)
Winchester Road, Cardinal Point,
TAMWORTH, Staffordshire, B78 3HG,
United Kingdom

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(72) Inventor(s):
Michael Patrick Reardon

(74) Agent and/or Address for Service:
Boult Wade Tennant
Verulam Gardens, 70 Gray's Inn Road,
LONDON, WC1X 8BT, United Kingdom

(54) Abstract Title: **A floor support system**

(57) The invention relates to a floor support system 10, especially floors used in attic or loft conversions. The system comprises a joist 11 comprising a main body portion 13 of substantially uniform cross-sectional area and an end portion whose cross-sectional area is less than that of the main body portion, and a support 14 for supporting the joist and comprising a supporting portion for providing strength to the end portion of the joist 11. The support 14 may also be provided with a fixing portion in the form of a flange 15 for fixing the support to a building. The main body portion 13 of the joist may be I-shaped or rectangular in cross section. Later embodiments relate to a support for use in such a floor support system, and a kit for the formation of a floor support system.

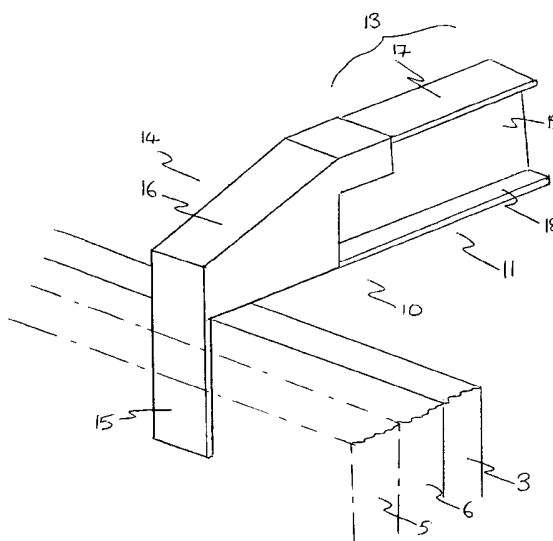


Fig. 1

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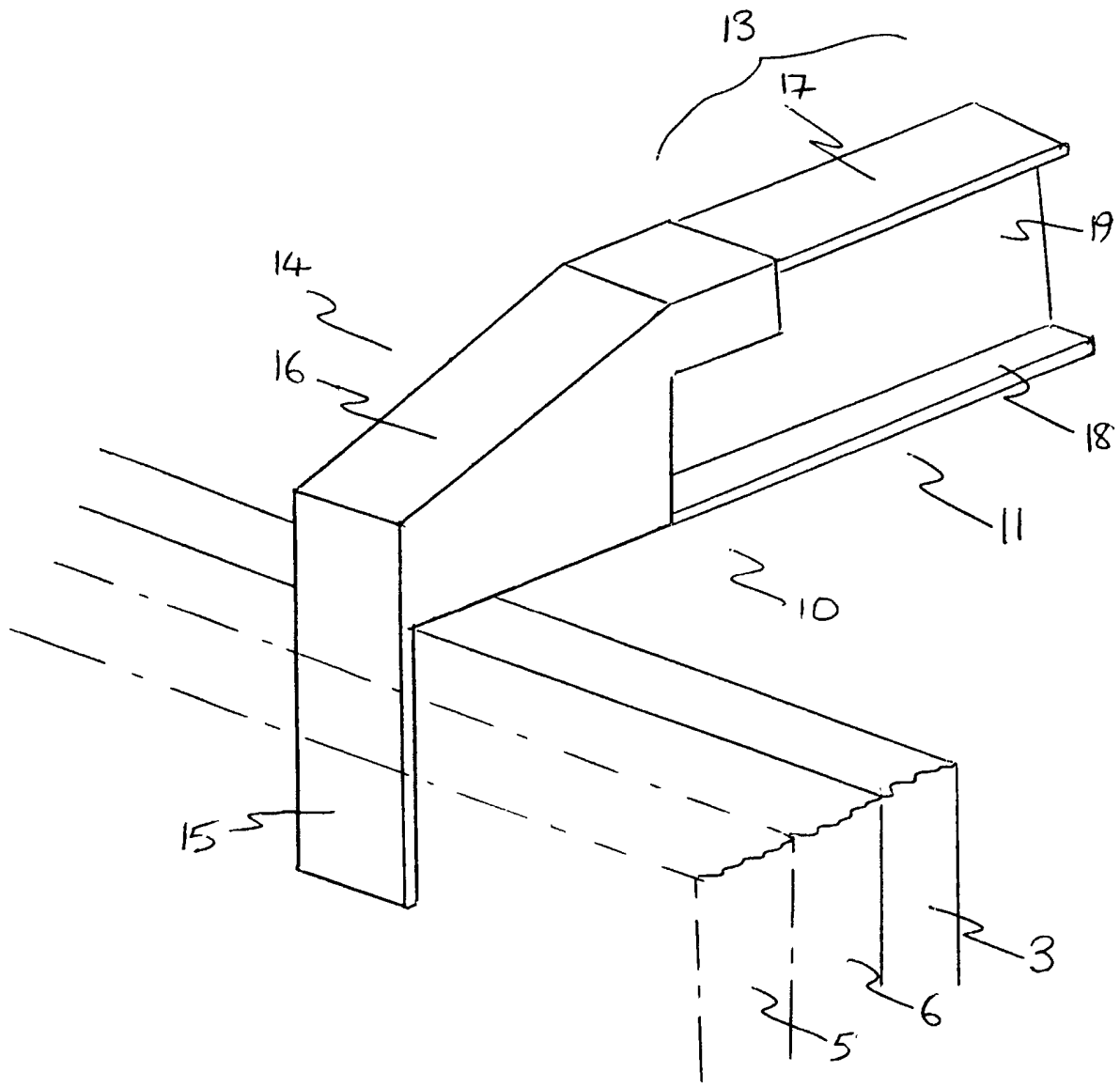


FIG. 1

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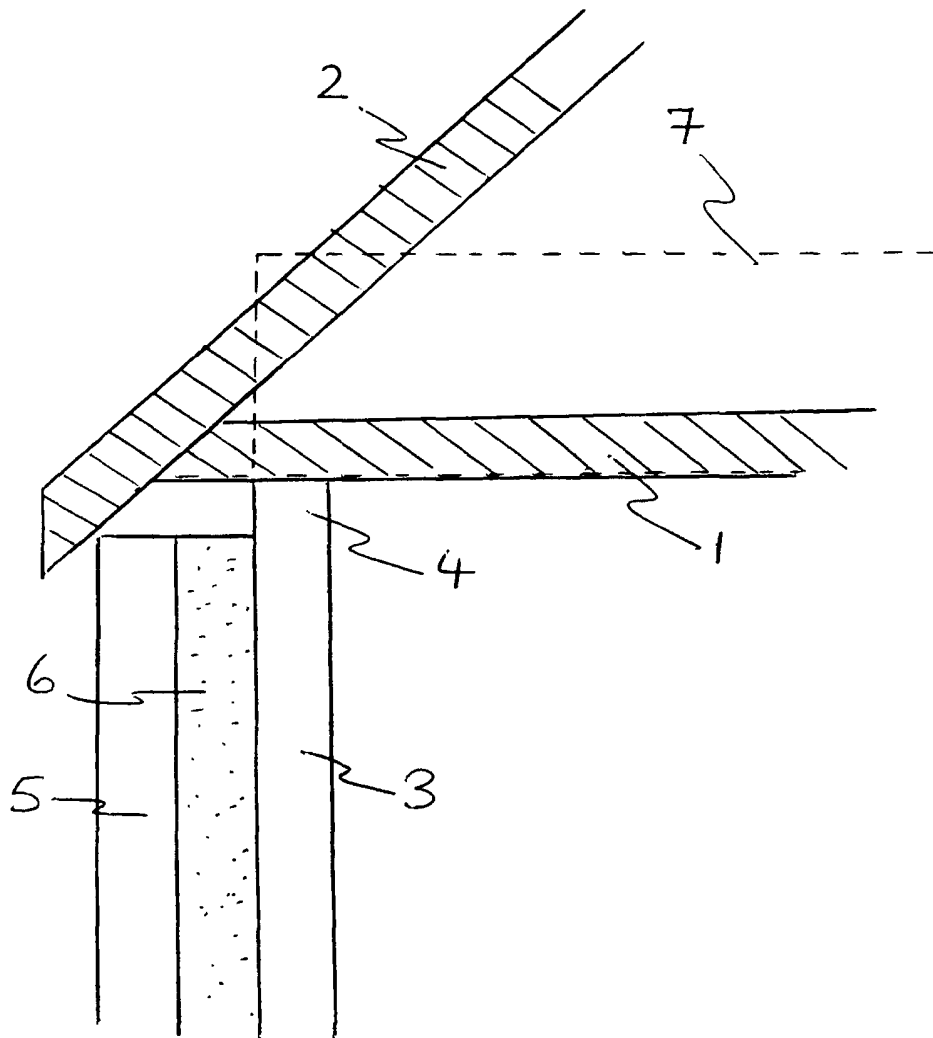
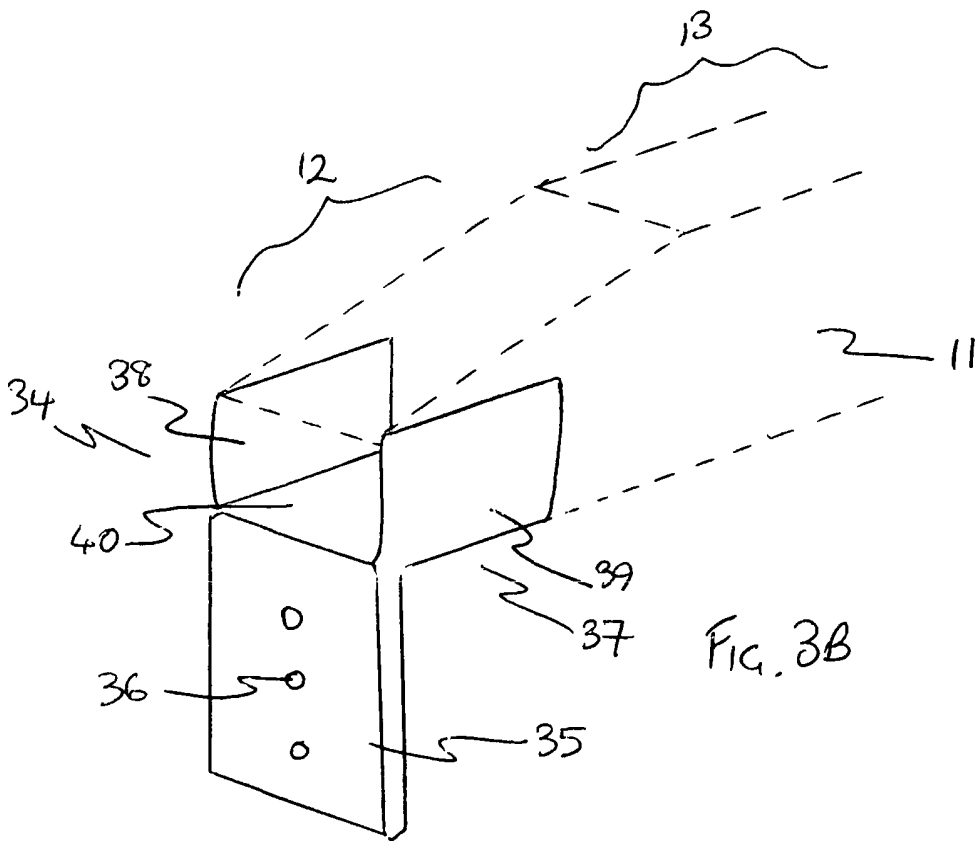
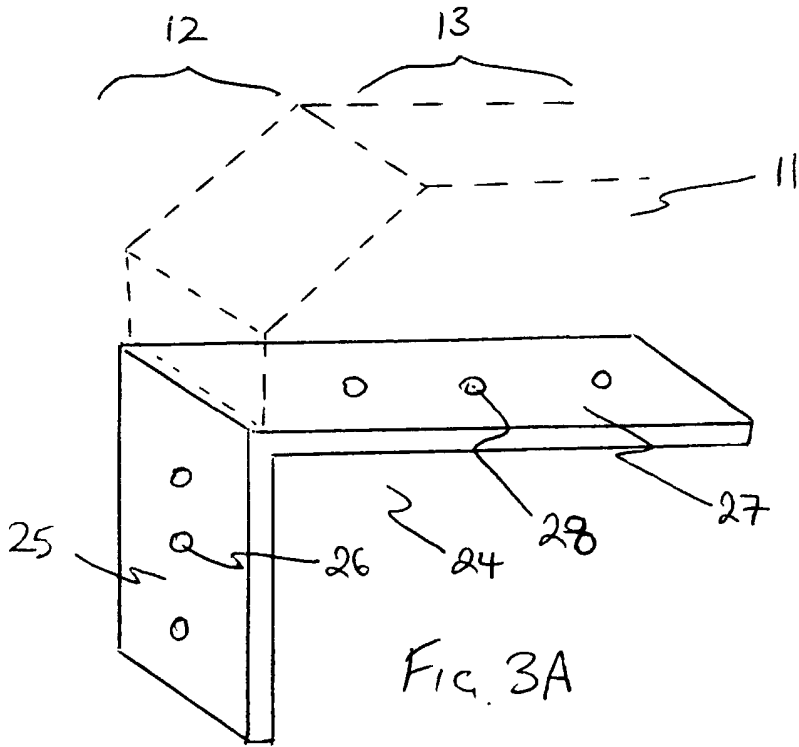


FIG. 2

3/6



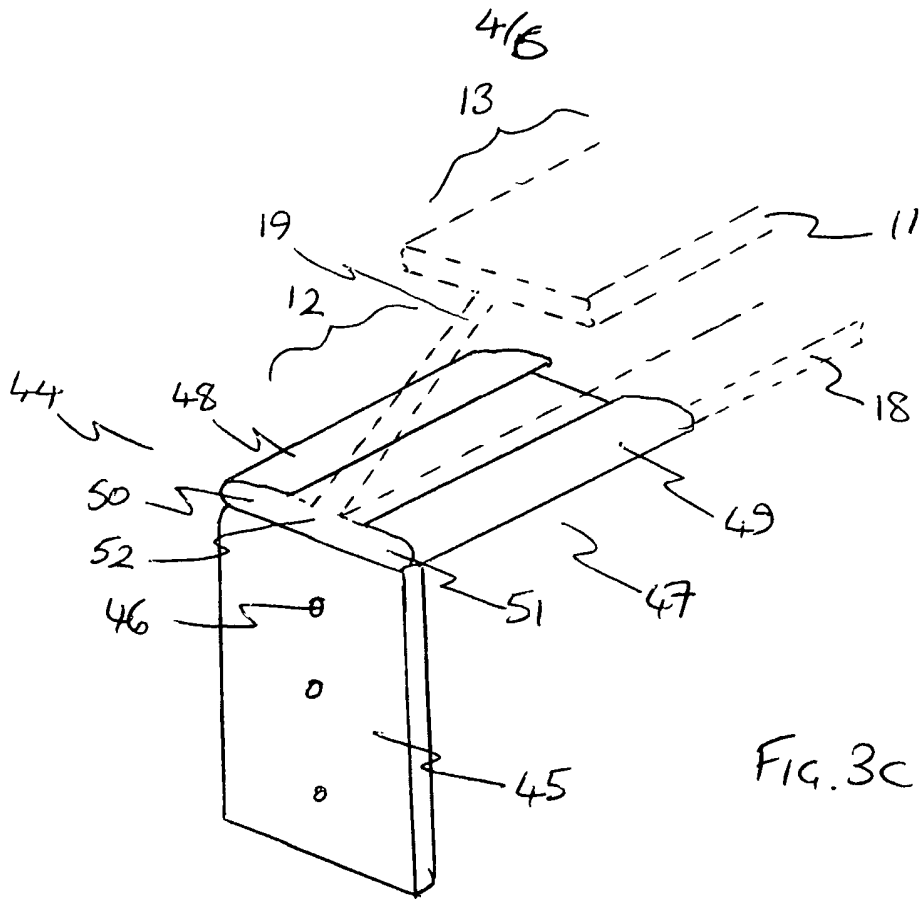


FIG. 3C

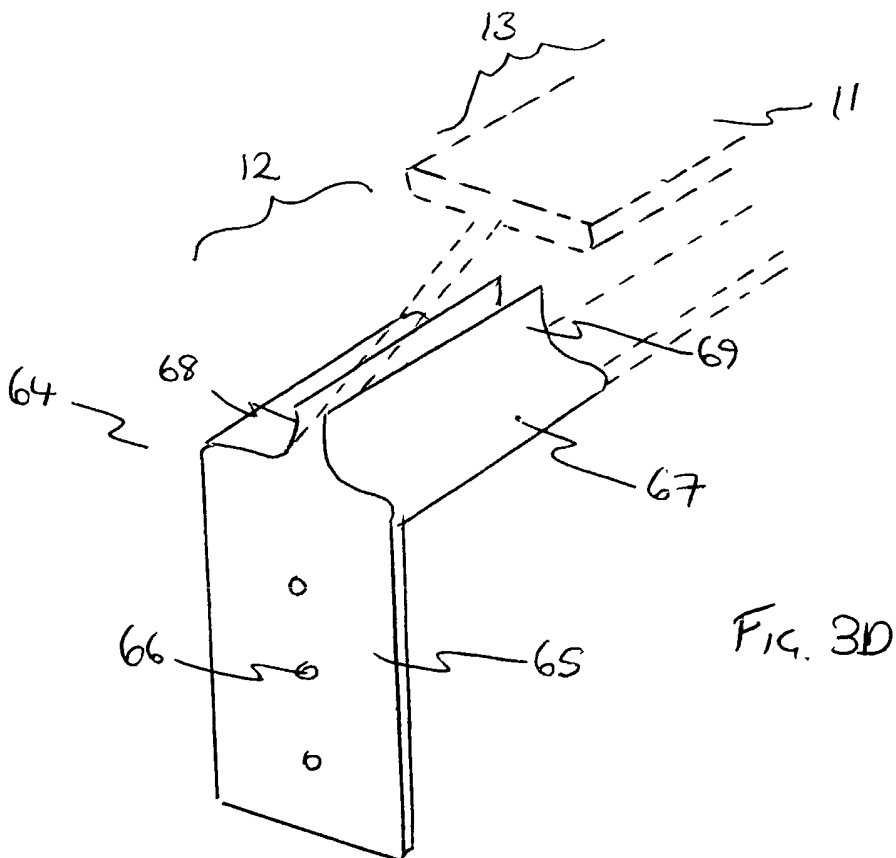


FIG. 3D

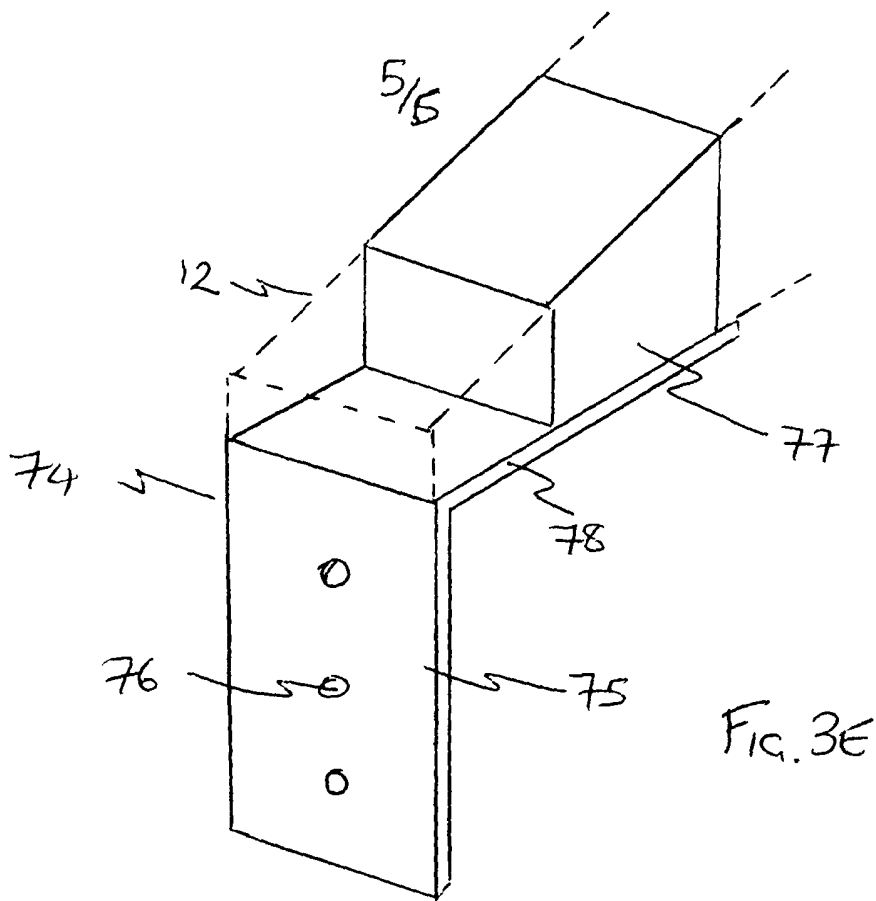


FIG. 3E

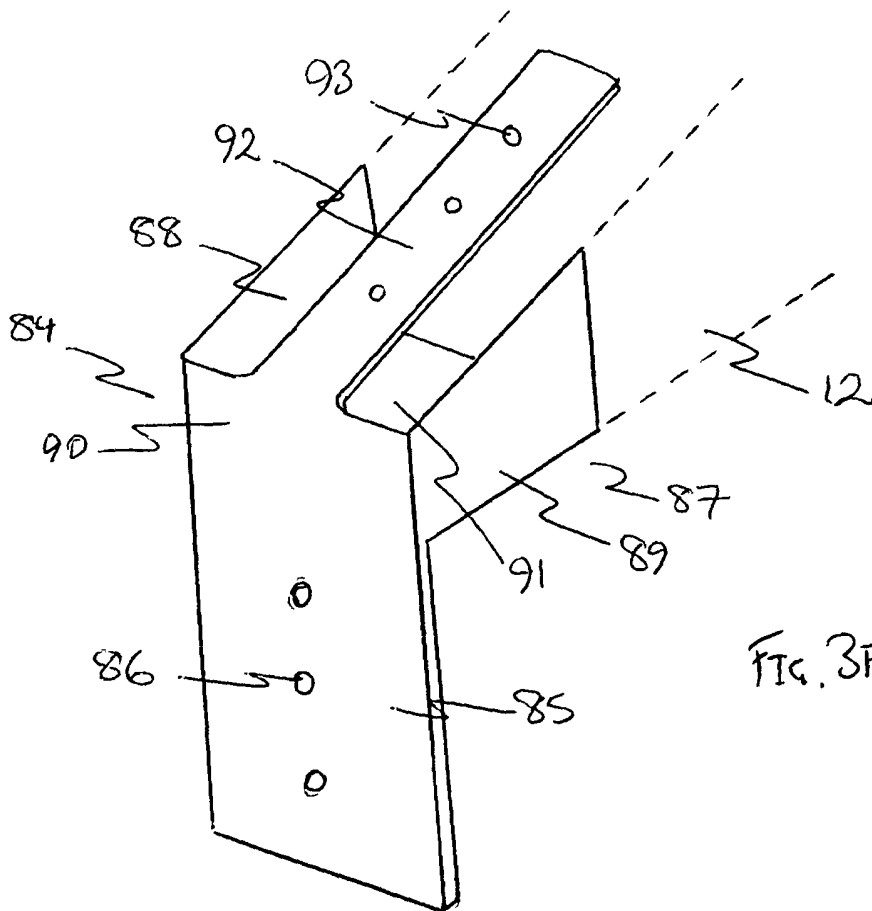


FIG. 3F

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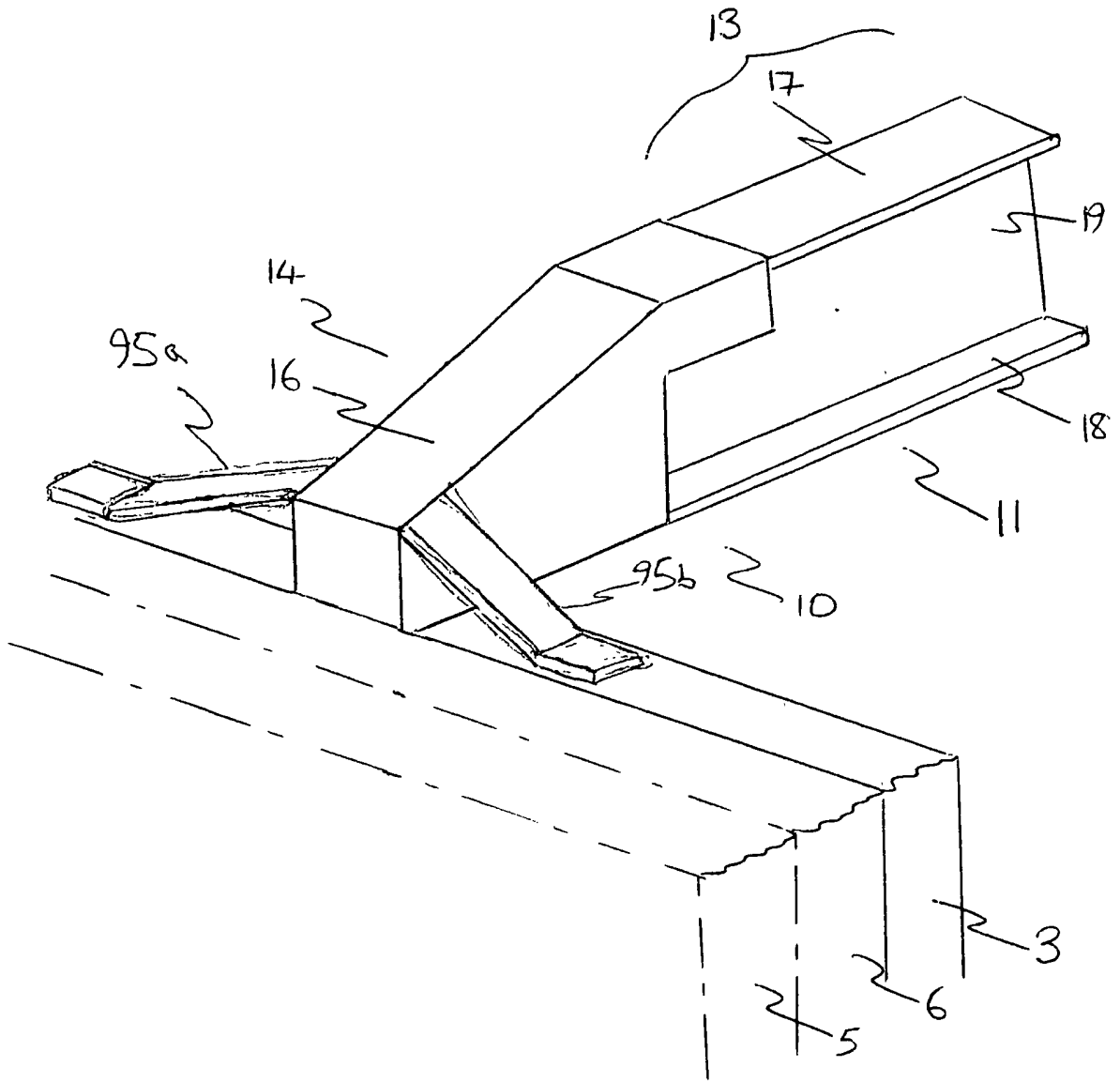


FIG. 3g

Floor support system and support therefor

The present invention relates to a floor support system particularly (but not exclusively) a floor support system
5 that may be used to support a floor in an attic space or the like. The present invention further relates to a support for use in the floor support system.

Roofs in most houses are supported by roof trusses. Whilst
10 roof trusses provide sufficient strength to support the roof, they do not provide sufficient strength to satisfactorily support a floor. Floors in an attic (or loft) are typically supported by a series of parallel steel joists which run along the length of the attic. Such steel joists
15 are heavy and often have to be put into place using a crane or other lifting equipment. This is obviously expensive and inconvenient. One possible alternative would be to use alternative (often wooden) floor supports, such as the FinnJoist supports available from Cullen (Glenrothes, Fife,
20 UK) or Simpson Strong-Tie (Tamworth, Staffordshire, UK). However, such supports would protrude through the proposed roof space and would need a conventional roof to be moved to accommodate the joist.

25 The present invention seeks to mitigate one or more of the problems of the prior art.

There is provided in accordance with a first aspect of the present invention, a floor support system comprising:

- 30 (a) a joist for supporting a floor, the joist comprising a main body portion of substantially uniform cross-sectional area and an end portion whose cross-

sectional area is less than that of the main body portion, and

- (b) a support which is for supporting the joist, the support comprising a supporting portion for
5 providing strength to the end portion of the joist.

The support preferably comprises a fixing portion for fixing the support to a building.

- 10 The floor support system of the present invention facilitates the use of joists that could otherwise not be used because removal of part of the end of the joist would reduce the strength of the joist. Such a joist may not meeting building regulations.

- 15 The joist is preferably elongate. It is preferred that the joist has substantially the same cross section along whole of length of joist apart from the end portion (the end portion having a reduced cross-sectional area compared to
20 the body portion).

- The main body portion may be I-shaped in cross-section or may be rectangular in cross-section. An example of a joist with an I-shaped cross-section (commonly referred to as an
25 "I-beam") is the FinnJoist (mentioned above).

- The end portion of the joist may comprise a face that is obliquely angled with respect to the longitudinal axis of joist. Such a joist may be supplied pre-shaped, or a worker
30 may make an oblique cut in the end of the joist. The angle between the oblique face and the longitudinal axis of the body portion may be from 30 to 70 degrees, preferably from

30 to 50 degrees. The end portion of the joist may comprise a face that is substantially normal to the longitudinal axis of the body portion. Such a face may provide the end face of the joist. For the avoidance of confusion, it is noted that
5 a joist may comprise a face that is obliquely angled with respect to the longitudinal axis of the body portion and a face that is substantially normal to the longitudinal axis of the body portion.

10 A step may be provided in the joist to provide the end portion. This may be provided by cutting a notch of material from the end of the joist.

It is preferred that the joist is wooden. Such joists are
15 light and may be easily shaped using manually-operated tools.

In accordance with a second aspect of the present invention, there is provided a support for supporting the end portion
20 of a floor-support joist, the support comprising a supporting portion for providing strength to the end portion of a joist.

It is preferred that the support comprises a fixing portion
25 for attachment to a building.

For the avoidance of confusion, it is hereby noted that the following statements in relation to the nature of the support apply to the support of the floor support system of
30 the first aspect of the invention and the support of the second aspect of the present invention.

The support may comprise a bracket which provides the supporting portion and the fixing portion. Such a bracket would be simple and cheap to manufacture.

- 5 The fixing portion, if present, may comprise a flange. The flange may comprise one or more fixture-receiving apertures. Such apertures may receive fixtures such as nails, bolts or screws. The support may comprise a plurality of fixing portions (typically two fixing portions). Each fixing
10 portion may be a laterally-extending fixing portion.

The supporting portion may provide a slot into which the end portion of the joist may be received. This provides a simple and effective way of locating the joist in the support. A
15 slot may allow the joist to be slid into place.

The supporting portion may comprise a substantially-U shaped structure which defines a slot for the receipt of the end portion of the joist. Such a U-shaped structure conveniently
20 defines a space for the location of the end portion of the joist. The U-shaped structure may typically comprise first and second legs interconnected at one end of the legs by a bottom portion. The first and second legs may be readily deformable so as to be brought into frictional engagement
25 with the joist, such frictional engagement inhibiting removal of the joist from the support.

The supporting portion may comprise an enclosure portion for receiving the end portion of the joist. The enclosure
30 portion provides a slot in the form of an enclosed cavity for receipt of the end portion of the joist.

The supporting portion may comprise a collar or sleeve for receipt of the end portion of the joist. The collar or sleeve defines a slot for the receipt of the end portion of the joist. In use, a least a part of the end portion of the joist protrudes through the collar or sleeve.

The enclosure portion, collar or sleeve may be provided by two or more side wall portions and a top portion interconnecting the side walls portions.

10

The enclosure portion, collar or sleeve may define an aperture for the receipt of the joist. The cross-section of the slot defined by the enclosure portion, collar or sleeve may decrease with increasing distance from the aperture. In other words, in use, the cross-section of the slot defined by the enclosure portion, collar or sleeve may decrease with increasing distance from the body portion of the joist.

The support may be made from a metal, such as steel.

20

The support may comprise a strap portion for attaching the support to the joist.

The support or part thereof may be readily deformable from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration in which the support or part thereof frictionally engages with the joist to inhibit removal of the joist from the support. The support may be provided with deformable elements which are readily deformable. The deformable elements may be in the form of walls.

30

The support may be provided with a barb, and the support or part thereof may be readily deformable from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration
5 in which the barb engages with the joist to inhibit removal of the joist from the support.

The support may be provided with one or more barbs to inhibit the removal of the joist from the support once the
10 support has been fitted to the joist.

In accordance with a third aspect of the present invention, there is provided a support suitable for use in the floor support system of the first aspect of the present invention.
15

In accordance with a fourth aspect of the present invention, there is provided a kit for the formation of a floor support system, the kit comprising a plurality of supports in accordance with the second or third aspects of the present
20 invention and instructions for the fitment of said supports. The kit may further comprise a plurality of joists for supporting floors. The joists may be conventional joists or may be joists as described in relation to the floor support system of the first aspect of the present invention.
25

In accordance with a fifth aspect of the present invention, there is provided a support for the end of an I-beam or timber joist, the support comprising a collar, sleeve, shoe clip or bracket. The support may be suitable to support the
30 end of an I-beam or joist wherein an angled cut has been made to the end of the I-beam or joist. It is preferred that the support is arranged so that the end of the I-beam or

joist may be inserted into the support. The support may be attachable to the outer wall of a building.

In accordance with a sixth aspect of the present invention,
5 there is provided a roof support system comprising a support in accordance with the fifth aspect of the present invention and an I-beam or joist. An angled cut may have been made to the end of the I-beam or joist. The end of the I-beam or joist may be inserted into the support.

10

The present invention will now be described by way of example only with reference to the following figures of which:

Figure 1 is a perspective view of an embodiment of a floor
15 support system and support in accordance with the present invention;

Figure 2 is a cross-sectional view of a conventional roof structure, showing the size and shape of a conventional, prior art joist in relation to the roof structure;

20 Figure 3a is a perspective view of an alternative embodiment of a support and floor support system, the support comprising a bracket;

Figure 3b is a perspective view of an alternative embodiment of a support and floor support system, the support
25 comprising a U-shaped supporting portion which defines a slot for the receipt of a joist;

Figure 3c is a perspective view of a further alternative embodiment of a support and floor support system, the support comprising a slot for the sliding receipt of the
30 base of an I-shaped joist;

Figure 3d is a perspective view of a further alternative embodiment of a support and floor support system, the

support comprising deformable side-wall portions that have been deformed to frictionally engage with the joist;

Figure 3e is a perspective view of a further alternative embodiment of a support and floor support system, the

5 support comprising a collar;

Figure 3f is a perspective view of a further alternative embodiment of a support and floor support system, the support comprising a deformable strap portion for attaching the support to the joist; and

10 Figure 3g is a perspective view of a further alternative embodiment of a support and floor support system, the support comprising two laterally-extending fixing portions.

Figure 2 shows a cross-section through a conventional

15 roofing structure. The roofing structure comprises a plurality of roof trusses, one of which is shown in the figure. The roof truss comprises a substantially horizontal portion 1 and an angled portion 2. The roof truss is supported by inner wall 3, the end 4 of which is slightly

20 raised compared to the outer wall 5 and the wall cavity 6.

The roofing structure presents a space for the insertion of a joist. A conventional floor-supporting joist is shown in dashed lines and is denoted by reference numeral 7. As can be seen, a conventional floor-supporting joist cannot be

25 used without extending the roof covering (not shown). This is highly inconvenient given that many floor-support joists would be required to support a floor in a roofing space.

One embodiment of each of a floor support system and a

30 support of the present invention are shown in Figure 1. The floor support system 10 comprises a joist 11 suitable for supporting a floor. The joist 11 comprises an end portion

(not shown) and a body portion 13, the cross-section of the end portion being lower than the cross-section of the body portion. The end portion may typically be formed by making an oblique cut into a conventional joist. The floor support system 10 further comprises a support 14 for supporting the end portion 12 of the joist. The support comprises a flange 15 for fixing the support to the house. In this case, the flange is attached by use of screws to the outer face of the inner wall 3 of the house. The outer wall 5 and wall cavity 6 are shown in chained lines. The support comprises a supporting portion 16 which provides strength to the end portion of the joist. The supporting portion is in the form of an enclosure portion which receives and encloses the end part of the end portion 12 of the joist. The enclosure portion provides a slot into which the end portion of the joist has been inserted. The cross-section of the slot decreases with increasing distance from the body portion 13 of the joist. Without the support, the joist may not be sufficiently strong to support any overlying floor and may not meet building regulations.

The joist of Figure 1 is an I-shaped joist, the body portion 13 of the joist 11 comprising an upper flange 17 and a lower flange 18 separated by a rib 19.

Those skilled in the art will realise that the supporting member need not extend over the whole length of the end portion of the joist. It may be sufficient for the supporting member to extend over a fraction of the length of the joist end portion.

Further embodiments of floor support systems and supports of the present invention are shown in Figures 3a-3f. In each of these figures, the joist 11 comprises an end portion 12 and a body portion 13, the cross-section of the end portion
5 being lower than the cross-section of the body portion. The joist is shown in each of these figures by a dotted line in order that the features of the support may be seen more clearly.

10 In the floor support system of Figure 3a, the support 24 comprises an L-shaped bracket. One arm 25 of the bracket is provided with fixture-receiving apertures 26 (only one of which is labelled) for fixing the support to a house. The other arm 27 of the bracket provides support and strength to
15 the joist 11. The other arm 27 of the bracket is provided with fixture-receiving apertures 28 (only one of which is labelled) for fixing the support to the joist 11.

A further alternative floor support system and support are
20 shown in Figure 3b. The support 34 comprises a flange 35 provided with fixture-receiving apertures 36 (only one of which is labelled) for fixing the support to a house. The support comprises a substantially U-shaped portion 37 for receiving and providing strength to the end portion 12 of
25 the joist. The U-shaped portion forms a slot which is shaped to enable convenient locating therein of the joist. The U-shaped portion comprises upwardly extending legs 38, 39 attached at their lower ends to a base portion 40. In the present embodiment the legs 38, 39 are relatively rigid and
30 cannot be readily deformed. It is anticipated, however, that it may be desirable for the legs to be readily deformable so as to engage with the joist 11 once the joist has been put

in place, such engagement inhibiting removal of the joist. Alternatively or additionally, one or both of the legs may be provided with a barb which inhibits removal of the joist from the support once the leg has been deformed to engage
5 with the joist.

A further alternative floor support system and support are shown in Figure 3c. The support 44 comprises a flange 45 provided with fixture-receiving apertures 46 (only one of
10 which is labelled) for fixing the support to a house. The support comprises a supporting portion 47 for receiving and providing strength to the end portion 12 of the joist. First slot region 50 and second slot region 51 are defined by base portion 52 and slot-forming portions 48, 49. The slots
15 regions 50, 51 are arranged to slidably receive the lower flange 18 of joist 11. The gap (not labelled) between slot-forming portions 48, 49 facilitates the passage there into of rib 19 of joist 11. In the present embodiment the slot-forming portions 48, 49 are relatively rigid and cannot be
20 readily deformed. It is anticipated, however, that it may be desirable for the slot-forming portions to be readily deformable so as to engage with the lower flange 18 of the joist 11 once the joist has been put in place, such engagement inhibiting removal of the joist. It is further
25 anticipated that the support may be provided with an end stop which inhibits the support from being slid along the length of the joist, ensuring that the support remains located on the end of the joist. This may be achieved, for example, by bending downwards an end portion of one or both
30 of the slot-forming members 48, 49 adjacent to the flange 45.

A further embodiment of a floor support system and support in accordance with the present invention are shown in Figure 3d. The support 64 comprises a flange 65 provided with fixture-receiving apertures 66 (only one of which is
5 labelled) for fixing the support to a house. The support comprises a supporting portion 67 for receiving and providing strength to the end portion 12 of the joist. The supporting portion comprises side walls 68, 69 which have been deformed to engage with the joist 11. Prior to
10 presentation of the joist to the support, the support side walls 68, 69 would have formed part of a substantially U-shaped structure which forms a slot for the receipt of the joist. The side walls are then deformed to form a snug fit around the end portion 12 of the joist 11. Alternatively or
15 additionally, one or both of the legs may be provided with a barb which inhibits removal of the joist from the support once the leg has been deformed to engage with the joist.

A further alternative floor support system and support are shown in Figure 3e. The support 74 comprises a flange 75 provided with fixture-receiving apertures 76 (only one of which is labelled) for fixing the support to a house. The support comprises an arm 78 for providing strength to the end portion 12 of the joist. The support further comprises a
20 collar 77 for receiving and providing further strength to the end portion 12 of the joist. The cross-section of the slot formed by collar 77 decreases with increasing distance from the body portion of the joist.

30 Figure 3f shows a further embodiment of a floor support system and support in accordance with the present invention. The support 84 comprises a flange 85 provided with fixture-

receiving apertures 86 (only one of which is labelled) for fixing the support to a house. The support comprises a shoe portion 87 for receiving and providing strength to the end portion 12 of the joist. The shoe portion 87 comprises side walls 88, 89 and an end wall 90 extending upwardly from a base portion 91. The shoe portion 87 forms a recess which is shaped to enable convenient locating therein of the joist. The support further comprises a strap portion 92 which is brought into contact with the angled surface of joist end portion 12. Fixture means (not shown) may be inserted through fastener-receiving apertures 93 (only one of which is labelled) to attach the strap to the joist.

A further alternative embodiment of a floor support system and support are shown in Figure 3g. The support and floor support system are very similar to those shown in Figure 1, and features in Figure 3g which are common with those of Figure 1 are denoted using the same reference numerals. The arrangement for fixing the support to the building is, however, different in Figure 1 and Figure 3g. The support of Figure 3g comprises two laterally-projecting fixing portions 95a, 95b which may be attached to the upper edge of inner wall 3, for example, using screws or other fasteners.

The fixture-receiving apertures of Figures 3a-3f are suitable for the receipt of screws, nails, pins or other fixture means that may conventionally be used. The supports of Figures 1 and 3a to 3f may typically be made from metal. The supporting portion may be formed integrally with the fixing portion (for example, by cutting the support from one piece of metal) or the supporting portion may be attached to the fixing portion (for example, by welding).

Claims

1. A floor support system comprising:
 - (a) a joist for supporting a floor, the joist comprising
5 a main body portion of substantially uniform cross-sectional area and an end portion whose cross-sectional area is less than that of the main body portion, and
 - (b) a support which is for supporting the joist, the support comprising a supporting portion for providing
10 strength to the end portion of the joist.

2. A floor support system according to claim 1 wherein the support comprises a fixing portion for fixing the support to
15 a building.

3. A floor support system according to claim 1 or claim 2, wherein the joist is elongate and the joist has substantially the same cross section along whole of length of joist apart from the end portion (the end portion having
20 a reduced cross-sectional area compared to the body portion).

4. A floor support system according to any one of claims 1 to 3, wherein the main body portion is I-shaped or
25 rectangular in cross-section.

5. A floor support system according to any one preceding claim, the end portion of the joist comprising a face that is obliquely angled with respect to the longitudinal axis of
30 joist, the angle between the oblique face and the longitudinal axis of the body portion may be from 30 to 70 degrees.

6. A floor support system according to any one preceding claim, wherein the end portion of the joist comprises a face that is substantially normal to the longitudinal axis of the body portion.

7. A floor support system according to claim 2 and any one of claims 3 to 6 when dependent on claim 2, wherein the support comprises a bracket which provides the support portion and the fixing portion.

8. A floor support system according to any one preceding claim, the supporting portion providing a slot into which the end portion of the joist may be received.

9. A floor support system according to claim 8, the supporting portion comprising a substantially-U shaped structure which defines a slot for the receipt of the end portion of the joist.

10. A floor support system according to claim 9, wherein the U-shaped structure comprises first and second legs interconnected at one end of the legs by a bottom portion, the first and second legs being readily deformable so as to be brought into frictional engagement with the joist, such frictional engagement inhibiting removal of the joist from the support.

11. A floor support system according to claim 8, the supporting portion comprising an enclosure portion providing a slot in the form of an enclosed cavity for receipt of the end portion of the joist.

12. A floor support system according to claim 8, the supporting portion comprising a collar or sleeve for receipt of the end portion of the joist.

5

13. A floor support system according to claim 11 or 12, wherein the enclosure portion, collar or sleeve is provided by two or more side-wall portions and a top portion interconnecting the side-wall portions.

10

14. A floor support system according to any one of claims 11 to 13, wherein the enclosure portion, collar or sleeve define an aperture for the receipt of the joist, the cross-section of the slot defined by the enclosure portion, collar or sleeve decreasing with increasing distance from the body portion of the joist.

15

15. A floor support system according to any one preceding claim, the support comprising a strap portion for attaching the support to the joist.

20

16. A floor support system according to any one preceding claim, wherein the support or part thereof is readily deformable from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration in which the support or part thereof frictionally engages with the joist to inhibit removal of the joist from the support.

25

17. A floor support system according to any one preceding claim, the support being provided with one or more barbs to

30

inhibit the removal of the joist from the support once the support has been fitted to the joist.

18. A floor support system according to claim 17, wherein
5 the support or part thereof is readily deformable from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration in which the barb engages with the joist to inhibit removal of the joist from the support.

10

19. A support suitable for use in the floor support system of any one of claims 1 to 18.

20. A support suitable for supporting the end portion of a
15 floor-supporting joist, the support comprising a supporting portion for providing strength to the end portion of a joist, the supporting portion providing a slot into which the end portion of the joist may be inserted.

20 21. A support according to claim 20 comprising a fixing portion for attachment to a building.

22. A support according to claim 20 or claim 21, the
25 supporting portion comprising a substantially-U shaped structure which defines a slot for the receipt of the end portion of the joist.

23. A support according to claim 22, wherein the U-shaped
30 structure comprises first and second legs interconnected at one end of the legs by a bottom portion, the first and second legs being readily deformable so as to be brought

into frictional engagement with the joist, such frictional engagement inhibiting removal of the joist from the support.

24. A support according to claim 20 or claim 21, the
5 supporting portion comprising an enclosure portion providing a slot in the form of an enclosed cavity for receipt of the end portion of the joist.

25. A support according to claim 20 or claim 21, the
10 supporting portion comprising a collar or sleeve for receipt of the end portion of the joist.

26. A support according to claim 24 or 25, wherein the enclosure portion, collar or sleeve is provided by two or
15 more side-wall portions and a top portion interconnecting the side-wall portions.

27. A support according to any one of claims 24 to 26, wherein the enclosure portion, collar or sleeve define an
20 aperture for the receipt of the joist, the cross-section of the slot defined by the enclosure portion, collar or sleeve decreasing with increasing distance from the aperture.

28. A support according to any one of claims 20 to 27, the
25 support comprising a strap portion for attaching the support to a joist.

29. A support according to any one of claims 20 to 28, wherein the support or part thereof is readily deformable
30 from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration in which the support or part thereof

frictionally engages with the joist to inhibit removal of the joist from the support.

30. A support according to any one of claims 20 to 29, the
5 support being provided with one or more barbs to inhibit the removal of a joist from the support once the support has been fitted to a joist.

31. A support according to claim 30, wherein the support or
10 part thereof is readily deformable from a first configuration in which the joist may be readily presented to, and removed from the support, to a second configuration in which the barb engages with the joist to inhibit removal of the joist from the support.

15

32. A kit for the formation of a floor support system, the kit comprising a plurality of supports of any one of claims 19 to 31 and instructions for the fitment of said supports.

20 33. A kit according to claim 32, the kit further comprising a plurality of joists for supporting floors.

20

Application No: GB0704849.9

Examiner: Mr Haydn Gupwell

Claims searched: 1-18 & 32, 33

Date of search: 17 March 2008

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-7, 15, 17, 32 & 33	US2003/0217521 A1 (RICHARDSON et al) see whole document especially the figures noting joist 74 figure 2, support 52 and paragraph 0054.
X	1, 3-6, 17, 23 & 33	US3040479 A (THOMAS AYOTTE EDWARD) see whole document especially figures 2-8 noting joist 16 and support 21.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	L	Patent document published on or after, but with priority date earlier than the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

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Worldwide search of patent documents classified in the following areas of the IPC

E04B; E04C; E04F; E04G

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
E04C	0003/02	01/01/2006
E04B	0005/10	01/01/2006
E04B	0005/12	01/01/2006
E04C	0003/07	01/01/2006