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(54) Wall restraining system

(57) A wall restraining system comprising spaced apart support posts and coupling assemblies for coupling the support posts to a wall, especially a stone wall. Each coupling assembly comprises a coupling bracket for each support post, a plurality of ties that engage with the wall, and a rail for coupling the ties to the brackets. The ties are releasably coupled to the rail, and the rail is releasably coupled to the brackets. The rail extends across the support posts coupled to the respective brackets. The system is easy to install and adjust, and removes the requirement of a block work stud wall behind the stone wall.

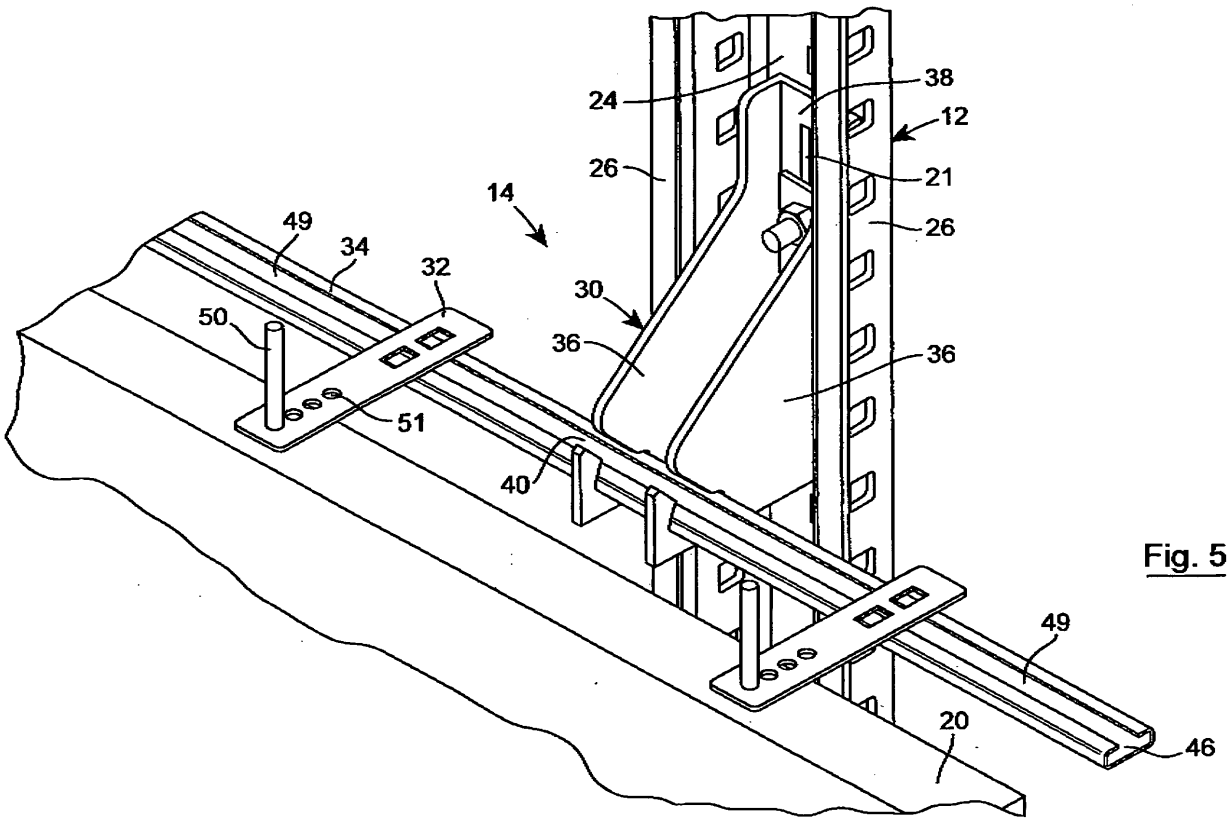

Fig. 5

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to wall restraining systems.

BACKGROUND TO THE INVENTION

[0002] When building certain types of walls, especially walls made from stone, it is necessary to provide a restraining system for preventing the stones from toppling. A known approach is to provide a stud wall of blockwork behind the stone wall, and to connect a series of ties between the two. The stud wall itself is typically provided against the superstructure of the building, the ties being provided in the cavity between the stud wall and the stone wall. This approach is problematic firstly in that it requires the provision of a blockwork stud wall behind the stone wall and, secondly, in that the ties are awkward to fit and to replace.

[0003] It would be desirable to mitigate the problems outlined above.

SUMMARY OF THE INVENTION

[0004] A first aspect of the invention provides a wall restraining system comprising a plurality of spaced apart support members, preferably in the form of posts, and at least one coupling assembly for coupling the support members to a wall, wherein said at least one coupling assembly comprises a respective coupling bracket for each support member, a plurality of ties that are adapted engage with the wall, and a rail for coupling the ties to the brackets, and wherein the ties are releasably coupled to the rail, the rail extending across the support members coupled to the respective brackets.

[0005] Preferred features of the invention are recited in the dependent claims.

[0006] It will be understood that the term "block" as used herein is intended to embrace not only regularly shaped units of building material, e.g. bricks, concrete blocks and the like, but also any other unit of building material, whether it is regularly shaped or not, man-made, naturally occurring, quarried or otherwise, including lumps of stone.

[0007] In use, the support members are fixed at one or more locations, typically adjacent the top and adjacent the bottom, to a support structure, for example the super structure of a building, by any suitable means.

[0008] In preferred embodiments, the rail is shaped to define a channel, e.g. a substantially C shaped channel, running longitudinally of the rail, the tie being provided with a male connector which may be slidably or otherwise received by the channel in a first orientation, and which engages with the walls of the channel in a second orientation to fix the position of the tie with respect to the rail. With the male connector in the second orientation, the preferred arrangement is such that the tie extends substantially perpendicularly from the rail. For example, the male connector may be elongate and run substantially parallel with the tie, its width being such that it is capable of being inserted into the channel in said first orientation, and its length being such that it engages with the walls of the channel in the second orientation. In this case, the first and second orientations are separated by approximately 90°. Conveniently, the tie includes a substantially flat body portion, said male connector comprising at least one tongue portion partially cut out from said body portion and deformed therefrom. In preferred embodiments, said male connector comprises two such tongue portions arranged back to back.

[0009] The tie preferably includes, or is co-operable with, a dowel for engaging with at least one, and preferably both, blocks of adjacent courses between which it is disposed in use. Preferably, the dowel is located at one end of the tie, the male connector being located at the other.

[0010] In preferred embodiments, at least one coupling bracket is removably mountable to the support post, advantageously at a plurality of positions along the length of the post.

[0011] In preferred embodiments, the rail is removably mountable to the bracket and, to this end, each bracket includes a seat for removably receiving the rail.

[0012] Typically, the system also includes a respective load bearing assembly for coupling each support member to the wall. The load bearing assembly is typically located at the in-use base of the post.

[0013] From another aspect, the invention provides a restraining apparatus for a wall formed from blocks, especially stone blocks, the apparatus comprising a support post and at least one coupling assembly for coupling the support post to the wall during use, wherein said at least one coupling assembly comprises a coupling bracket and a tie, the tie being adapted to fit between adjacent courses of blocks in the wall and, preferably, to engage with each of said adjacent courses.

[0014] In preferred embodiments, the restraining system comprises a plurality of restraining apparatus arranged in a row and interconnected by at least one of said coupling rails extending between corresponding coupling brackets on the respective posts.

[0015] Another aspect of the invention provides a coupling device comprising said coupling rail and said tie. It will be apparent that the coupling rail and tie are not limited to use in the restraining system or restraining apparatus of the invention.

[0016] Further advantageous aspects of the invention will become apparent to those ordinarily skilled in the art upon review of the following description of a specific embodiment or with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] An embodiment of the invention is now described by way of example and with reference to the accompanying drawings in which:

Figure 1 is a side view of a restraining apparatus forming part of a restraining system embodying one aspect of the invention;

Figure 2 is a side view of a load bearing assembly included in the apparatus of Figure 1;

Figure 3 is a side view of a coupling assembly included in the apparatus of Figure 1;

Figure 4 is a side view of inverted coupling assembly;

Figure 5 is a perspective view of the restraining apparatus of Figure 1 shown in situ; and

Figure 6 is an elevation of a restraining system embodying the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

[0018] Referring now to the drawings there is shown generally indicated as 10 a restraining apparatus forming part of a restraining system 110 (figure 6) embodying the invention. The apparatus 10 comprises a support member in the form of a post 12 supporting a plurality of coupling assemblies 14. The support post 12 is connected in use to a support structure 16, for example the superstructure of a building, or other building structure. In this example the post 12 is fixed to the structure 16 by two spaced apart brackets 18, advantageously being located adjacent the top and bottom of the posts respectively. It will be understood that any suitable means for fixing the post to a structure 16 may be used and any suitable number of fixing means may be used.

[0019] The apparatus 10 is shown in use coupled to a wall 20 comprising a plurality of courses 22, each course typically comprising a row of blocks. The apparatus 10 is particularly suited to restraining walls formed from stone blocks and so, in this example, it is assumed that each course 22 is comprised of stone blocks.

[0020] In typical use, the post 12 extends substantially vertically (or at least substantially perpendicularly with respect to the ground). Normally, the post 12 is substantially parallel with at least one and typically both of the structure 16 and the wall 20. It is noted that in some cases one or both of the structure 16 and the wall 20 may be inclined with respect to vertical.

[0021] Although not apparent from Figure 1, the preferred support post 12 is substantially U shaped in longitudinal cross section, having a rear portion 24 and two side portions 26 (only one visible) in Figure 1. The post 12 includes a number of apertures for receiving bolts or other means for fixing the coupling assemblies 14 and/or brackets 18 to the post 12. The apertures are longitudinally spaced apart along the post to provide adjustability in the position of the assemblies 14 / brackets 18 on the post 12. In the present example the assemblies 14 are removably fixed to the post 12 via apertures 19 (Figures 3 and 4) provided in the rear portion 24 of the post 12. Additional apertures 28 may be provided with corresponding locations in each side portion 26 of the post. In use, one or more strengthening bolts or similar devices may be inserted between corresponding apertures 28 in respective side portions 26 to lend strength to the post 12.

[0022] The preferred coupling assembly 14 comprises a respective coupling bracket 30 for each post 12, a plurality of ties 32 and a coupling rail 34 for coupling the ties 32 to the brackets 30. The coupling rail 34 is preferably substantially C-shaped in transverse cross-section.

[0023] The bracket 30 is mountable, preferably removably mountable, on the post 12 and may take any suitable form, but preferably comprises a pair of spaced apart substantially parallel side plates 36 joined by a back portion 38. In this example the back portion 38 includes one or more apertures 21 to allow a bolt or other fixing means to connect the bracket 30 to the post 12. As can best be seen from Figure 5, the apertures 21, or at least one of them, preferably takes the form of an elongate slot extending longitudinally of the bracket 30. The arrangement is such that the slot extends, in use, longitudinally of the post 12 to allow adjustability in the in use vertical direction when fixing the bracket 30 to the post 12.

[0024] In preferred embodiments, the coupling rail 34 is removably mountable to the bracket 30. To this end, the bracket 30 is shaped to define a seat 40 for receiving the rail 34. Preferably, the seat 40 is arranged to hold the rail 34 substantially perpendicularly to the longitudinal axis of the bracket 30 (and therefore substantially perpendicularly to the longitudinal axis of the post 12 during use). Normally, therefore the rail 34 is held substantially horizontally by the bracket 30 (or at least substantially parallel with the ground).

[0025] In the illustrated embodiment, the seat 40 is defined by a respective cut out portion 42 in at least one by typically each of the side plates 36. The cut out portions 42 are aligned with one another such that the rail 34 can extend between them, being seated in each of them. The preferred cut out portion 42 is shaped and dimensioned such that the seat 40 has a mouth 43 through which the rail 34 can be inserted into or removed from the seat 40 when in a first orientation (not illustrated). The cut out portion 42 is further shaped and dimensioned to allow the rail 34 to be rotated within the seat 40 about its longitudinal axis between the first orientation and a second orientation (Figure 3). In the second orientation, the shape and dimensions of the cut out 42 prevents the rail 34 from being removed through the mouth 43. In the second orientation, the rail 34 adopts a seated position, preferably resting on a seating surface 45 defined by the cut out 42.

[0026] Preferably, each cut out portion 42 is shaped and dimensioned to positively engage with the rail 34, e.g. by means of a friction fit between the rail 24 and surfaces defined by the cut out portion, when the rail 34 adopts the seated position (as shown in Figure 3) but to allow disengagement of the rail 34 from the seat 40 upon rotation of the rail 34 with respect to the bracket 30 about the rail's longitudinal axis. To facilitate this, the edges (or sides) 44 of the rail 34 are preferably rounded. In the preferred embodiment, the cut out portion 42 is shaped to define a recess 47 for receiving a side 44 of the rail 34, the rail 34 being rotatable about its longitudinal axis from the side 44 when received in the recess 47 between the first and second orientations.

[0027] In preferred embodiments, the rail 34 is long enough to extend between at least two adjacent restraining apparatus 10 that are spaced apart in a transverse direction between the wall 20 and the support structure 16. The rail 34 thus couples the apparatus 10 together. The typical arrangement is such that the rail 34 is held substantially horizontally during use by the respective bracket 30 of the respective apparatus 10.

[0028] Each tie 32 is releasably coupled to the rail 34 by means of co-operating releasable male and female connectors. Conveniently, the male connector is provided on the tie 32 and the co-operating female member is provided on the rail 34, although the opposite arrangement could be used. In the preferred embodiment, the rail 34 is shaped to define a female connector in the preferred form of a channel 46 for coupling with the tie 32. The channel 46 runs at least partially, but preferably the whole way, along the length of the rail 34. The preferred channel 46 has a single open mouth running along the length of the rail 34. Alternatively, the channel 46 may have a plurality of open mouths spaced apart along the length of the rail.

[0029] The tie 32 includes a male connector in the preferred form of a pair of tongues 48. Conveniently, the tongues 48 are each formed by a cut out in the body of the tie 32 (the tie typically comprising a substantially flat strip of material, usually metal) and deforming the resulting tongues 48 away from the body of the tie. Preferably, two tongues 48 are provided each extending in an opposite direction to the other. The tongues 48 together provide a male connector whose length, running in the direction longitudinally of the tie 32, is greater than its width, running transversely of the tie 32. The preferred length of the male connector is such that when the tie is substantially perpendicular to the rail 34, the tongues 48 engage with the walls, preferably still the side walls, of the channel 46 to secure the tie 32 to the rail 34 (for example by means of a friction fit). The free ends of the tongues 48 may be rounded to facilitate this. However, by pivoting the tie 32 about an in use vertical (as illustrated) axis, e.g. by approximately 90°, the dimensions of the tongues are such that they can be removed from the channel 46, for example through an open end of the channel, and/or the longitudinal mouth 49 of the channel, thereby allowing the tie 32 to be disengaged from the rail 34. Hence, the ties 32 can be quickly coupled to and removed from the rail 34 by a simple pivoting movement and without the need for any fixings such as bolts or screws. In alternative embodiments, the tongues 48 need not necessarily engage with the walls of the channel 46 to secure the tie 32 to the rail 34, although the arrangement is such that the tongues 48, or other male connector, cannot be disengaged from the rail 34 through the longitudinal mouth 49 of the channel 46 without being rotated with respect to the rail 34 about the vertical axis. Advantageously, the tie 32 may be moved longitudinally along the rail 34 during fitting until a desired located on the rail is reached. In the preferred embodiment, such movement takes place before the tie is rotated into its secured position. In other embodiments, the tie may be capable of such longitudinal movement at any time before being fixed to the wall 20.

[0030] Typically, a load bearing assembly 60 is provided adjacent the in use lower end of the post 12, the assembly 60 coupling the post 12 to the wall 20.

[0031] Each tie 32 is coupled, or adapted to be coupled, to at least one dowel 50, the dowel typically being formed from metal. The preferred arrangement is such that the dowel 50 extends substantially perpendicularly with respect to the tie and therefore, in use, substantially parallel with the wall 20. Preferably, the dowel 50 extends both upwardly and downwardly from the tie 32 so that it may engage with each course 22 of the wall 20 between which the tie 32 is located in use. In the preferred embodiment, the tie 32 includes one or more sockets, conveniently in the form of apertures, through which the dowel 50 may pass, and preferably also means for retaining the dowel 50 with respect to the tie 32. This may conveniently take the form of friction fit between the dowel 50 and the aperture in the tie 32. A plurality of a spaced apart apertures 51 may be provided in the tie for receiving the dowel 50, the apertures being spaced apart in a direction substantially perpendicular to the rail 34 in use. This provides adjustability for the positioning of the dowel 50 to account for different spacing between the post 12 and the wall 20. Recesses for receiving the respective ends of the dowels 50 are provided in the courses 22. In the preferred embodiment, the male connector is provided at one end of the tie 32, the dowel-receiving apertures being provided at the other end. In the drawings, the dowel 50 is shown having a substantially circular cross-section but it may alternatively take any other suitable cross-sectional shape.

[0032] Referring in particular to figure 4, the bracket 30 is shown in an inverted orientation with respect to the orientation shown in figures 1 to 3 and 5. The orientation to figure 4 is useful in cases where it is desired to position the bracket 30 close to the top of the post 12 without extending beyond the post 12.

[0033] The restraining apparatus 10 is typically used as part of a restraining system comprising a plurality of instances of the apparatus 10 spaced apart along the length of the rail 34. An example of the restraining system

is shown in elevation in figure 6, generally indicated as 110. The restraining system 110 is disposed between the support structure 16 and the wall 20 with the respective apparatus 10 being mutually spaced apart in a horizontal (or transverse) direction. The respective posts 12 of the respective apparatus 10 are preferably substantially parallel with one another. At least one, but preferably two or more ties 32/dowels 50 may be provided with each apparatus 10. Moreover, as shown in figure 1, typically a plurality of coupling assemblies 14 are provided spaced apart along the length of the posts 12.

[0034] It will be apparent that the restraining apparatus 10 and system 110 provide an effective means of restraining the wall 20 that is easy to install and adjust, and which removes the requirement of a blockwork stud wall behind the stone wall.

[0035] The components of the apparatus 10 may be formed from any suitable material(s), typically metal e.g. stainless steel.

[0036] The invention is not limited to the embodiment (s) described herein but can be amended or modified without departing from the scope of the present invention.

Claims

1. A wall restraining system comprising a plurality of spaced apart support members and at least one coupling assembly for coupling the support members to a wall, wherein said at least one coupling assembly comprises a respective coupling bracket for each support member, a plurality of ties that are adapted engage with the wall, and a rail for coupling the ties to the brackets, and wherein the ties are releasably coupled to the rail, the rail extending across the support members coupled to the respective brackets.

2. A system as claimed in claim 1, wherein the rail is shaped to define at least one channel, each tie being provided with a male connector that is insertable into and removable from said channel in order to releasably couple said tie to the rail.

3. A system as claimed in claim 2, wherein said at least one channel has at least one open mouth running longitudinally of said rail, said male connector and said at least one channel being shaped and dimensioned such that the male connector is insertable into and removable from said at least one channel via said at least one open mouth when the respective tie adopts a first orientation with respect to the at least one channel, and is prevented from being removed from said at least one channel via said at least one open mouth when the respective tie adopts a second orientation with respect to said at least one channel.

4. A system as claimed in claim 3, wherein said male connector is arranged to engage with at least one wall of the channel when located in said at least one channel and in said second orientation to fix the position of the respective tie with respect to the rail.

5. A system as claimed in claim 3 or 4, wherein, in said second orientation, the tie is substantially perpendicular to the rail.

6. A system as claimed in any one of claims 2 to 5, wherein the male connector is elongate having a width such that it is capable of being inserted into said at least one channel via said at least one open mouth when in said first orientation, and a length such that is prevented from being removed from said at least one channel via said at least one open mouth when in said second orientation, the length preferably being such that it engages with at least one wall of the channel in the second orientation.

7. A system as claimed in claim 6, wherein the tie comprises a substantially flat body portion, said male connector comprising at least one tongue portion partially cut out from said body portion and deformed therefrom.

8. A system as claimed in claim 7, wherein said male connector comprises two tongue portions extending in substantially opposite directions.

9. A system as claimed in any preceding claim, wherein each tie is adapted to fit between adjacent courses of blocks in the wall and includes, or is co-operable with, means for engaging with one or both of said adjacent courses.

10. A system as claimed in claim 9, wherein said engaging means comprises a dowel, each tie having a plurality of dowel-receiving sockets spaced-apart longitudinally of the tie, the arrangement being such that, when located in one of said sockets, the dowel projects substantially perpendicularly from the tie.

11. A system as claimed in any preceding claim, wherein the rail is removably coupled to the brackets, each bracket including at least one seat for receiving the rail.

12. A system as claimed in claim 11, wherein each seat is shaped and dimensioned to define a mouth through which the rail is insertable into or removable from the seat when in a first orientation, and to allow the rail to be rotated about its longitudinal axis when in said seat between said first orientation and a second orientation, and such that, when the rail is in said second orientation, it is prevented from being removed from said seat via said mouth.

13. A system as claimed in claim 12, wherein each seat is shaped and dimensioned to positively engage with the rail when the rail adopts a seated position in said second orientation, and to allow disengagement of the rail from the seat upon rotation of the rail about its longitudinal axis.

14. A system as claimed in claim 14, wherein each seat is shaped to define a recess for receiving a side of the rail, the rail being rotatable between the first and second orientations about its longitudinal axis from said side when received in the recess.

15. A system as claimed in any preceding claim, wherein each of said brackets in said at least one coupling assembly is substantially aligned with one another such that said rail, when coupled to said brackets, extends substantially perpendicularly across said support members.

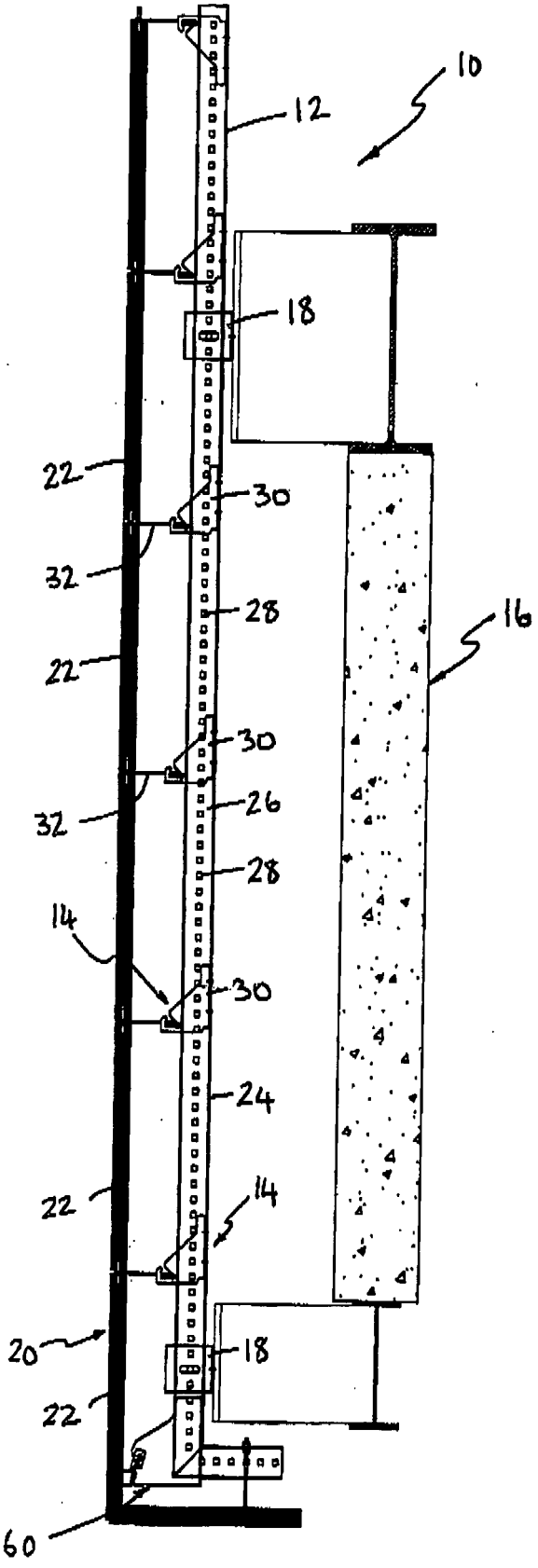

FIG. 1

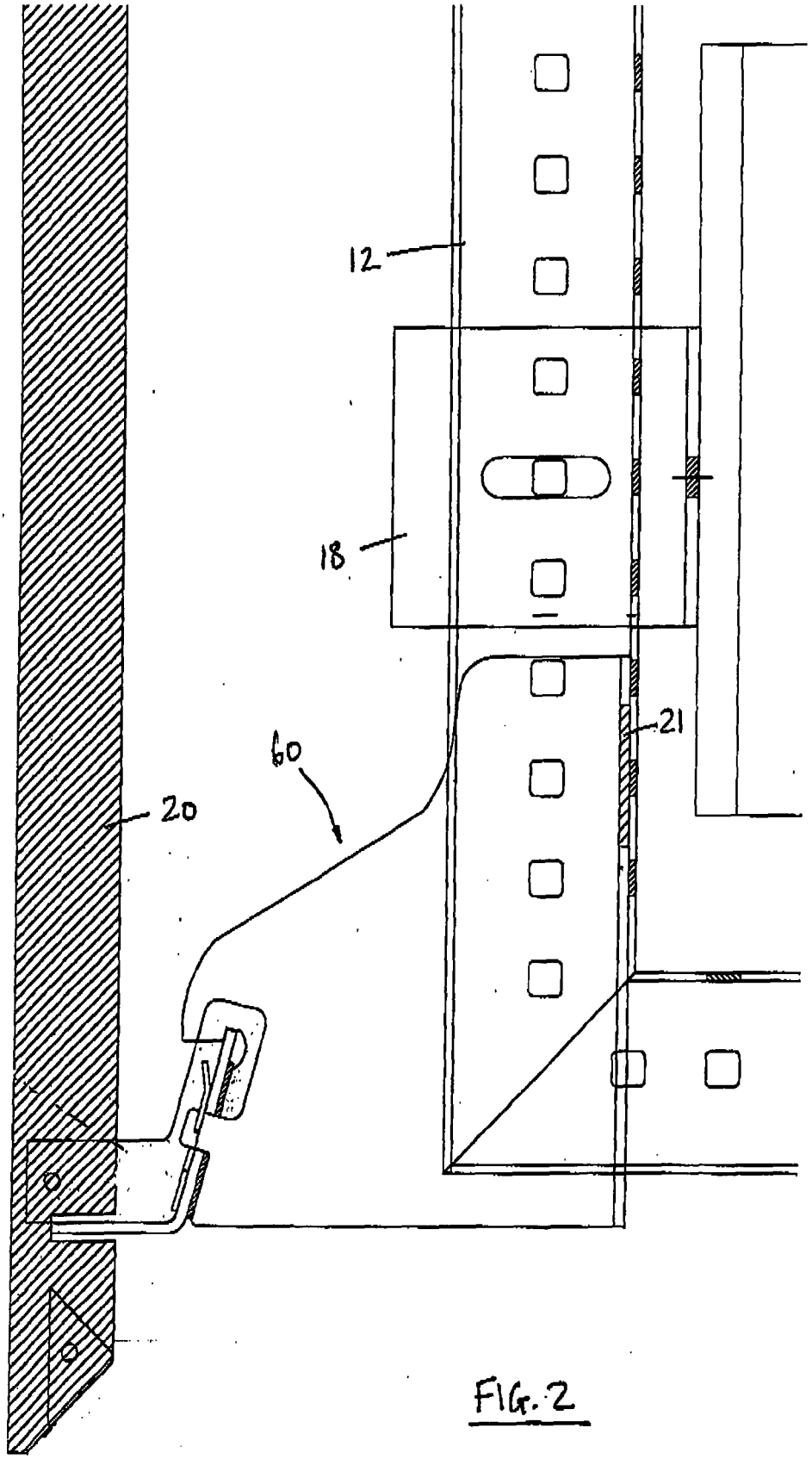

FIG. 2

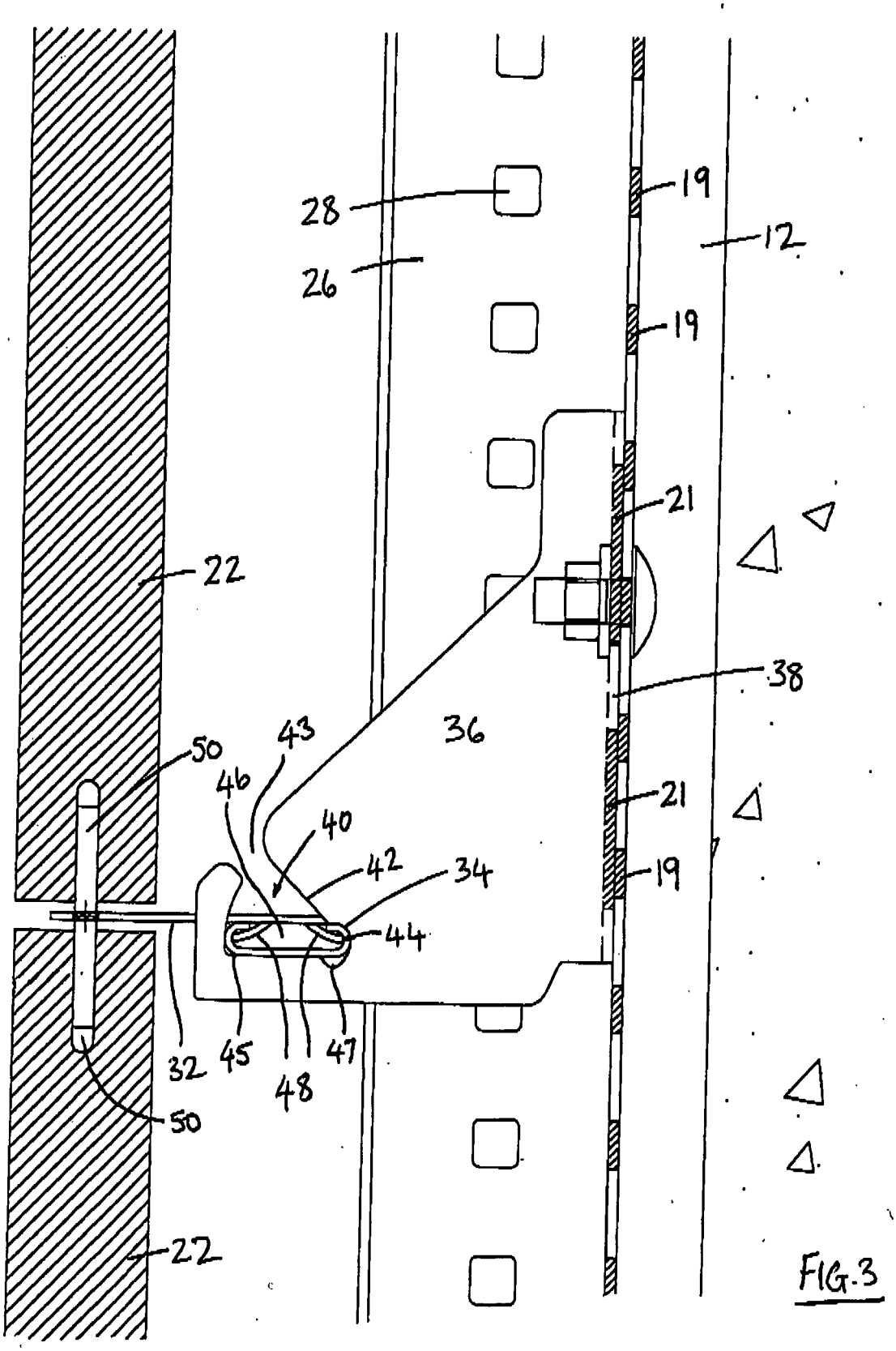

FIG.3

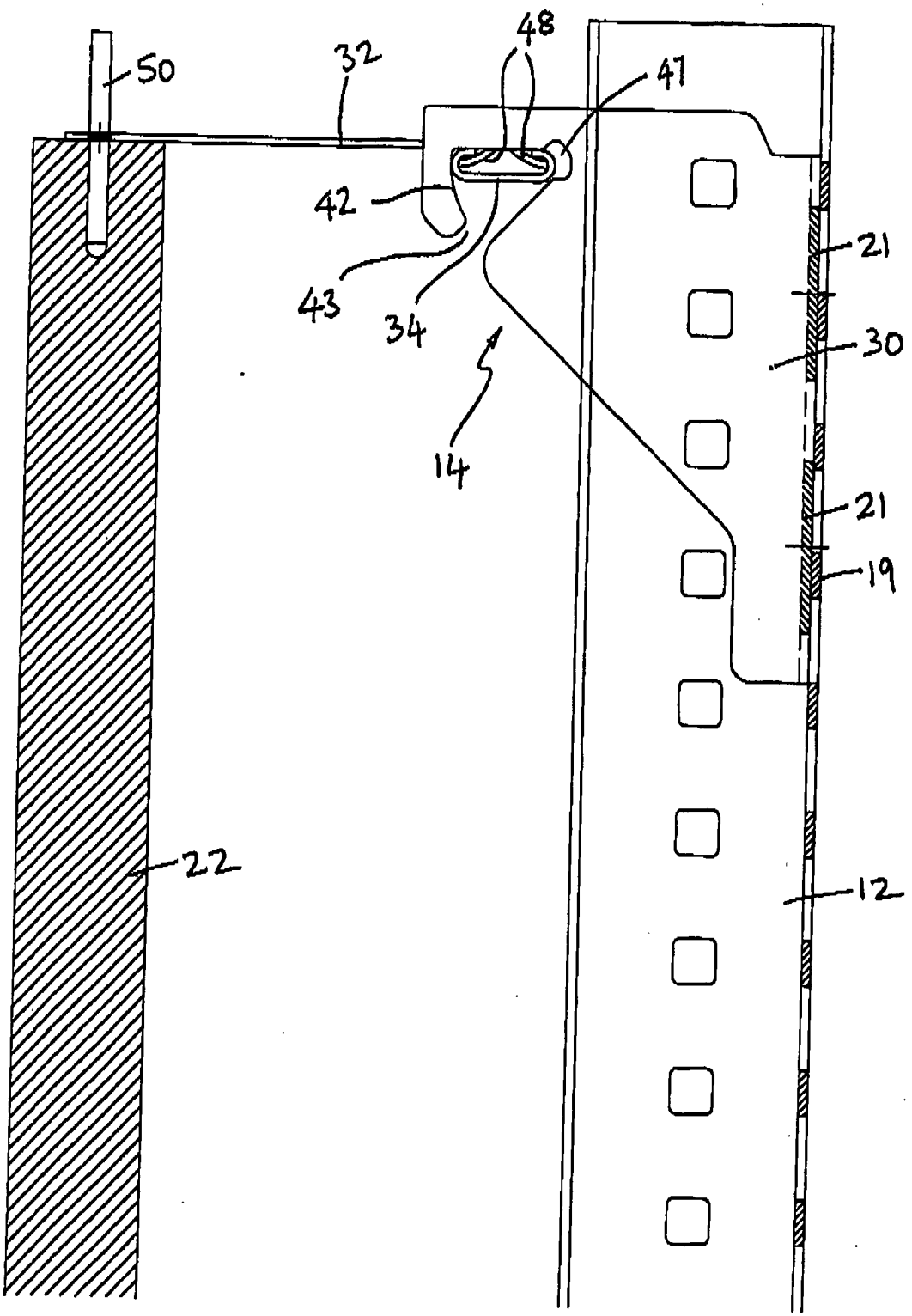

FIG-4

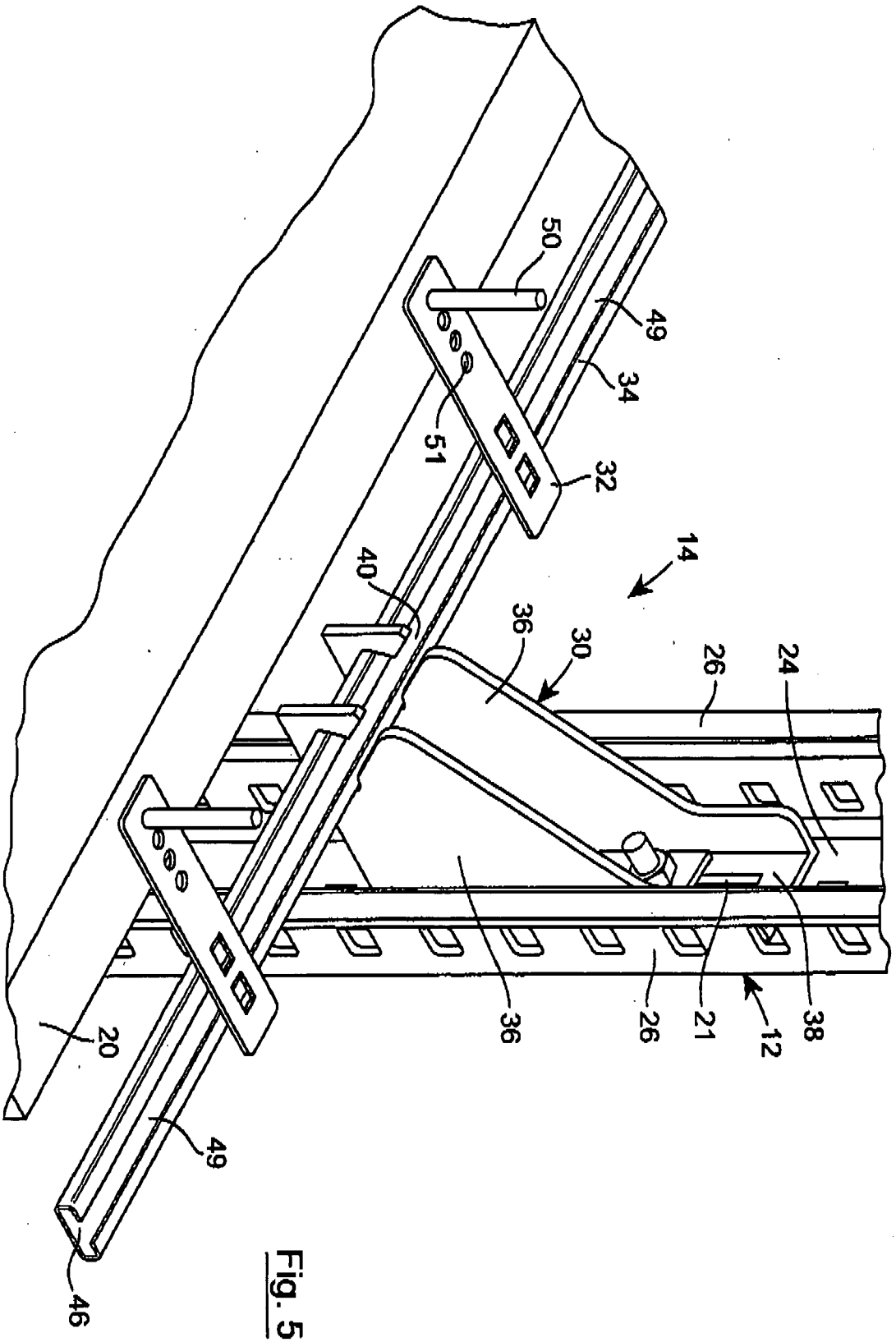

Fig. 5

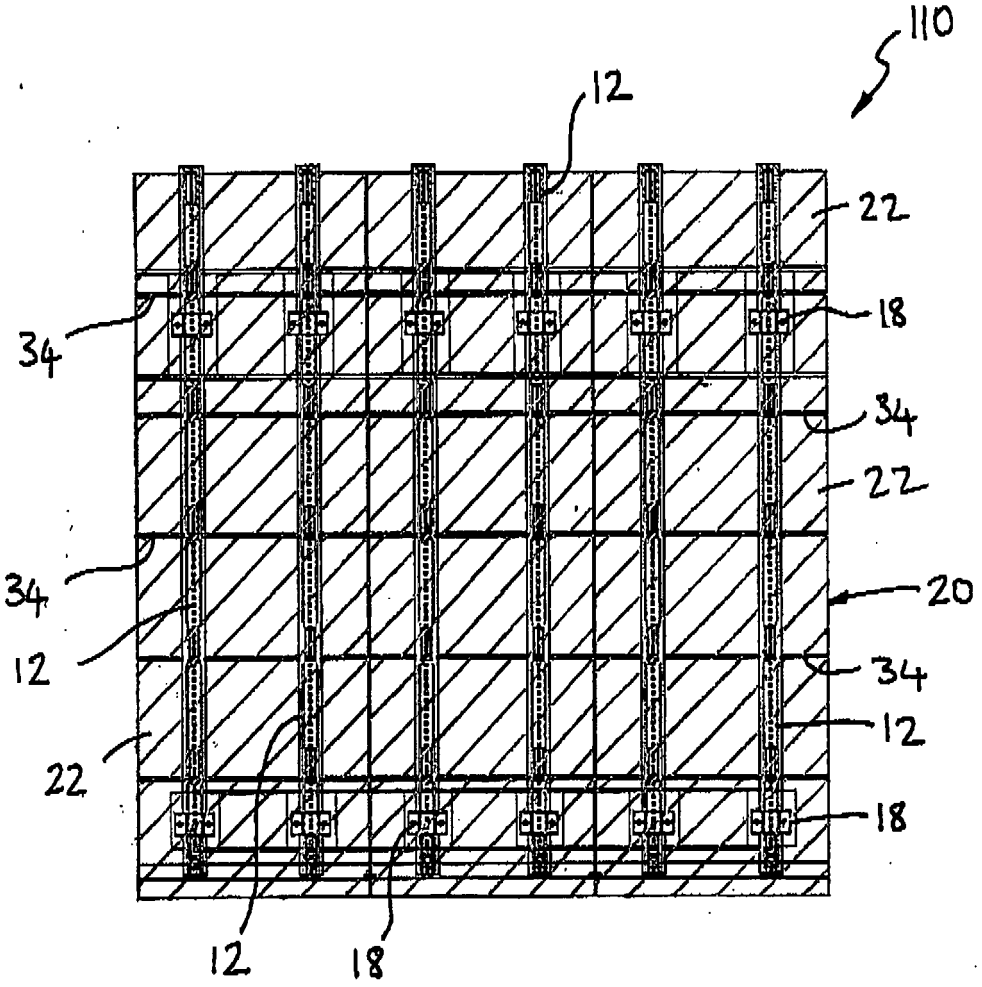

FIG. 6