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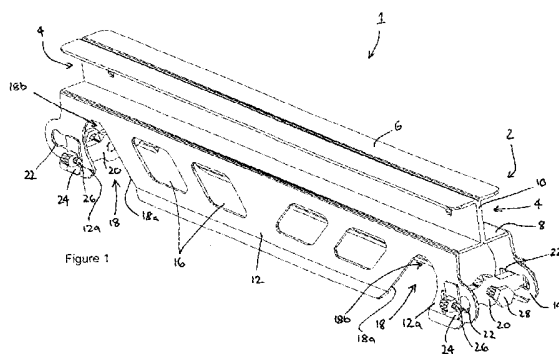
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(56) Documents Cited:
GB 2374895 A **GB 2209553 A**
GB 2097086 A **GB 1079875 A**
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(58) Field of Search:
INT CL **E04G**
Other: **Online: EPODOC, WPI**

(54) Title of the Invention: **Platform structures and cross beams therefor**
Abstract Title: **Platform supporting cross beam**

(57) The invention relates to a cross beam 1 that forms part of an improved platform structure. The platform structure may be joined to a scaffolding structure. The cross beam 1 has a shaped notch 18 at each end for receiving and locating a scaffolding tube. Locking members are operable to selectively engage with the scaffolding tubes that are located within the notches 18 and prevent the cross beam from sliding along the scaffolding tubes. A longitudinal channel 4 is defined by an I-section 2 for receiving one or more scaffolding boards or planks that together form a working surface for the platform structure. The shaped notches are preferably formed in a pair of flanges that are spaced apart in a transverse direction in use.



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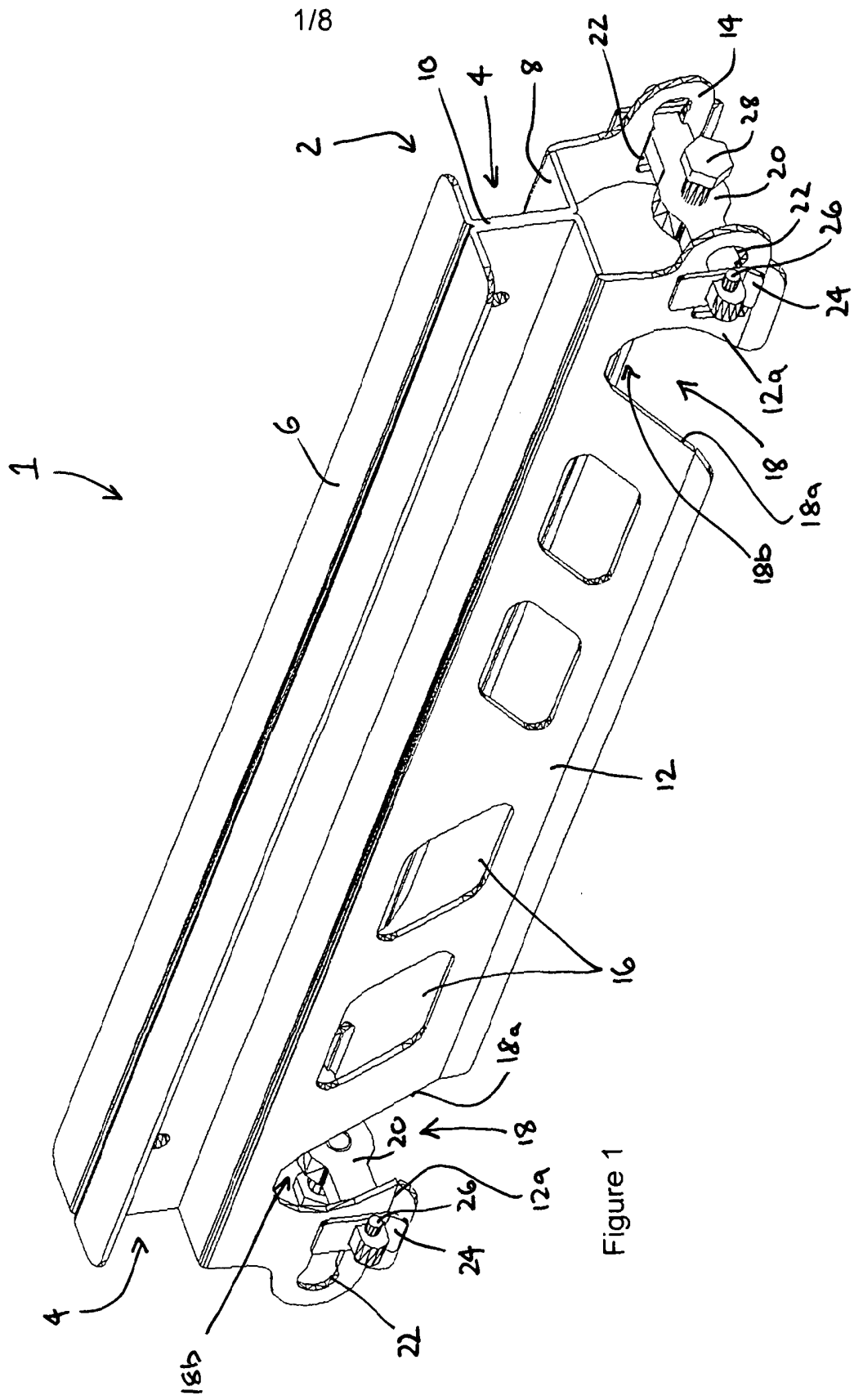
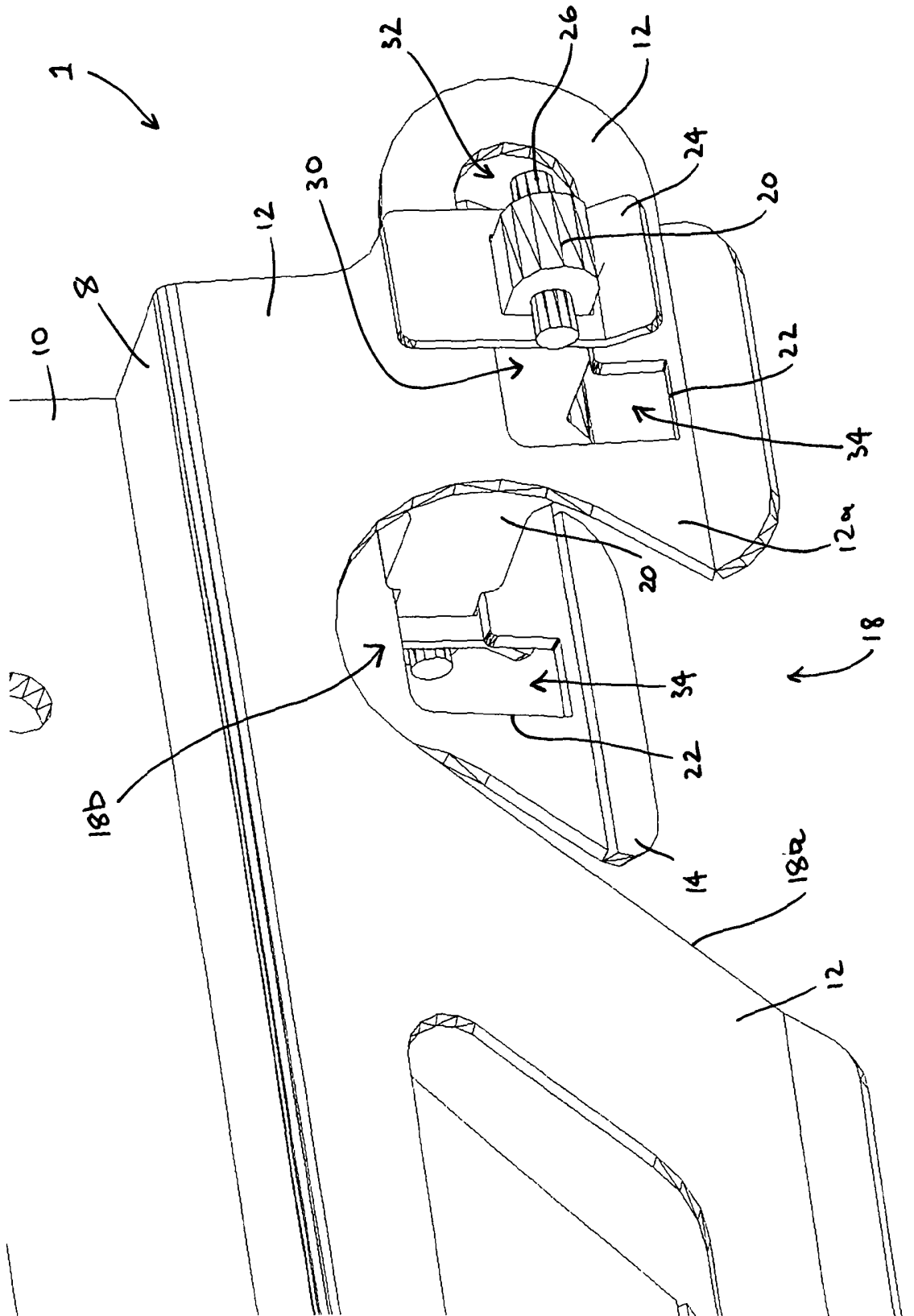


Figure 1

Figure 2



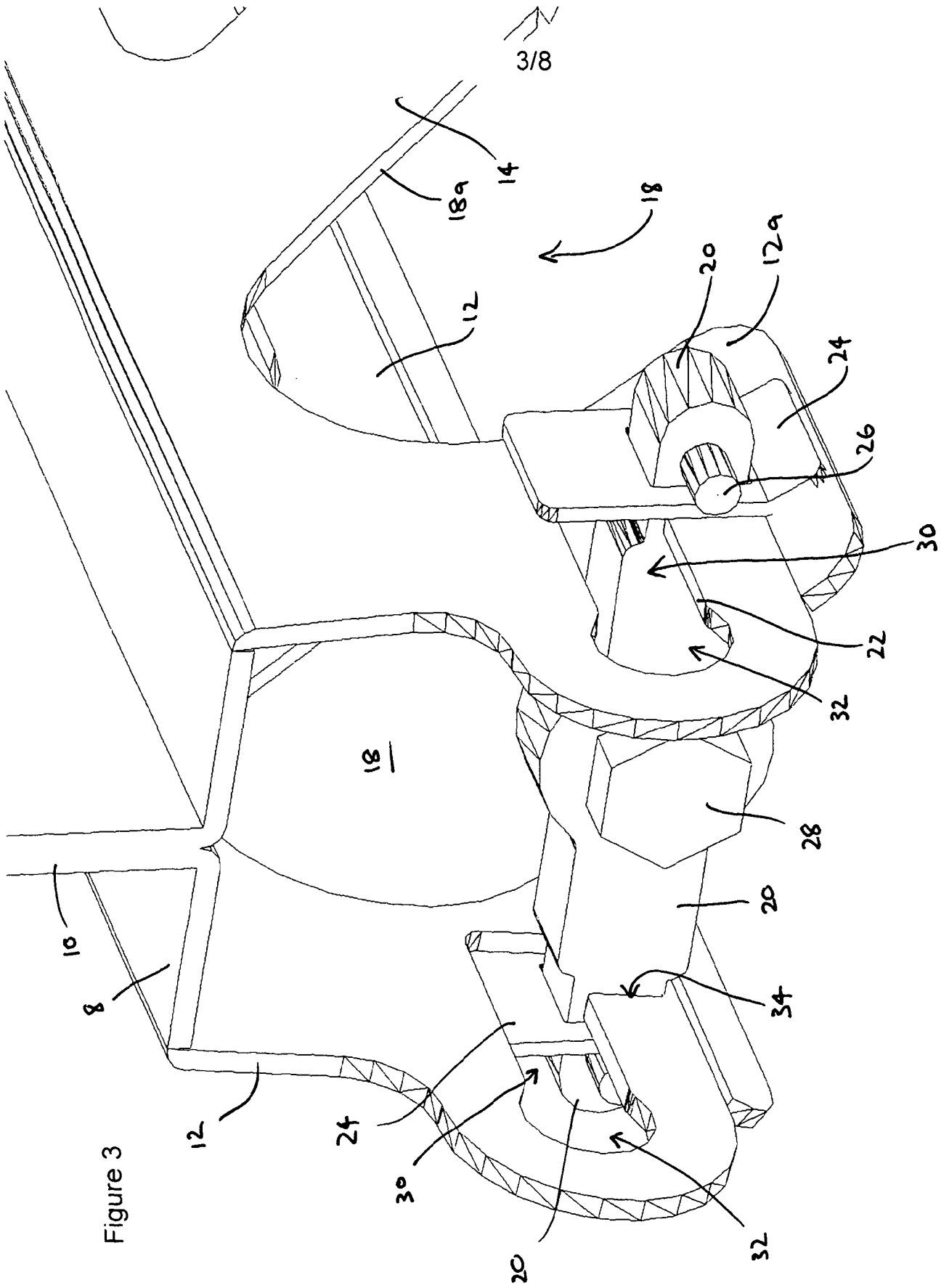


Figure 3

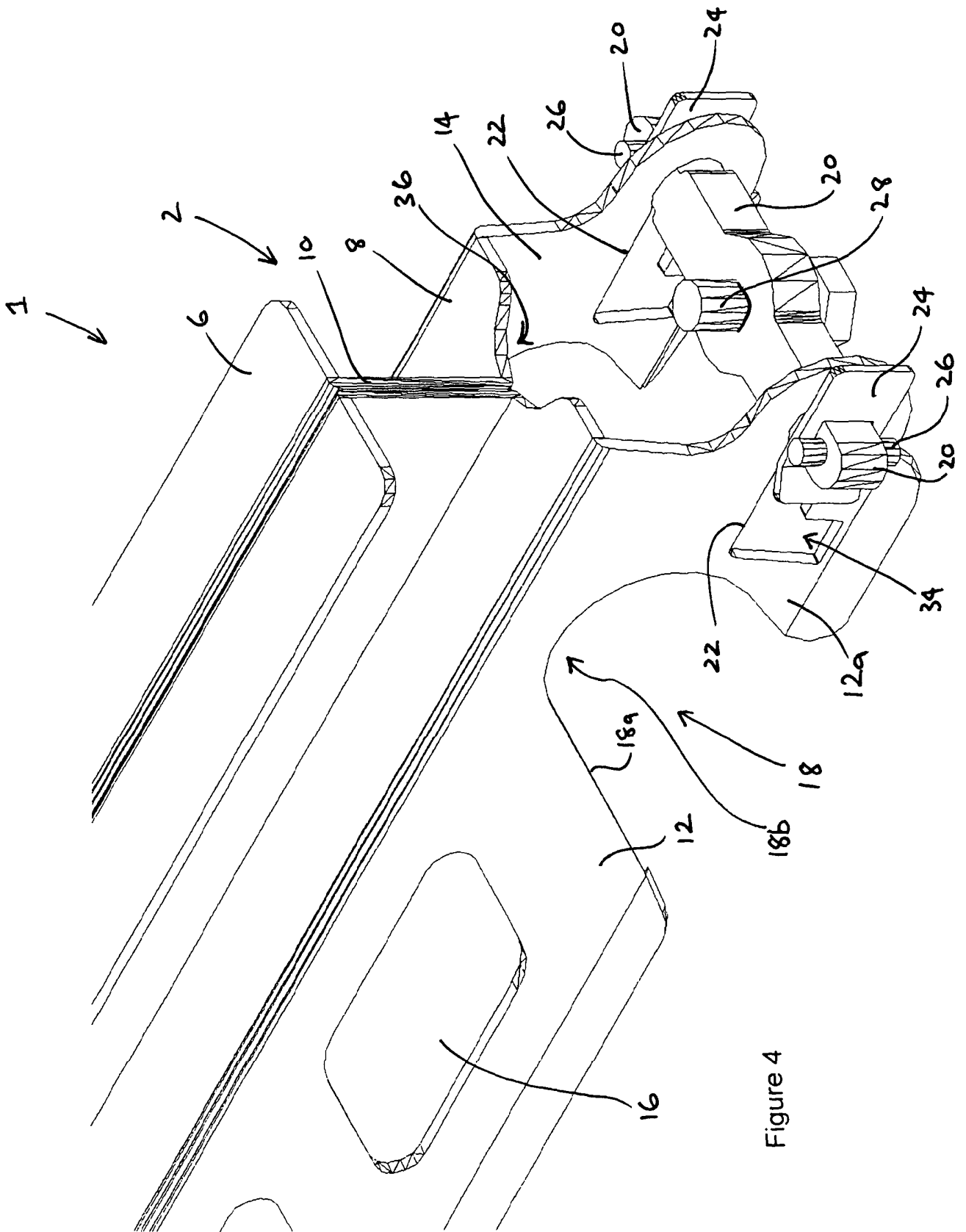


Figure 4

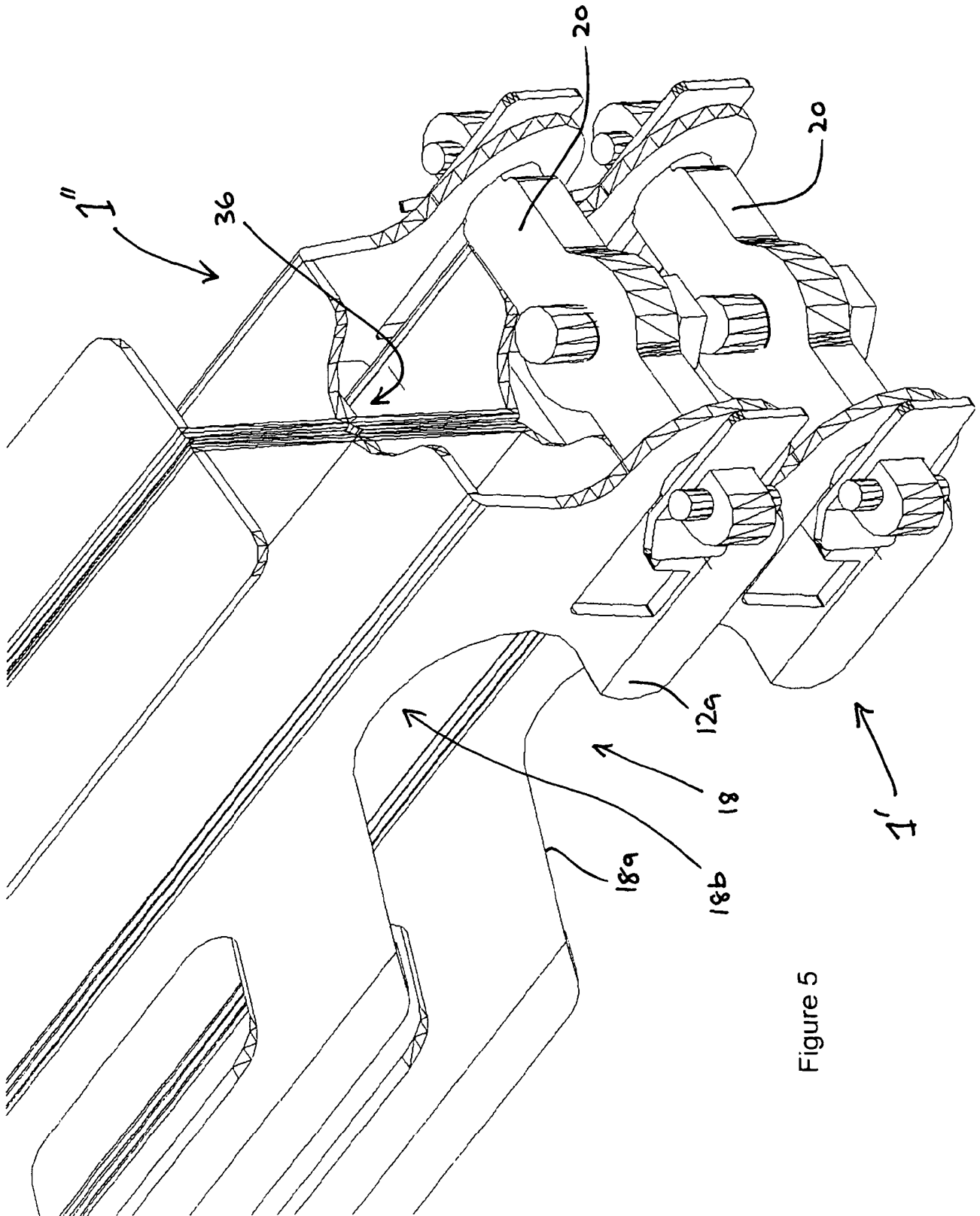


Figure 5

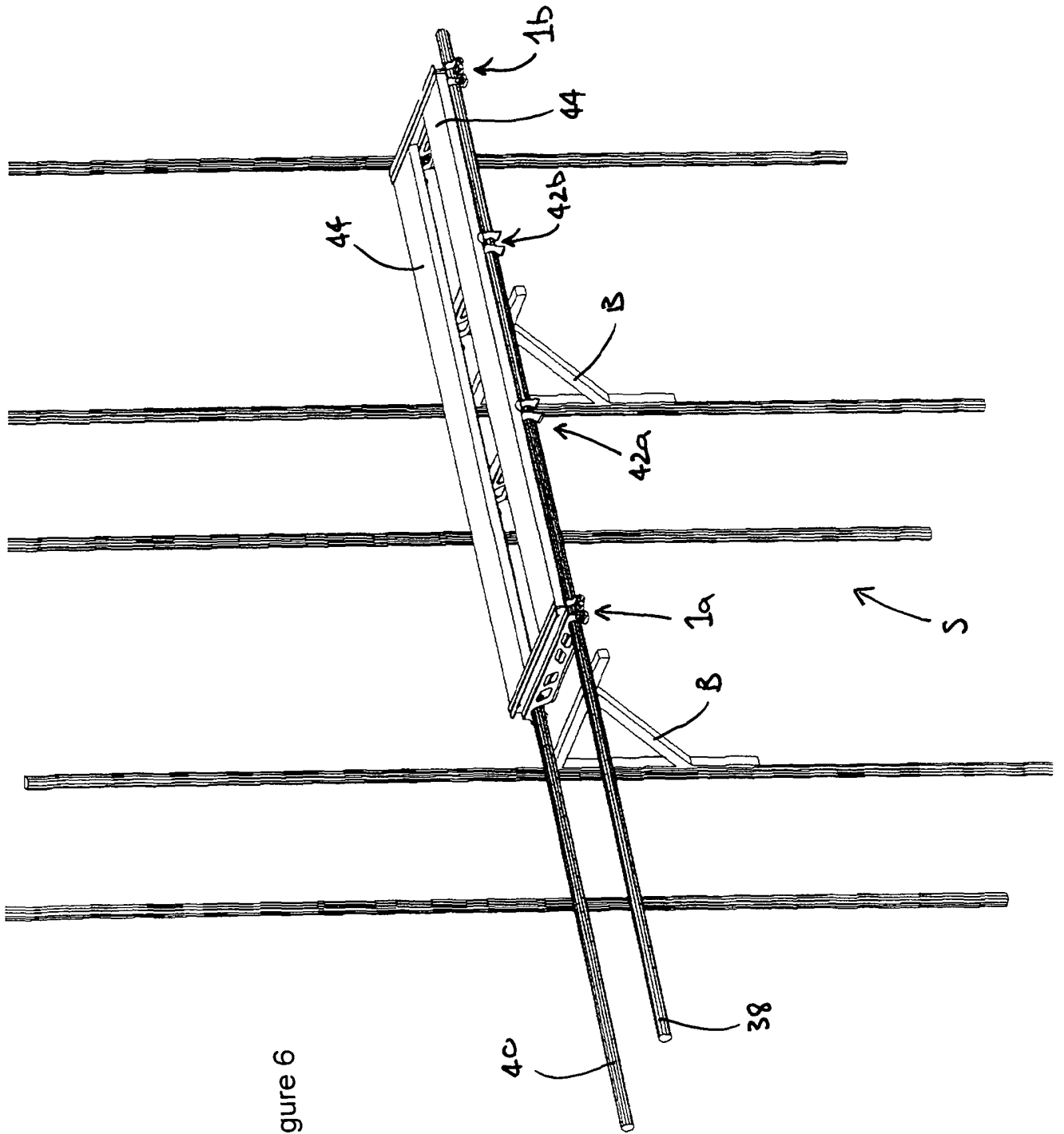
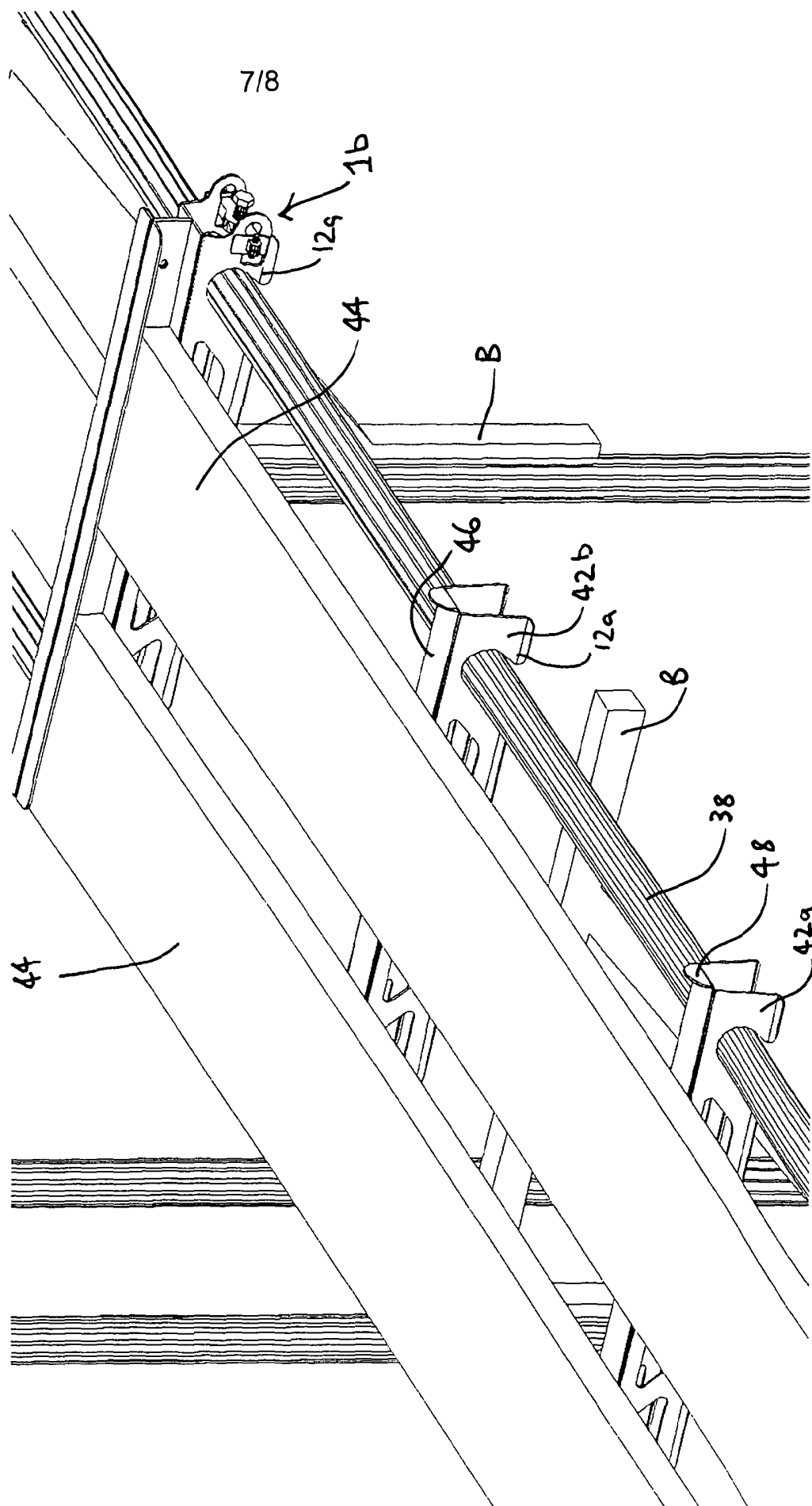


Figure 6

Figure 7



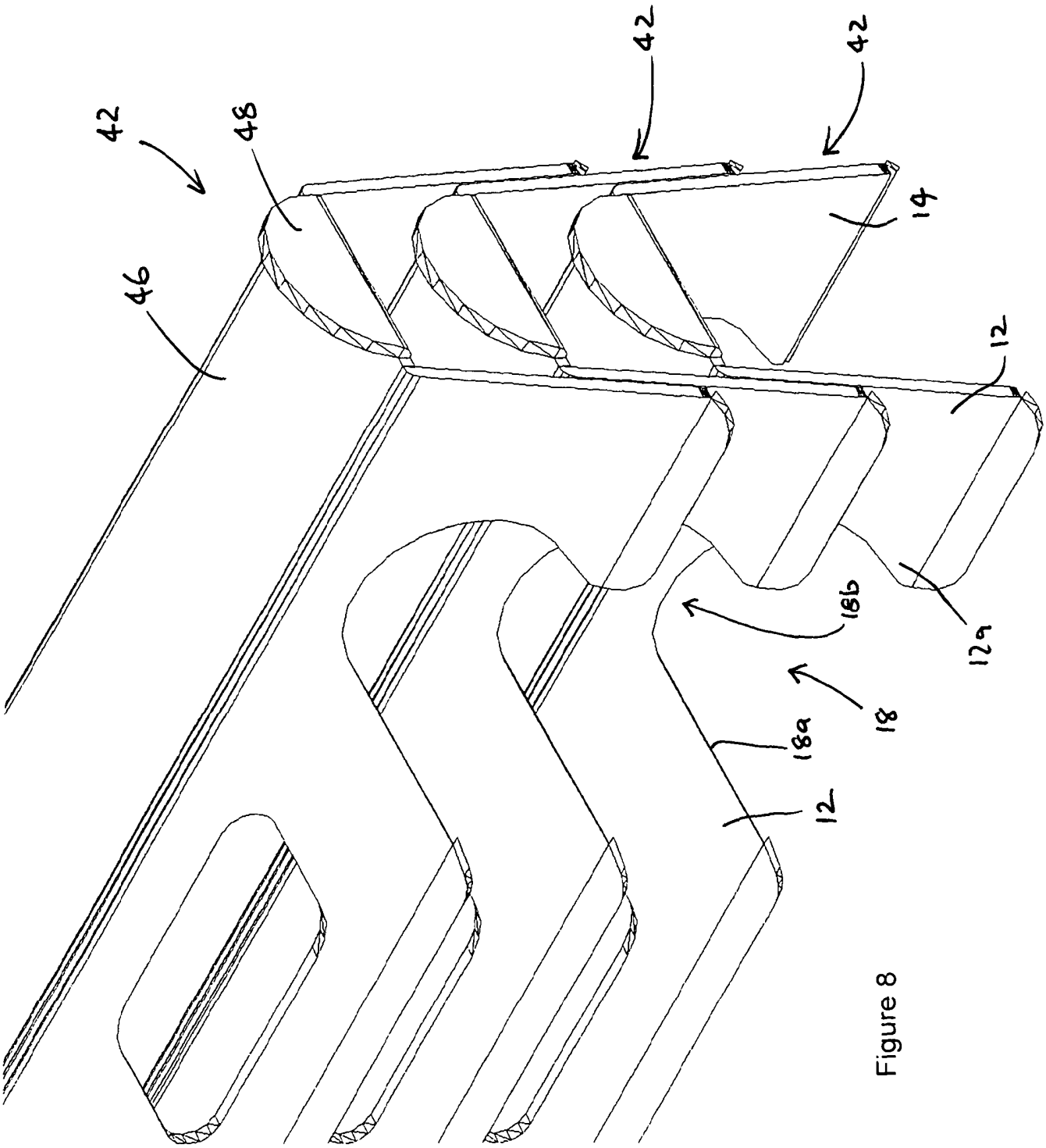


Figure 8

TITLE

Platform structures and cross beams therefor

DESCRIPTION

5 Technical Field

The present invention relates to platform structures, and in particular to platform structures that are intended to be used with conventional scaffolding.

Background Art

10 Scaffolding forming a temporary structure includes metal tubes that are held together by couplers. Boards or planks of wood or metal are used to provide a working surface. Standards (or uprights) are vertical tubes that normally rest on base plates. Ledgers are horizontal tubes that connect between the standards. Transoms span the ledgers and support the boards.

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Summary of the Invention

The basic component of the improved platform structure of the present invention is a cross beam having, at each end, a shaped notch for receiving and locating an elongate support member (e.g. a scaffolding tube) and a locking member that is operable to
20 selectively engage an elongate support member in use, the cross beam further including a longitudinal channel for receiving one or more boards (e.g. scaffolding boards or planks) that, in use, form a working surface.

The platform structure includes first and second elongate support members (e.g. scaffolding tubes) spaced apart in the longitudinal direction; first and second cross
25 beams as described above spaced apart in the transverse direction, i.e. in the axial direction of the elongate support members, and mounted across the first and second elongate support members such that the first elongate support member is retained in the notch provided at a first end of each cross beam and the second elongate support
30 member is retained in the notch provided at a second end of each cross beam; and one or more boards extending between the cross beams to form a working surface of the platform structure, the one or more boards having a first end received in the

longitudinal channel of the first cross beam and a second end received in the longitudinal channel of the second cross beam.

5 The elongate support members can be fixed to part of a scaffolding structure, e.g. hop up brackets. The platform structure may be used as a hop up platform. It will usually be convenient if the elongate support members are scaffolding tubes since these are widely available and have a standard diameter. The one or more boards that form the working surface of the platform structure may also be scaffolding boards or planks for the same reason.

10

The notches in each cross beam are preferably shaped to position the first and second elongate support members at a desired longitudinal spacing. The notches are also preferably shaped so that once the first and second elongate support members are at the desired longitudinal spacing, and are fixed to the scaffolding structure, then the
15 elongate support members are retained securely within the notches such that the cross beams cannot be lifted off the elongate support members.

Each notch can include a shaped (or cam) edge that engages the respective elongate support member to force the elongate support members outwardly to the desired
20 longitudinal spacing as the cross beam is lowered on to the elongate support members. The first and second elongate support members are preferably located in an upper part of the notches when the cross beam is properly mounted.

The notches in each cross beam can be formed in a pair of flanges that are spaced
25 apart in the transverse direction.

Each locking member preferably includes a pin that is adapted to slide in aligned slots formed in the cross beam, e.g. in the spaced flanges. The slots at each end of the cross beam can include a rotating position where the pins are free to rotate relative to
30 the remainder of the cross beam. If the part of each pin that passes through each slot has a substantially rectangular cross section then the rotating positions might be defined by a part of each slot that is substantially circular having a diameter that is

sufficient to allow the pins to rotate. Allowing each pin to rotate at a rotating position can be useful when the cross beams are designed to be stacked conveniently on top on one another as described in more detail below. The pins are preferably not free to rotate in any other part of the slots.

5

The slots at each end of the cross beam can be substantially $\neg$ -shaped and include a locking position where the pins are fixed relative to the remainder of the cross beam. The locking position may be an end part of the slots that is lower than a main part of the slots such that when the pins are slid longitudinally along the main part of the slots
10 towards the notches that receive and locate the first and second elongate support members they naturally drop into the end part, for example. Once the pins have dropped into the end part they will remain there until they are manually raised and slid longitudinally back along the main part of the slots.

15 The pin of each locking member can include a rotatable fixing member that is adapted to be brought into firm, locking, engagement with a facing elongate support member, typically when the pin is in the locking position. When the pins are in the locking position they cannot slide and they are therefore fixed relative to the remainder of the cross beam. The rotatable fixing members can then be rotated (e.g. using a standard
20 tool such as a scaffolding spanner) such that their contacting ends move toward the notches that receive and locate the first and second elongate support members.

If the first and second elongate support members are received within the notches in the cross beam then rotating the rotatable fixing members will bring their contacting
25 ends into firm, locking, engagement with the facing elongate support members. This engagement prevents the cross beam from sliding axially along the first and second elongate support members. In some arrangements the rotatable fixing members can also be used to prevent the cross beam from being lifted off the first and second elongate support members, i.e. they can contact a lower part of the cylindrical outer
30 surface of the facing elongate support members or even extend underneath the facing elongate support members to selectively retain them in the notches.

When the platform structure is to be disassembled then the rotatable fixing members of each cross beam are rotated in the opposite direction to move the contacting ends away from the first and second elongate support members. The contacting end of each rotatable fixing member can be appropriately shaped, e.g. made substantially spherical, to improve the engagement with the cylindrical outer surface of the first and second elongate support members and help to prevent the elongate support members from being deformed.

The rotatable fixing member can be a standard bolt that is received in a threaded aperture formed in the pin of each locking member.

The pins can be rotated between a stacking orientation and a use orientation where the contacting end of the rotatable fixing member faces the notches in the cross beam.

The cross beam may include an I-section that defines the longitudinal channel for receiving an end of the one or more boards that form the working surface of the platform structure. The I-section may be integral with the pair of flanges. In practice, the cross beam may be formed from two metal plates that are shaped, e.g. folded, and then welded together.

At least one end of the I-section can include a shaped notch. The notch can receive the locking member of an adjacent cross beam when the cross beams are stacked on top on one another for convenient storage or transport. More particularly, the notch can receive the pin of a lower cross beam in the stack when the pin is in the stacking orientation.

The platform structure may further include an intermediate cross beam having, at each end, a shaped notch for receiving and locating an elongate support member, the intermediate cross beam further including a surface for supporting the one or more boards that form the working surface of the platform structure, wherein the intermediate cross beam is mounted across the first and second elongate support members such that the first elongate support member is retained in the notch provided

at a first end of the intermediate cross beam and the second elongate support member is retained in the notch provided at a second end of the intermediate cross beam.

5 The intermediate cross beam is similar to the first and second cross beams but is mounted between the cross beams to provide additional support to the one or more boards that form the working surface of the platform structure. The intermediate cross beam does not have an I-section that defines a longitudinal channel for receiving an end of the one or more boards but instead has a substantially planar support surface which abuts an underside of the one or more boards in use.

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The notches in the intermediate cross beam are preferably shaped so that once the first and second elongate support members are at the desired longitudinal spacing and are fixed to the scaffolding structure then the elongate support members are retained within the notches such that the intermediate cross beam cannot be lifted off the
15 elongate support members. The first and second elongate support members are preferably located in an upper part of the notches when the intermediate cross beam is properly mounted.

20 The notch at each end of the intermediate cross beam can be formed in a pair of flanges that are spaced apart in the transverse direction.

The surface of the intermediate cross beam preferably includes a raised lip at each end. The raised lips are designed to prevent the one or more boards from moving in the longitudinal direction and keep the first and second ends of the one or more
25 boards securely within the longitudinal channels of the first and second cross beams. If no intermediate cross beam is used then a suitable structure can be provided on one or both of the cross beams to prevent the one or more boards from moving in the longitudinal direction. Alternatively, the one or more boards are retaining within the channels by a suitable fixing, e.g. a mechanical fixing.

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More than one intermediate cross beam can be positioned between the first and second cross beams and the number of intermediate cross beams will depend on the length of the one or more boards and the amount of support that is required.

5 To assemble an improved platform structure of the present invention the first and second cross beams and any intermediate cross beam(s) are typically lowered on top of the first and second elongate support members which are spaced longitudinally but not yet fixed to the scaffolding structure. The first and second elongate support members are received in the notches and are forced to move outwardly to a desired longitudinal spacing. At this stage the first and second elongate support members can be fixed to the scaffolding structure. Once the first and second elongate support members are fixed to the scaffolding structure at the desired longitudinal spacing then the first and second cross beams and any intermediate cross beam(s) cannot be lifted off the elongate support members and are retained securely in position.

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The locking members of the first cross beam are then operated to prevent the first cross beam from being able to move axially along the first and second elongate support members. The pins are moved to the locking position and the rotatable fixing members are rotated to bring their contacting ends into firm, locking, engagement with the first and second elongate support members.

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One or more boards are placed on top of the support surface of the intermediate cross beam(s). The first end of the one or more boards is slid into the longitudinal channel of the first cross beam that has been locked in position across the first and second elongate support members. The second cross beam can then be moved axially along the first and second elongate support members towards the first cross beam until the second end of the one or more boards is received in the longitudinal channel of the second cross beam. At this stage the locking members of the second cross beam are then operated to prevent the second cross beam from being able to move axially along the first and second elongate support members. The pins are moved to the locking position and the rotatable fixing members are rotated to bring their contacting ends into firm, locking, engagement with the first and second elongate support members.

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The one or more boards are held securely within the longitudinal channels of the first and second cross beams because the cross beams are locked to the first and second elongate support members by the locking members. The one or more boards cannot
5 move in the longitudinal direction because they are held by the raised lips of the intermediate cross beam(s).

The cross beams allow a stable and functional support platform to be constructed easily and quickly using widely available standard components, e.g. scaffolding tubes
10 and scaffolding boards or planks.

Drawings

Figure 1 is a perspective view of part of a cross beam according to the present invention;

15 Figure 2 is a detail view of an end of the cross beam of Figure 1;

Figure 3 is a detail view of an end of the cross beam of Figure 1 with the pin in a locking position;

Figure 4 is a detail view of an end of the cross beam of Figure 1 with the pin in a storage orientation;

20 Figure 5 shows a stack of cross beams of Figure 4;

Figure 6 is a perspective view showing a platform structure according to the present invention;

Figure 7 is a detail view of the platform structure of Figure 6; and

Figure 8 shows a stack of intermediate cross beams.

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With reference to Figure 1, a steel cross beam 1 according to the present invention includes an I-section 2 that defines a pair of oppositely facing longitudinal channels 4. The spacing between upper and lower horizontal parts 6, 8 of the I-section (i.e. the height of the longitudinal channels and a vertical part 10) is selected to match closely
30 the thickness of the scaffolding boards that will be used to form the working surface of the platform structure.

A pair of depending flanges 12, 14 are spaced apart in the transverse direction. The cross beam is formed from two steel plates that are folded and welded together along the vertical part 10 of the I-section 2 to form a rigid, integral structure. The flanges 12, 14 therefore depend from the lower horizontal part 8 of the I-section 2.

5

Each flange 12, 14 is provided with a series of openings 16 that both reduce the mass of the cross beam and allow for the attachment of other pieces of equipment, e.g. using ties or webs. A notch 18 is provided in each flange 12, 14 at each opposite end of the cross beam 1 and is shaped and sized to receive a conventional scaffolding tube.

10

A locking member is provided at each opposite end of the cross beam 1 outside the notches 18 and consists of a pin 20 that is free to slide in a pair of aligned slots 22 formed in the flanges 12, 14. Each pin 20 extends through the slots 22 and is retained in position by rectangular washers 24 and a dowel pin 26 or the like. A bolt 28 is received in a threaded aperture provided in a central part of each pin 20.

15

The locking member is more clearly shown in Figures 2 and 3. The end parts of each pin 20 that pass through the slots 22 have a rectangular cross section and are sized to slide in a main part 30 of each slot. Each slot 22 is $\neg$ -shaped with an end part 32 that is substantially circular and in which the pins 20 are free to rotate. The pins 20 cannot rotate in any other part of the slots 22 and can only slide in the main parts 30 in the particular use orientation shown in Figures 2 and 3, i.e. where the contacting end of the bolt 28 faces inwardly towards the adjacent notch 18. An opposite end part 34 of each slot 22 is lower than the main part 30 and defines a locking position for the pins 20. The pin 20 shown in Figure 2 is free to slide longitudinally along the main part 34 of the slots 22 in either direction. However, the pin 20 shown in Figure 3 has dropped down into the end part 34 of the slots 22 and is fixed relative to the cross beam 1. The lower end part 34 of each slot 22 is appropriately sized such that the pins 20 cannot move longitudinally relative to the cross beam 1 once they have dropped down. This allows firm, locking, engagement to be established between the bolt 28 of each pin 20 and the cylindrical outer surface of the facing scaffolding tube when the platform

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structure is assembled because the pin is unable to move and braces against the vertical wall of the lower end part 34.

Figure 4 shows a cross beam 1 where the pin 20 has been rotated to a storage orientation with the contacting end of the bolt 28 pointing upwardly. The storage orientation allows cross beams 1 to be conveniently stacked one on top of the other for storage or transportation purposes. A stack of cross beams is shown in Figure 5. A shaped notch 36 may optionally be provided in the lower horizontal part 8 of each I-section 2. The notch 36 of the lower cross beam 1' receives the pin 20 of the upper cross beam 1" as shown in Figure 5.

An assembled platform structure is shown in Figures 6 and 7. A pair of cross beams 1a, 1b is mounted across a pair of scaffolding tubes 38, 40. A pair of steel intermediate cross beams 42a, 42b are mounted across the scaffolding tubes 38, 40 between the cross beams 1a, 1b. Three separate scaffolding boards 44 will be positioned side by side with their opposite ends received in the longitudinal channels 4 defined by the I-section 2 of each cross beam 1a, 1b but only two of the scaffolding boards are shown in Figures 6 and 7 so that the underlying intermediate cross beams 42a, 42b are partly visible for the assistance of the reader. The scaffolding tubes 38, 40 are themselves mounted or fixed to brackets B that are provided on the standards (or uprights) of the scaffolding structure S.

The intermediate cross beams 42 are generally similar in construction to the cross beams 1 shown in Figures 1 and 2 but do not have an I-section or locking members. Instead of an I-section they have a substantially planar surface 46 that abuts an underside of the scaffolding boards 44 to provide additional support between the pair of cross beams 1a, 1b. A raised lip 48 is provided at each end of the support surface 46 to prevent the scaffolding boards 44 from moving in the longitudinal direction and hence sliding out of the I-sections 2 of the cross beams 1a, 1b. The intermediate cross beams 42 may also be conveniently stacked one on top of the other for storage or transportation purposes as shown in Figure 8.

The platform structure shown in Figures 6 and 7 may be assembled as follows.

The scaffolding tubes 38, 40 are laid across the brackets B with an approximate longitudinal spacing. The cross beams 1a, 1b and the intermediate cross beams 42a, 42b are lowered onto the scaffolding tubes 38, 40. The scaffolding tubes 38, 40 are engaged by an inner (or cam) edge 18a of the notches 18 and, as the cross beams 1a, 1b and the intermediate cross beams 42a, 42b are lowered, the inner edges force the scaffolding tubes to move outwardly along the brackets B until a desired longitudinal spacing is achieved where the scaffolding tubes are located in an upper part 18b of the notches. The scaffolding tubes 38, 40 are then fixed to the brackets B by any suitable means (not shown). When the scaffolding tubes 38, 40 are fixed to the brackets B at the desired longitudinal spacing then the cross beams 1a, 1b and the intermediate cross beams 42a, 42b cannot be lifted off the scaffolding tubes because a lower part 12a of the flanges 12 that is adjacent an outer edge of the notches 18 lies directly underneath a part of the scaffolding tubes. Put another way, once the scaffolding tubes 38, 40 are properly located in an upper part 18b of the notches then the cross beams 1a, 1b and the intermediate cross beams 42a, 42b can only be removed from the scaffolding tubes if the scaffolding tubes are allowed to move towards each other to narrow the longitudinal spacing between them and move past the lower part 12a of the flanges 12. Such movement is not possible while the scaffolding tubes 38, 40 remain fixed to the brackets B.

The first cross beam 1a is locked to the scaffolding tubes 38, 40 by operating the locking members. If the pins 20 are in a storage orientation then they are rotated to the use orientation shown in Figures 2 and 3 and are slid longitudinally along the main parts 30 of the slots 22 to the end parts 34 where they drop down to the locking position. The hex head of each bolt 28 is then turned using a scaffolding spanner until the contacting end of the bolt comes into firm, locking, engagement with the cylindrical outer surface of the facing scaffolding tube. This engagement prevents the first cross beam 1a from being able to slide axially along the scaffolding tubes 38, 40.

The scaffolding boards 44 are laid on top of the intermediate cross beams 42 to be held in position by the raised lips 48 and are received in the longitudinal channel 4 defined by the I-section 2 of the first cross beam 1a.

- 5 The second cross beam 1b is slid axially along the scaffolding tubes 38, 40 until the scaffolding boards 44 are received in the longitudinal channel 4 defined by the I-section 2 of the second cross beam 1b. The second cross beam 1b is then locked to the scaffolding tubes 38, 40 by operating the locking members are described above.
- 10 Once the scaffolding boards 44 are properly received in the longitudinal channels 4, and the cross beams 1a, 1b are locked to the scaffolding tubes 38, 40, the upper horizontal part 6 of each I-section 2 prevents them from being lifted out of the cross beams 1. The scaffolding boards 44 are also unable to move in the longitudinal direction because of the raised lips 48 provided at each end of the support surface 46
- 15 of the intermediate cross beams 42.

A longer platform structure may be created by mounting further cross beams 1 and intermediate cross beams 42 across the scaffolding tubes 38, 40. For example, in the case of the platform structure shown in Figure 6, a further cross beam could be added

20 to the left of the existing platform structure to provide an extended working surface. In this case, the first cross beam 1a would have scaffolding boards located in both of its longitudinal channels 4. Further intermediate cross beams could also be added.

The transverse spacing of the cross beams 1a, 1b will depend on the length of the

25 scaffolding boards. The length of the cross beams 1 will depend on the desired width of the working surface and the width of the scaffolding boards 44.

CLAIMS

1. A cross beam forming part of a platform structure, the cross beam having, at each end, a shaped notch for receiving and locating an elongate support member and a locking member that is operable to selectively engage an elongate support member in use, the cross beam further including a longitudinal channel for receiving one or more boards that, in use, form a working surface.
5
2. A cross beam according to claim 1, wherein the shaped notches are formed in a pair of flanges that are spaced apart in the transverse direction.
10
3. A cross beam according to claim 1 or claim 2, wherein each locking member includes a pin that is adapted to slide in slots formed in the cross beam.
4. A cross beam according to claim 3, wherein the slots at each end of the cross beam further include a rotating position where the pins are free to rotate relative to the remainder of the cross beam.
15
5. A cross beam according to claim 3 or claim 4, wherein the slots at each end of the cross beam are substantially T-shaped and include a locking position where the pins are fixed relative to the remainder of the cross beam.
20
6. A cross beam according to claim 5, wherein the pin of each locking member includes a rotatable fixing member that is adapted to be brought into firm contact with the elongate support member when the pin is in the locking position.
25
7. A cross beam according to claim 6, wherein the rotatable fixing member is a bolt that is received in a threaded aperture formed in the pin of each locking member.
8. A cross beam according to any of claims 3 to 7, wherein the part of each pin that passes through each slot has a substantially rectangular cross section.
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9. A cross beam according to any preceding claim, further including an I-section that defines the longitudinal channel.

10. A cross beam according to claim 2, further including an I-section that defines
5 the longitudinal channel, the I-section being integral with the pair of flanges.

11. A cross beam according to claim 9 or claim 10, wherein at least one end of the I-section includes a shaped notch.

10 12. A platform structure comprising:

first and second elongate support member spaced apart in the longitudinal direction;

first and second cross beams according to any preceding claim spaced apart in the transverse direction and mounted across the first and second elongate support
15 members such that the first elongate support member is retained in the notch provided at a first end of each cross beam and the second elongate support member is retained in the notch provided at a second end of each cross beam; and

one or more boards extending between the cross beams to form a working surface of the platform structure, the one or more boards having a first end received in
20 the longitudinal channel of the first cross beam and a second end received in the longitudinal channel of the second cross beam.

13. A platform structure according to claim 12, further comprising an intermediate cross beam having, at each end, a shaped notch for receiving and locating an elongate
25 support member, the intermediate cross beam further including a surface for supporting the one or more boards that form the working surface of the platform structure, wherein the intermediate cross beam is mounted across the first and second elongate support members such that the first elongate support member is retained in the notch provided at a first end of the intermediate cross beam and the second
30 elongate support member is retained in the notch provided at a second end of the intermediate cross beam.

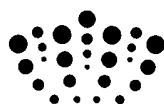
14. A platform structure according to claim 13, wherein the shaped notch at each end of the intermediate cross beam is formed in a pair of flanges that are spaced apart in the transverse direction.

5 15. A platform structure according to claim 13 or claim 14, wherein the surface of the intermediate cross beam includes a raised lip at each end.

16. A cross beam substantially as herein described and with reference to Figures 1 to 7

10

17. A platform structure substantially as herein described and with reference to Figures 6 and 7.



Application No: GB1007395.5

Examiner: Mrs Judith Peake

Claims searched: 1-17

Date of search: 6 September 2010

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,Y	X: 1-3, 5-6, 9, 11, 12 Y:13-15	GB2097086 A (GOUBAUD) See whole document, especially Figures 1-4
X,Y	X: 1, 9, 11-12 Y:13-15	GB2209553 A (PLUNKETT) Figs 2&3 particularly
Y	13, 14, 15	GB2374895 A (LYNDON SCAFFOLDING PLC) See Figures 1 and 2 particularly
Y	13 and 15	GB1079875 A (SCAFFOLDING GREAT BRITAIN LTD) Fig 2 especially
A	-	US4340130 A (KWIKFORM AMERICA INC) Scaffold frame header

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	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

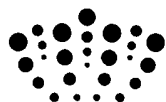
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The following online and other databases have been used in the preparation of this search report

Online: EPODOC, WPI



International Classification:

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E04G	0007/28	01/01/2006
E04G	0001/15	01/01/2006
E04G	0007/30	01/01/2006