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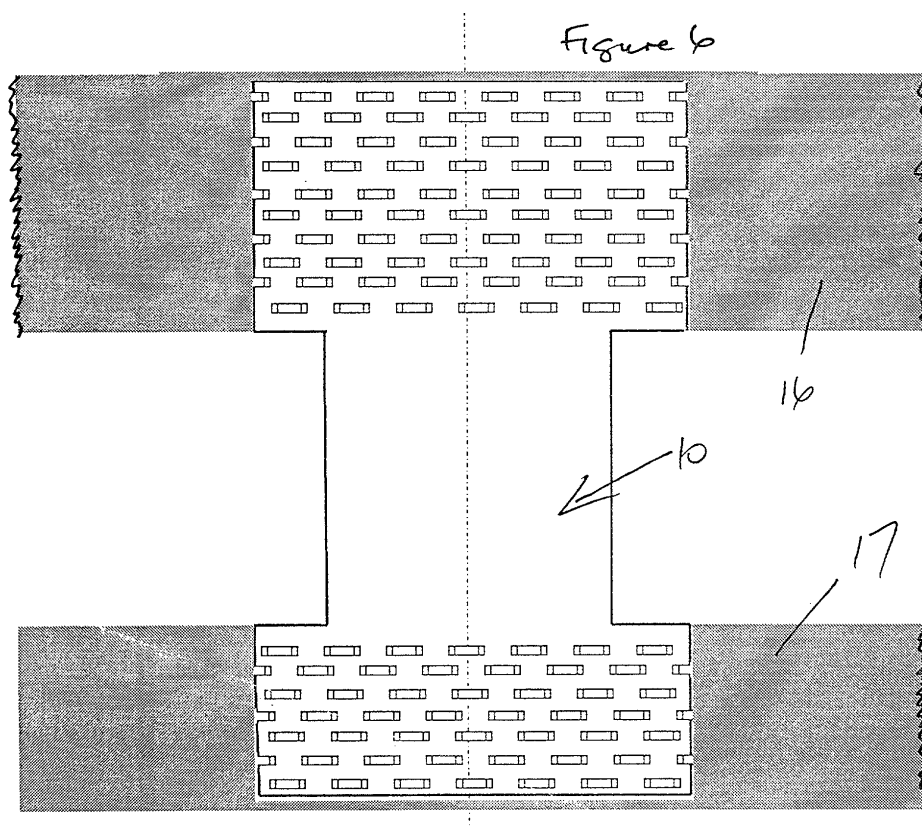
(54) **A beam and a method of making a beam**

(57) A method of making a beam (18) includes:-

- a) providing a nail-plate-applying station,
- b) positioning a pair of lengths of timber (16 & 17) in spaced parallel relationship,
- c) advancing the pair of lengths of timber (16 & 17) incrementally relative to the nail-plate-applying sta-

tion, and

d) attaching a nail plate (10) to each side of the pair of lengths of timber (16 & 17) at each of a plurality of spaced positions along the pair of lengths of timber (16 & 17) so as to join the two lengths of timber (16 & 17) together to form the beam (18).



Description

Field of the Invention

[0001] This invention relates to a beam and to a method of making a beam and, although it has been specifically developed in relation to the manufacture of floor beams, the invention is also applicable to the manufacture of other types of beams, e.g. roof beams or other structural members.

[0002] It is an object of the present invention to provide an improved beam.

[0003] It is a further object of the present invention to provide an improved method of making a beam.

Summary of the Invention

[0004] According to a first aspect of the present invention there is provided a beam that comprises a pair of parallel lengths of timber with nail plates attached to the sides of the lengths of timber so as to interconnect the lengths of timber at a plurality of spaced positions, each nail plate being provided at each of its ends with an array of projecting nail formations that are embedded in the lengths of timber.

[0005] The nail plates are preferably of I form, i.e. each comprises spaced rectangular end members from which the nail formations project and an elongated channel-section main body portion interconnecting the two end members.

[0006] According to a second aspect of the present invention there is provided a method of making a beam, said method comprising:-

- a) providing a nail-plate-applying station,
- b) positioning a pair of lengths of timber in spaced parallel relationship,
- c) advancing the pair of lengths of timber incrementally relative to the nail-plate-applying station, and
- d) attaching a nail plate to each side of the pair of lengths of timber at each of a plurality of spaced positions along the pair of lengths of timber so as to join the two lengths of timber together to form the beam.

[0007] Advancing movement of the pair of lengths of timber relative to the nail-plate-applying station is preferably guided by a plurality of rollers. There are preferably a plurality of rollers on the in-feed side of the nail-plate-applying station to define the depth of the beam and a plurality of rollers on the out-feed side of the nail-plate-applying station to control the depth of the beam.

[0008] Attachment of the nail plates to the spaced lengths of timber is preferably effected by means of a pair of oppositely acting press heads, each of which is movable between a retracted position (in which loading of a nail plate is effected) and an advanced position (in which the projections of the nail plate are embedded in

the two lengths of timber).

[0009] The nail plates are preferably of I form, i.e. each comprises spaced rectangular end members from which the nail formations project and an elongated channel-section main body portion interconnecting the two end members.

[0010] The nail plates may be produced from a continuous length of steel strip which is subject to a repeated two-step forming process, with the projections formed in the first step and the channel section formed in the second step. The two forming operations may alternatively be carried out simultaneously.

[0011] According to a third aspect of the present invention there is provided a composite beam produced by the method defined above.

Brief Description of the Drawings

[0012]

Figure 1 is a front view of a nail plate,

Figure 2 is a side view of a nail plate,

Figure 3 is an end view of a nail plate,

Figure 4 is a plan view of apparatus for attaching the nail plates to a pair of lengths of timber,

Figure 5 is a side view of the apparatus of Figure 4,

Figure 6 is a side view of part of a formed beam,

Figure 7 is a vertical sectional view of the part of the beam of Figure 6, and

Figure 8 is a horizontal sectional view the part of the beam of Figure 6.

Description of the Preferred Embodiment

[0013] The nail plate 10 shown in Figures 1 to 3 is formed from a rectangular sheet of galvanised steel plate and consists of a pair of rectangular end members 11 and 12 interconnected by a channel-section main body portion 13. Nail formations 14 are pressed out of the end members 11 and 12 and are arranged in rows with the nail formations 14 in one row staggered relative to the formations 14 in the adjacent row or rows (as shown in the drawings). The nail formations 14 all project in the same direction from the plane of the plate 10, and this is the same direction as that of the side walls 15 of the channel-section main body portion 13 of the plate 10.

[0014] Typical dimensions for a nail plate 10 for use with lengths of timber having a height of 75 mm. so as to form a composite beam having a height of 304 mm. are as follows:-

- a) overall height - 300 mm.,
- b) width - 155 mm.,
- c) height of end members 11 and 12 - 70 mm.,
- d) height of side walls 15 - 22 mm., and
- e) distance between side walls 15 - 111 mm.

[0015] It is envisaged that composite beams will be produced having overall heights that vary from about 200 mm. to about 400 mm. and that the dimensions of the nail plates will vary as appropriate.

[0016] The nail plates 10 are used to interconnect lengths of timber 16 and 17 in the manner shown in Figures 4 and 5 to produce a composite beam 18.

[0017] The two lengths of timber 16 and 17 are positioned in spaced parallel relationship, one above the other, on the in-feed side of a nail-plate-applying station 19. Rollers 20 are provided on the in-feed side of the station 19 to support the two lengths of timber 16 and 17, with the spacings between the axes of the rollers 20 defining the depth of the beam 18 that is produced. Rollers 21 are provided on the out-feed side of the station 19 to support the beam 18 while it is being produced and also to control the depth of the beam 18. The rollers 20 and 21 are mounted on parallel frame members 22 and 23 that are positioned one on each side of the path of travel of the lengths of timber 16 and 17.

[0018] Each frame member 22 and 23 provides a mounting for a horizontally reciprocable press head 24, 25 that is movable between a retracted position (as indicated in broken lines in Figure 4) and an advanced position (as shown in full lines in Figure 4). Each frame member 22, 23 includes a location slot 26, 27 to receive a nail plate 10.

[0019] A cycle of operations can be considered as commencing when the press heads 24 and 25 are in their retracted positions, as indicated in broken lines. Two lengths of timber 16 and 17 are supported by the rollers 20 with their leading ends in line with the press heads 24 and 25. A nail plate 10 is then placed in each location slot 26, 27 between the respective press head 24, 25 and the adjacent surfaces of the two lengths of timber 16 and 17. The two press heads 24 and 25 are then advanced so as to cause the nail formations 14 carried by the two end members 11 and 12 of each nail plate 10 to penetrate the lengths of timber 16 and 17 and to cause the side walls 15 of the channel-section main body portions 13 of the two nail plates 10 to enter the space bounded by the two lengths of timber 16 and 17.

[0020] The press heads 24 and 25 are disposed in line with one another so that each acts as a reaction member for the other press head, thereby avoiding causing any distortion of the two lengths of timber 16 and 17 during reciprocal movement of the press heads 24 and 25. The lengths of the side walls 15 of the channel-section main body portions 13 of the two nail plates 10 are just less than half the thickness of each length of timber 16, 17 so that, as shown in Figures 7 and 8, the free ends of

the side walls 15 of the channel-section main body portions 13 of the two nail plates 10 terminate just short of one another.

[0021] After the two press heads 24 and 25 have advanced to their fullest extent, they are returned to their retracted positions. While the press heads 24 and 25 are in their retracted positions, the two lengths of timber 16 and 17 are advanced by a predetermined distance, corresponding to the required spacing between adjacent pairs of nail plates 10 in the completed beam 18.

[0022] Nail plate feed means (not shown) can be provided for feeding the nail plates 10 into the location slots 26 and 27. The nail plates 10 may alternatively be placed manually in the location slots 26 and 27 at the beginning of each cycle of operations and then an actuating member (not shown) will be operated to initiate movement of the press heads 24 and 25 followed by advancing movement of the two lengths of timber 16 and 17.

[0023] The sequence of operations will be continued until nail plates 10 have been applied, at the required spacing, for the total length of the complete beam 18.

[0024] Automatic timber feed means (not shown) may also be provided for effecting advancing movement of the two lengths of timber 16 and 17 through predetermined, adjustable distances between successive operations of the press heads 24 and 25.

[0025] The resulting beam 18 is suitable for use as, for example, a floor beam or a roof beam or as a structural member for any other purpose. If it is a floor beam, sufficient space is provided between adjacent pairs of nail plates 10 to accommodate electrical conduits and/or other services.

Claims

1. A beam that comprises a pair of parallel lengths of timber with nail plates attached to the sides of the lengths of timber so as to interconnect the lengths of timber at a plurality of spaced positions, each nail plate being provided at each of its ends with an array of projecting nail formations that are embedded in the lengths of timber.
2. A beam as claimed in Claim 1, in which the nail plates are of I form, i.e. each comprises spaced rectangular end members from which the nail formations project and an elongated channel-section main body portion interconnecting the two end members.
3. A method of making a beam, said method comprising:-
 - a) providing a nail-plate-applying station,
 - b) positioning a pair of lengths of timber in spaced parallel relationship,

c) advancing the pair of lengths of timber incrementally relative to the nail-plate-applying station, and

d) attaching a nail plate to each side of the pair of lengths of timber at each of a plurality of spaced positions along the pair of lengths of timber so as to join the two lengths of timber together to form the beam. 5

4. A method as claimed in Claim 3, in which advancing movement of the pair of lengths of timber relative to the nail-plate-applying station is guided by a plurality of rollers. 10

5. A method as claimed in Claim 4, in which there are a plurality of rollers on the in-feed side of the nail-plate-applying station to define the depth of the beam and a plurality of rollers on the out-feed side of the nail-plate-applying station to control the depth of the beam. 15 20

6. A method as claimed in any one of Claims 3 to 5, in which attachment of the nail plates to the spaced lengths of timber is effected by means of a pair of oppositely acting press heads, each of which is movable between a retracted position (in which loading of a nail plate is effected) and an advanced position (in which the projections of the nail plate are embedded in the two lengths of timber). 25 30

7. A method as claimed in any one of Claims 3 to 6, in which the nail plates are of I form, i.e. each comprises spaced rectangular end members from which the nail formations project and an elongated channel-section main body portion interconnecting the two end members. 35

8. A method as claimed in Claim 7, in which the nail plates are produced from a continuous length of steel strip that is subjected to a repeated two-step forming process, with the projections formed in the first step and the channel section formed in the second step. 40

9. A method as claimed in Claim 7, in which the nail plates are produced from a continuous length of steel strip that is subjected to a repeated forming process, with the projections and the channel section formed simultaneously. 45 50

10. A beam made by the method claimed in any one of Claims 3 to 9. 55

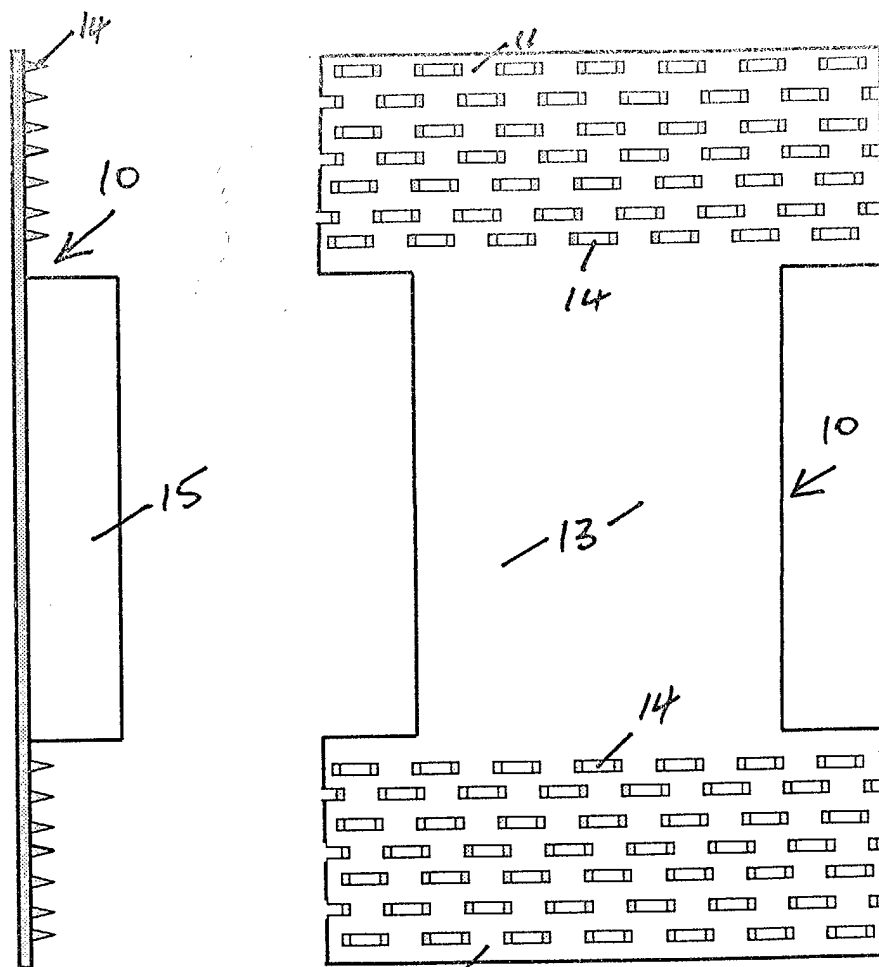


FIGURE 2

12 FIGURE 1

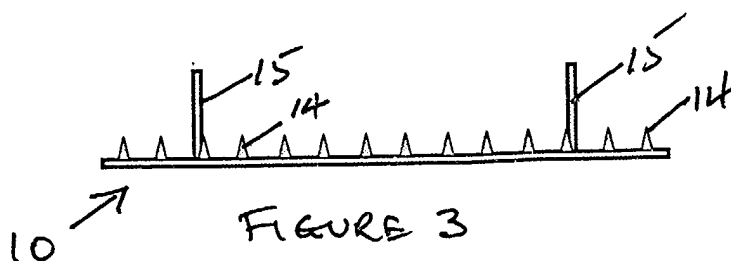


FIGURE 3

