

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 January 2008 (31.01.2008)

PCT

(10) International Publication Number
WO 2008/011684 A1

(51) International Patent Classification:

E04B 1/38 (2006.01) *E04F 13/076* (2006.01)
E04F 13/26 (2006.01) *E04F 15/02* (2006.01)
E04H 17/24 (2006.01)

(21) International Application Number:

PCT/AU2007/001062

(22) International Filing Date: 27 July 2007 (27.07.2007)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2006904144	28 July 2006 (28.07.2006)	AU
2006906690	29 November 2006 (29.11.2006)	AU
2006906974	13 December 2006 (13.12.2006)	AU
2007900402	29 January 2007 (29.01.2007)	AU
2007900976	26 February 2007 (26.02.2007)	AU

(81) Designated States (*unless otherwise indicated, for every*

kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every*

kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant and

(72) Inventor: **HOLLAND, Allan** [AU/AU]; 46 St. Catharines Terrace, Wynnum, Queensland 4178 (AU).

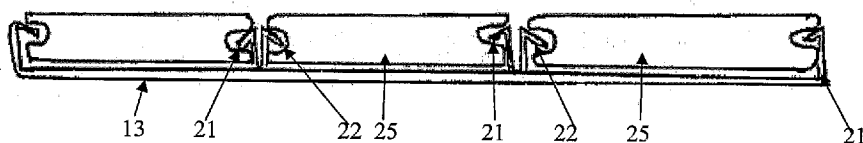
(74) Agent: **CULLEN & CO.**; Level 26, 239 George Street, Brisbane, Queensland 4000 (AU).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A CONNECTOR



(57) Abstract: A deck containing joists and decking planks can be assembled quickly and easily without requiring any fasteners and using a "snap lock" type arrangement by providing a connector on top of the joist which contains a number of clips that can be bent out of the plane of the top wall of the connector and which can engage with the decking planks.

WO 2008/011684 A1

A Connector

Field of the Invention.

5 This invention is directed to a connector which can be used to allow construction elements to be attached together without requiring any separate fasteners such as nails and screws. The invention is particularly suitable for decking systems to allow decking timber to be attached to joists without using screws and nails. However, the invention may have other applications such as attaching fence palings to rails,
10 attaching screen members to supports, for indoor and outdoor flooring and the like.

The invention will be described with reference to its suitability for decking. However, it is not considered that any particular limitation should be placed on the invention merely by illustrating this one particular suitable use of the connector.

15

Background Art.

Outdoor decks and verandas typically comprise an assembly of timber or metal members which are joined together. It is conventional for the deck to comprise a
20 number of vertical post members. Horizontal bearers are attached to the post members. A plurality of joists is then attached to the bearers. Decking planks can then be attached over the top of the joists.

In most cases, the members are made of wood but sometimes some of the members
25 are made of box or tubular steel, aluminium and the like.

The decking planks are usually made of wood or wood substitutes including some types of recycled plastic materials which look like wood, composite materials, laminate materials and the like.

30

Conventionally, the decking planks are nailed or screwed over the top of the joists. Sometimes, the nails can simply be hammered in or shot into the decking planks. Other times, it is necessary to pre-drill prior to screwing or nailing.

There are some disadvantages with the conventional method of building a deck. One disadvantage is the time-consuming requirement to nail or screw each decking plank to the joists. For a reasonably sized deck, there may be hundreds or even thousands of
5 nails or screws that must be used. Another disadvantage is that the nails and screws should be attached neatly and not in an irregular manner. Another disadvantage is that the decking plank can sometimes split or be damaged when nailed or screwed. This is especially the case when butting two planks together along their ends.

10 Some wood substitute materials must be predrilled which is extremely time-consuming. However, these wood substitute materials are virtually indestructible and do not rot, twist, warp or split over time, and therefore there would be a great advantage if this material could be used in a manner which does not require pre-drilling.

15 Another disadvantage is the care required to ensure that the decking planks are evenly spaced apart such that the small spacing (typically between 2-10 mm) between adjacent planks is even.

20 Another disadvantage is that the joists can be damaged by multiple nailing of the decking planks into the joists. To explain, a joist will typically support between 10-50 decking planks, and each plank is usually nailed into places to the joist. Therefore, the joist will have 100 or more nails nailed into the top face of the joist and along its length. It is found that, over time, these nails can act as small "wedges" and can create
25 a split along the top face of the joist into which water can pass to cause rotting and damage of the joist.

Therefore, there would be an advantage if it were possible to provide a method whereby the decking planks could be attached to the joist in a manner that does not
30 require as much nailing, pre-drilling, screwing etc. If this could be achieved, it is envisaged that the wood substitute materials would find greater acceptability.

Various attempts have been made to allow decking or something similar to be

attached without nails. For instance, it is known to provide a decking board having a top surface and a bottom surface. The bottom surface is formed with a pair of spaced apart relatively deep grooves. The joist to which the decking is attached contains a substantially upright U-shaped metal bracket containing turned out downwardly inclined lips. The bracket is nailed transversely across the top of the joist and does not cover the joist. The decking board can then be pressed fitted on to the inclined lips. Glue is used to hold the decking board in place. One disadvantage with this arrangement is that the relatively deep grooves need to be machined into the bottom surface of the decking board. As a decking board can be relatively thin (typically less than 20 mm) the grooves in the bottom wall can weaken the decking board causing splitting. Another disadvantage is that the bracket is nailed or screwed into the top wall of the joist and this can create a split along the top face into which water can pass to cause rotting or damage. Another disadvantage is that the arrangement does not provide any assistance in correct spacing between adjacent decking boards. In fact, if the brackets are not exactly positioned on the joists, it is possible for the spacing between the decking boards to vary which is quite unsightly. A bracket is required for each decking board on each joist and therefore for a relatively large deck containing say 100 lengths of decking board, and extending over 20 joists, it may be necessary to have a large number of brackets each of which needs to be precisely attached to the joists. This is clearly unsatisfactory and does not reduce the cost of decking assembly.

It is also known to provide a decking system comprising joists and hollow plastic "boards" of substantially rectangular cross-section. Each joist is provided with side clips (cleats) which clip into openings on the side wall of each "board". Again, this arrangement suffers from the disadvantage that the side clips need to be precisely positioned. The clips need to be individually nailed into the top of the joist which has all the disadvantages as described immediately above.

There would be an advantage if it were possible to provide a decking system or something similar where decking boards can be attached to joists without the use of nails or screws, or at least with reduced use of nails, and where the attachment is done in such a manner that it is not necessary to punch as many multiple nails through the top wall of the joist (which can cause splitting and rotting) and where there is no

need or a reduced need to precisely position and attach a large number of clips or cleats or brackets or something similar which can increase the time and therefore the cost of the assembly of the deck, the fence, partition etc.

- 5 It will be clearly understood that, if a prior art publication is referred to herein, this reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

Object of the Invention.

10

It is an object of the invention to provide a connector which may overcome at least some of the above-mentioned disadvantages or provide a useful or commercial choice.

- 15 In one form, the invention resides in a connector to allow a first member to be attached to a second member, the connector comprising an elongate member adapted for attachment to one of the members, the elongate member being provided with at least one clip, the clip having a laterally extending portion adapted to engage to the other of the members to attach the two members together.

- 20 The clips may be part of the elongate member which means that they are fixed thereto in the sense that they cannot slide or move along the elongate member.

- 25 In a more particular form, the invention resides in a connector to allow a plurality of first members to be attached to a second member, the connector comprising an elongate member adapted for attachment to the second member, the elongate member being provided with a plurality of clips, to facilitate attachment of the plurality of first members to the second member.

- 30 In a particular embodiment, the first members may comprise decking planks and the second member may comprise a joist and the connector can be attached to the joist with the plurality of clips enabling the decking planks to be attached to the joist without requiring screws or nails.

Of course, the first members need not comprise decking planks and may comprise other members such as fence palings, screens, flooring members, wall members, ceiling members and the like.

- 5 Of course, the second member need not comprise a joist and may comprise a post, or any other type of support.

The connector is preferably adapted to extend over at least part of the second member (for instance a joist). It is preferred that the connector is substantially U/C/ L-shaped
10 such that it can extend over the top of the first member and at least partially down one (for an L-shaped member) or each opposed side of the first member (for an U shaped member - see for instance at least figure 25) .

Thus, the connector may be substantially channel shaped and may comprise a pair of
15 opposed sidewalls and an interconnecting front wall/top wall etc.

It is also envisaged that the connector may be L shaped (see for instance figure 29 and figure 13), or comprise a flat plate or plate or strip like member (that is, without
sidewalls - see for instance figure 33, figure 34).

20

The length of the connector may vary but it is envisaged that the connector will extend between the first member and the second member and the length of the connector will depend on the number of first members that are to be attached to the second member. Thus, the length of the connector may be between 1-6 m although no particular
25 limitation should be placed on the length of the connector merely by exemplification of these lengths. It is envisaged that, for ease of transportation, storage and use, the connector will be made of lengths of between 1-3 m which may be placed end to end if a longer length is required.

30 It is also envisaged that the connector can be cut to length if required.

If two or more connectors are placed end to end, they may overlap if required and be attached to each other by any suitable means if required, or they may be attached by an

intermediate strap or similar type member and the like.

It is envisaged that each side wall (if present) will have a height to allow the side wall to pass at least partially along the side wall of the first member. It is not envisaged
5 that the height of the side wall should be excessive as this may increase cost, weight and the like. Also, it is envisaged that the connector will be attached to the first member by fasteners (such as nails or screws) passing through the, or each, side wall and therefore it is envisaged that the side wall should be sufficient for this purpose.

10 If the connector is used over the top of a joist, it is envisaged that the height of the side wall will be between 10-16 mm, and typically between 30-50 mm and the most typically about 38 mm.

The side wall may be provided with openings to allow fasteners to pass through the
15 side wall, or have indentations or weakened areas for the same reason. Alternatively, the side wall can be plain and self drilling fasteners can be used.

The interconnecting wall between the sidewalls typically extends over the top of a joist or similar. As a typical joist will have a thickness of between 40-100 mm, the
20 width of the interconnecting wall will be such that it can extend over the joist without too much gap between each side wall and the side wall of the joist.

The connector may also comprise a strip or plate member (which may be called a "top plate") without side walls or with no appreciable sidewalls, and in this variation, the
25 top plate may be glued to the joist or other member, or nailed/screwed with or without gluing.

The elongate member can be made of any suitable material and it is envisaged that suitable material will include metal. The metal may be galvanised or otherwise
30 treated to reduce corrosion, or may comprise stainless steel. Alternatively, the elongate member may be made of other material such as some plastics, laminate materials and the like.

The elongate member may be provided with a plurality of clips to attach one or more members (e.g. decking slats or planks) to the elongate member. The clips may be formed separately and attached to the elongate member if desired. However, it is envisaged that it will be more convenient if the clips can be "punched out" from a wall of the elongate member

It is preferred that the clips are attached to or relative to the interconnecting wall of the channel shaped elongate member, and therefore in a particular embodiment, the clips can be punched out from the interconnecting wall.

The connector may be initially formed with the clips in a retracted position, and it is preferred that the retracted position is where the clips are substantially in-line with a wall of the elongate member. This may allow the connectors to be stacked or nested more efficiently.

Alternatively, the clips can be formed separately and then attached to the elongate member (and preferably the interconnecting wall) prior to use. The attachment may be by spot welding, the use of fasteners, some form of press locking arrangement or twist locking arrangement and the like.

If the clips are formed integrally with the elongate member it is preferred that the clips comprise finger members or tongue members which are formed in the interconnecting wall and which can then be bent prior to use, or bent during the manufacturing process.

In one embodiment of the invention illustrated in figures 1-7, each clip can comprise an angled member which has a lower portion which extends substantially outwardly from the interconnecting member and an upper or tip portion which is angled relative to the lower portion. It is envisaged that the clip will initially comprise a substantially flat finger member which can then be bent upwardly and the end portion of which can be angled or bent relative to the lower portion. The clip can therefore have an inverted L shaped configuration. This might be achieved by a tool such as pliers, although it is envisaged that the clips will be formed into the "use" position during the

manufacturing process and not on site. To assist in bending or otherwise configuring the clip in this manner, it is envisaged that if the clip comprises a substantially flat finger member, the finger member may comprise a groove or something similar which can function as a fold line to facilitate bending of the tip part of the finger into the angled configuration. It is envisaged that the angle between the lower portion and the upper portion will be an included angle of between 30-80° and typically about 45°.

The connector may also be formed with the clips already extending from the elongate member.

10

In another embodiment of the invention illustrated in at least figures 9-10, the clip is not L-shaped but has laterally extending portions in the shape of small barbs 37 which pass into grooves in the sidewall of the decking (figure 9 for example), or "bite" directly into the sidewall of the decking (see figure 19 for example).

15

In another embodiment of the invention illustrated at least in figures 8, the barbs can be of slightly different design to better "bite" into the sidewall of the decking and also to facilitate attachment of the slats etc.

20 The size of the clip can vary depending on the size and configuration of the members which will be attached by the clip. As an example, the clip may be substantially planar and may have a length of between 10-30 mm and typically between 10-20 mm and most typically about 14 mm. The width of the clip may be between 5-30 mm and more typically between 10-20 mm and most typically about 15 mm. The thickness of the clip material may be between 0.5-4 mm and typically about 0.9 mm.

25

The length of the lower portion may be between 5-20 mm and typically about 8 mm and the length of the upper "turned in" portion may be between 10-20 mm and typically about 6 mm (according to the first embodiment of the invention).

30

If desired, the channel shaped elongate member may be provided with some form of projections or "barbs" to facilitate location of the channel member over the joist prior to fastening of the channel member to the joist (these are different to the barbs that

may be provided on the clip itself).

The first member (for instance a decking plank or slat) will typically have a configuration which may contain a recess to accommodate the turned in portion of the clip (e.g the first embodiment of the invention).

However, the clip can also be manufactured such that it can "bite" into the edges of the plank/ slat etc, in which case a recess need not be required. (e.g the second and third embodiments) The clip can be made of tensile steel.

10

A combination of a recess (possibly a shallower recess together with the "biting" action of the clip) is also envisaged.

The first member may contain an edge containing a longitudinal channel shaped recess into which the turned in portion of the clip can pass to lock the first member to the second member (e.g the first embodiment of the invention).

15

If the first member comprises a decking plank, the plank may have a width of between 50-200 mm and more typically between 60-150 mm, and most typically between 68-142 mm. The thickness of the decking plank may be between 10-50 mm and more typically between 20-35 mm.

20

To reduce any "rattle" or free play between the clip and the recess of the decking plank, it may be desirable to provide a resilient member between the decking plank and the interconnecting wall of the elongate member. The resilient member may comprise a small pad which may be made of compressible/resilient material such as rubber, plastics and the like. The pad may have a thickness of between 2-5 mm.

25

The connector may sometimes be referred to as a "top hat".

30

The clips are suitably biased such that they can be initially deflected away prior to being biased back into the recess. In a simple manner, the "top hat" may be formed from spring steel such that if the clips are punched out from the steel, the clips will

also have a degree of "spring".

If the clip is provided with barbs, the barbs may be punched from the side wall of the clip and, as an example, the barbs may be punched entirely out of the sidewall of the clip to form a small tab or finger member (see for instance figure 9 or figure 10) or
5 may be punched in the manner illustrated in figure 8. It is preferred that the barbs extend to each side of the clip and there may be provided between 1-10 barbs (and preferably about four barbs) on each clip.

10 A liner may be positioned underneath the elongate member and between the elongate member and the bearer/joist etc. to which the elongate member is fastened. The liner may be made of somewhat flexible waterproof plastic material.

The connector may also comprise a substantially flat elongate member (that is, the
15 elongate member is not U-shaped or L-shaped etc.) containing one or more clips, and this type of connector may be called a "top fix" type connector. The "top fix" type connector may be suited for attachment to metal purlins or sections etc. as opposed to wooden joist etc. an example of a "top fix" type connector is illustrated in figure 33 and figure 34. The top fix connector may be somewhat flexible such that it can be
20 formed in a roll (see for instance figure 35) and then cut to length, or may comprise a substantially rigid member.

Therefore, the connector can have various shapes including a U-shape (figure 25), an L-shape (figure 29) or a "flat" shape (figure 34) and it is not considered that any
25 particular limitation should be placed on the shape of the connector merely by illustrating these free particular variations.

In another form, the invention resides in a connector to connect a first member (e.g. a decking board) to a second member, the connector forming part of the second
30 member. An example of this version of the invention is illustrated in figure 26, figure 27 and figure 28 where the second member comprises a metal C- purlin, and the connector forms part of the top wall of the purlin and basically comprises a plurality of clips which may be as described above and formed integrally with the purlin or

formed separately and attached to the purlin (for instance by spot welding, or the use of fasteners.

5 The connector may be attached to one of the members in such a manner that it also traps a liner. An example of this is illustrated in figure 36 and figure 37. The liner will typically be formed of somewhat flexible plastic material and can function to waterproof the underneath of the deck/floor. Any water passing through the deck/floor will flow over the top of the liner. If desired, some form of collection gutter (not illustrated) can be attached to catch the water flowing off the liner.

10

The decking boards (example only) which are attached to the clips can also be glued to the top of the elongate member that forms part of the connector. An example of this is illustrated in figure 14. To enable the glue to be properly applied at the required amount and also at the required spacing, there may be provided some form of location means. An example of this is illustrated in figure 25 where an example of the location means comprises a plurality of upstanding small dimples with the glue needing to be positioned between the dimples. Of course, other types of location means may also be provided such as various other types of indicators such as grooves or other types of marking on the top wall of the elongate member.

20

The dimples can also function to slightly raise the boards from the elongate member to reduce rotting.

25 In another form, the invention resides in a system to attach a plurality of first members to a second member, the first members including decking planks, fence palings, boards etc., the second member including a joist, a bearer, etc., the system including a connector which comprises an elongate member adapted for attachment to the second member and preferably in such a manner that the top wall of the second member does not accommodate a plurality of fasteners to attach the elongate member to the second member, the elongate member containing a plurality of clips which are spaced apart 30 along one wall of the elongate member, the construction and arrangement being such that placement of the first members on the elongate member will cause the clips to engage with each side wall to attach the first members relative to the second member.

Brief Description of the Drawings.

- Embodiments of the invention will be described with reference to the following drawings in which:
- 5
- Figure 1. Illustrates an isometric view of part of the connector.
- Figure 2. Illustrates a plan view of the connector.
- Figure 3. Illustrates a side elevation view of the connector.
- Figure 4. Illustrates an isometric view of the connector showing the clip
- 10 members bent out of the plane of the top wall of the connector.
- Figure 5. Illustrates a profile of a decking plank.
- Figure 6. Illustrates three decking planks attached by a plurality of the clips.
- Figure 7. Illustrates in greater detail one said decking plank in position and particularly also illustrates the small cushioning pad below the decking plank.
- 15 Figure 8. Illustrates a clip have differently shaped "barbs".
- Figure 9. Illustrates a second embodiment of the invention where the clips have a design which is slightly different to the clips illustrated in figures 1 - 7.
- Figure 10. Illustrates the second embodiment of the invention from a different view.
- 20 Figure 11. Illustrates the second embodiment of the invention from a different view.
- Figure 12. Illustrates a plan view showing a plurality of decking planks attached to joists using the connector according to the second embodiment of the invention.
- Figure 13. Illustrates an underneath view of the second embodiment of the
- 25 invention.
- Figure 14. Illustrates a close up underneath view of the second embodiment of the invention.
- Figure 15. Illustrates another underneath view of the second embodiment of the invention.
- 30 Figure 16-23 illustrate an embodiment of the invention where the decking boards do not require recesses.
- Figure 24. Illustrates the additional use of a flexible membrane stretching between adjacent joists and to provide a relatively waterproof system.

Figure 25. Illustrates a U-shaped connector where the clips have the barbed shape illustrated in figure 8 to provide a better "bite" into the decking timbers, and the top wall of the connector also comprises a location means in the form of small upstanding dimples, the location means indicating where adhesive should be placed on the top wall.

Figure 26. Illustrates the embodiment of the invention where the clips can form part of a steel member such as a C-purlin.

Figure 27. Illustrates a decking slat being attached to the top of the C-purlin.

Figure 28. Illustrates a decking slat being attached over the top of three side-by-side purlins.

Figure 29. Illustrates a connector where the elongate member is L-shaped.

Figure 30. Illustrates the connector of figure 29 from a different angle.

Figure 31. Illustrates the aesthetic appeal of the deck formed by the invention.

Figure 32. Illustrates the underneath of the deck of figure 31 showing the clean lines.

Figure 33. Illustrates a connector where the elongate member is flat (top fix).

Figure 34. Illustrates the connector of figure 33 attached to a wooden joist.

Figure 35. Illustrates how the flap elongate member can be coiled and cut to length.

Figure 36. Illustrates the versatility of the connecting system and particularly illustrates the connecting system being used in fencing.

Figure 37. Illustrates in better detail the water proofing liner that can be positioned underneath the deck.

Figure 38. Illustrates a close-up of the water proofing liner extending underneath a connector.

Figure 39. Illustrates an upside down connector to fit a ceiling.

Best Mode.

Referring to the illustrations and initially to the first embodiment illustrated in figures 1 - 7, there is illustrated in figure 1, a connector to allow a plurality of decking planks to be attached to a joist without requiring any screws or nails.

The connector 10 comprises an elongate member made of metal. The elongate member is substantially channel shaped and comprises a pair of sidewalls 11, 12 and an interconnecting top wall 13. The elongate member can be formed from steel having a thickness of about 0.9 mm.

5

The elongate member can have a length of between 1-6 m.

The side wall, in the particular embodiment, has a height of 38 mm and contains a plurality of openings 13 to allow the connector to be placed over the top of a joist and
10 then nailed or screwed to each side wall of the joist through openings 13.

An advantage of having the side wall of this height is that if the joist is partially damaged or decayed in the upper portion, it is considered that the joist will still be substantially solid where openings 13 are positioned such that a screw can screw into
15 an undamaged part of the joist.

Top wall 13 has a width depending on the width of the joist. As a typical joist will have a width of 45-68 mm, the width of the top wall will be substantially the same.

20 If desired (see figure 4), the side wall may be provided with barbs 14 to locate the connector over the top of the joist prior to screwing/nailing the connector into position.

Top wall 13 contains a number of clips which are initially substantially flat and
25 comprise finger members 15 which are best illustrated in figure 2. Each finger member is positioned within a larger cutout portion to allow each finger member to be bent upwardly in the direction of arrow 16.

Figure 3 illustrates this in greater detail and shows the finger member initially in the
30 "flat" position 17, followed by the partially bent upwardly position 18 followed by the "fully erected" position 19.

In the particular embodiment illustrated, finger member has a lower portion which is

substantially straight, and an upper tip portion 20 (see figure 3) which is bent to an included angle of approximately 45°.

Figure 4 illustrates the connector 10 with a pair of clips having been pushed out and
5 having the tips bent over to provide the connector "ready for use". As illustrated in figure 4, the clips are arranged in pairs 21, 22 across the top wall of the connector and also as illustrated in figure 4, the tip of one clip 21 is bent the opposite way to tip of the other clip.

10 The reason for this is that one clip can be used to attach one decking plank and the other clip can be used to attach to an adjacent decking plank. This particular arrangement is then carried over through every pair of clips along top wall 13.

Figure 5 illustrates the profile of a particular decking plank 25 and the decking plank
15 contains opposed longitudinal edges formed with recesses 23, 24.

The turned in tip portion of each clip passes into a particular recess to attach the decking plank ultimately to the joist (via the connector 10).

20 Figure 7 illustrates in greater detail how decking plank 25 is attached. Specifically, the turned in clip 21 passes into recess 24 while the turned in clip 22 (which is on the next row of clips on top wall 13) passes into recess 23.

A small resilient pad 26 is positioned below decking plank 25 and functions to
25 provide a small upward "push" to the decking plank such that the turned in portions of clips 21, 22 properly engage in the recesses of the decking plank and any "looseness" or "rattle" is reduced.

In use, once connector 10 is in the position illustrated in figure 4, a decking plank 25
30 can be pushed against the clips. The initial push will slightly deflect away the clips until such time as a particular recess (23, 24) is in line with the turned in portion of a particular clip at which time the turned in portion will spring back into engagement into the particular recess. Thus, the assembly of the decking planks can be seen as a

"push lock" arrangement where each plank is simply pushed against the top of the clips and will initially push the clips away until such time as the clips can spring back into each recess on the decking plank.

- 5 The planks can then be assembled without requiring any nails or screws.

The gap between the planks is uniform.

Referring now to the second embodiment illustrated in figures 9 - 15, there is
10 illustrated a decking system for attaching a plurality of decking planks 30 to a joist 31. In the particular embodiment, the decking planks 30 made of a wood plastic composite material which is known. The decking planks 30 provided with opposed U-shaped recesses 32 in each side wall of each decking plank.

- 15 The joist 31 can be a conventional wooden joist (if desired). Attached over the top of joist 31 is a plastic liner 33. Plastic liner 33 is U-shaped in cross-section and extends over the top wall and partially along each side wall of joist 31. Although not illustrated, the top wall of plastic liner 33 is slightly domed such that any water that may pass onto plastic liner 33 will drain away from the top wall. This can be achieved
20 by making the top wall slightly thicker in the centre portion to create the domed effect.

- Once the plastic liner 33 is in place, the connector 34 can then be pushed over the top of plastic liner. Connector 34 can be somewhat as described above and comprises a U-shaped elongate metal member which may be galvanised or otherwise protected
25 against corrosion or which may be made of stainless steel or something else.

- Connector 34 in the particular embodiment comprises galvanised steel which has been bent to form the U-shaped cross-section. The length of connector 34 can vary but for convenience, it is expected that the connector will have a length of between 0.5 - 3 m
30 and typically between 1 - 1.5 m. Of course, it is possible to make the connector longer and then cut the connector to size.

Once connector 34 has been placed over the top of joist (and over the top of plastic

liner 33), nails 35 can be driven through each side wall of connector 34 to attach the connector to the joist. Importantly, the arrangement does not require any nails to be driven into the top wall of the joist.

- 5 Connector 34 contains a plurality of upright clips 36. These clips extend along the top wall of the connector and precisely spaced in such a manner that the planks 30 when attached to the clips, will provide a neat appearance with a uniform spacing between the planks (see for instance figure 12). Thus, it is not necessary to precisely position each clip which is a disadvantage with some existing systems.

10

- Clips 36 are initially punched out of the top wall of connector 34 and then bent upwardly into the position illustrated in at least figures 9 - 11. This is all carried out at the manufacturing stage such that when the connector is placed over the joist, the clips are already in the upright position. The clips 36 according to the second embodiment
15 slightly different to the clips according to the first embodiment in that each clip 36 contains locking tabs 37 extending from each side of each clip. Thus, a single clip 36 can attach a pair of adjacent decking planks 30 to joist 31.

- Another advantage of clip 36 is that it can also act as a spacer between adjacent planks
20 30.

- To secure the decking planks 30 in place, adhesive 38 is applied over the top of connector 34 and between adjacent clips 36. Thus, the placement of adhesive 38 (typically by some form of a gun), is extremely simple as it merely needs to be placed
25 between the adjacent clips 36. Then, when the planks 30 are placed over the top of joists 31, the planks will initially push and associated clip to one side and when the tabs 37 contact the recess 32, the clips will spring back into position. At the same time, the planks 30 will be pressed on top of the adhesive.

- 30 When the adhesive is cured, the planks will be strongly bonded to the top of each joist 31 and will be held by clips 36.

As the clips are punched out of the metal of the connector, an opening will be formed

in the top wall of the connector. The plastic liner 33 protects the joist against any water that would otherwise contact the joist through this opening.

5 In a further embodiment of the invention, the clips may be substantially as described and illustrated above and can be made of tensile steel. In this embodiment, the planks/slats do not need to have recesses. Instead, the clips can bite to into the edges of the planks/slats. This further embodiment is illustrated with reference to figures 16-23.

10 Figures 16-18 illustrates an elongate cover member 40 containing a plurality of clips 41 which extends substantially at right angles from the top wall of the elongate cover member 40 and extend laterally (that is across the top wall). Each clip 41 in the particular embodiment has a number (typically two) barbs 42 extending outwardly from one side of the clip 41, and a number (again, typically two) barbs 43 extending
15 outwardly from the other side of the clip. These barbs 42 and 43 illustrated in figure 17 and figure 18.

A decking plank 44 (see figure 19) can be positioned between adjacent clips 41 (see figure 16 which illustrates a pair of adjacent clips 41) and the positioning between
20 clips 41 is slightly larger than the width of plank 44. In use, one edge of the plank is positioned against one clip and this position is illustrated in figure 19. A sharp blow on the top of the plank will then push the plank to be locked between the pair of clips 41. The barbs 42, 43 on each clip will then bite into the side wall of the plank to lock the plank against movement. The locked position is illustrated in figure 20, figure 21
25 and figure 22. A blob of glue (not illustrated) can be used in a manner illustrated with reference to previous embodiments above.

Figure 23 illustrates a close up view of the plank 44 locked against a clip 41 with the barbs on one side of the clip having been pushed into the side wall of the plank to lock
30 the plank in position.

An advantage of this arrangement is that a pair of planks can be end butted together with the butt joint being somewhere on the top wall of the elongate member.

Previously, it has been necessary to use nails very close to the butt end of each plank and this usually causes the end of the plank to split. This is no longer a problem with the system of the invention.

- 5 As further planks 44 are pushed into position, the second plank will push the clip 41 which is already engaged in the first plank even harder into engagement with the first plank creating an even better plank locking arrangement.

Figure 24, 37 and 38 illustrate a variation or addition to the above embodiments and shows additional versatility with respect to the connector use. Referring to the figures 10 ,there is shown a section view of a of spaced apart joists 50, 51 (usually made of timber). On top of each joist is a connector 52 described previously containing the upstanding clips 41. Underneath the connector 52 may be a U-shaped plastic liner 53 described previously. Interconnecting the adjacent joists 50, 51 is a waterproof 15 relatively flexible membrane 54 which, in the particular embodiment, is made of plastic having a thickness of less than 2 mm. The plastic membrane is the first part which is placed over the top of the joists 50, 51 and sufficient slack is placed in the membrane. The next step is placement of the plastic liner 53 (if provided) which is pushed on top of each joist and, because the plastic liner is relatively rigid, it will 20 cause the relatively flexible membrane 54 to be pushed about the top end of each joist and this will tension the membrane between the joists. The plastic liner 53 has rounded edges such that it does not damage the membrane 54. The third step is attachment of the metal connector described previously and which contains the clips 41/60 to which the decking boards can be attached. An advantage of this arrangement 25 is that the flexible membrane 52 can waterproof the space underneath the deck reasonably well, and any water that passes between the decking boards will flow over the top of the membrane. The deck can slope downwardly slightly and this will cause the water to flow over the top of the membrane to the edge of the deck. A gutter (not illustrated and not necessarily always required) can be positioned to collect the water 30 for disposal or reuse. This means that the area underneath the deck can be used as a somewhat waterproof area and may contain garden equipment, vehicles and the like.

Another embodiment of the invention is illustrated in figure 33, figure 34 and figure 35 and comprises a connector which is an elongate flat strip 61 or plate member which can be called a "top fix". The strip contains the clips as described above but does not contain side walls or does not contain appreciable sidewalls. The top plate
5 can be screwed and glued in place. This variation of the invention may be useful in some circumstances where the need for sidewalls or side fixing is of reduced importance. As an example, the strip 61 can be fixed only to the top of a joist (see for instance figure 34) in circumstances where side fixing is not as important. Such circumstances may be in the assembly of vertical fence illustrated in figure 36. The
10 strip 61 may be flexible enough such that it can be coiled (see 35) and can then be unwound and cut to length and the clips can then be bent out of the strip member. This top fix embodiment may also be suitable for attachment to a C-purlin or something similar, as opposed to the variation where the C-purlin is of special design and contains the integrally formed clips (see figure 26, figure 27 and figure 28).

15

Referring now in to figure 8, this figure illustrates a clip 62 which is generally the same as clip 41 except that the barbs 63 have a different more pointed shape and are therefore adapted to better bite into the sidewalls of the decking slats or whatever is attached to the clips. Specifically, the shape of the barbs is somewhat "nose like" in
20 configuration and has a downwardly ramped surface 64. As a slat (not illustrated) is pushed downwardly, the slat will slide along the nose like configuration of the barbs , but once the slat is in position against the top wall of the elongate member, upward lifting of the slat is very difficult as the barbs will more strongly dig into the side wall of each slat. The barbs 63 extend to each side of the clip 62. As a slat is pushed into
25 position, it will slightly deflect the clip to one side. When the next slat is pushed into position, it will return the clip back to the upright position and will also cause the barbs to dig strongly into the side wall of both slats.

Another useful feature on clip 62 is that the top of the clip is provided with a notch 65
30 to accommodate a string line.

Referring now to figure 25, the top wall 66 of the connector is provided with pairs of small dimples 67 which act as location means for glue, which is used to glue the

underside of the slats to the top of the connector. The arrangement is that the bead of glue is to be placed between each group of dimples (e.g. 68, 69 etc.) and this will ensure that the slats are properly glued without using either too much glue or not enough glue. The bead of glue should pass from one pair of dimples to an adjacent
5 pair of dimples. This makes it very easy for even inexperienced people to ensure that a proper amount of adhesive is used. The dimples also slightly raise the slats from the top wall of the connector to reduce rot, swelling etc.

Referring now to figure 26-figure 28, there is illustrated another variation of the
10 invention. In this variation, rather than a wooden joist being use, a steel member is used and in this particular embodiment, the steel member is a C-purlin 70. The C-purlin 70 has a top wall 71 containing extending clips 62 which are formed on the C-purlin and therefore do not comprise a separate connector. This particular variation of the invention may be suitable for large jobs that require a specially designed C-purlin.
15 For smaller jobs, the top fix as illustrated in figure 33 and figure 34 can be screwed, spot welded or otherwise attached to the top wall 71 of the C-purlin 70.

Figure 29 and figure 30 show a connector for attachment to a wooden joist (in this particular version a joist made of LVL (laminated veneer lumber), and where the
20 connector is L-shaped rather than U-shaped.

Figure 31 and figure 32 illustrated part of the deck made according to an embodiment of the invention and particularly illustrate the lack of nails or screws that are ordinarily in this type of deck.
25

Figure 36 illustrates how the connector can be used in a vertical manner such as a wall or fence etc. The connectors 73 can be attached to vertical post members and horizontal board members 74 can then be clipped in place.

30 Figure 39 illustrates an upside-down connector 101 attached to a batten or something similar 102 to enable a number of ceiling boards 100 to be simply pressed into position without requiring any nails or screws.

Throughout the specification and the claims (if present), unless the context requires otherwise, the term "comprise", or variations such as "comprises" or "comprising", will be understood to apply the inclusion of the stated integer or group of integers but not the exclusion of any other integer or group of integers.

5

Throughout the specification and claims (if present), unless the context requires otherwise, the term "substantially" or "about" will be understood to not be limited to the value for the range qualified by the terms.

- 10 Any embodiment of the invention is meant to be illustrative only and is not meant to be limiting to the invention . Therefore, it should be appreciated that various other changes and modifications can be made to any embodiment described without departing from the spirit and scope of the invention.

Claims.

1. A connector to allow a plurality of first members to be attached to a second member, the connector comprising an elongate member adapted for attachment to the second member, the elongate member being provided with a plurality of clips which are immovably fixed to the elongate member, to facilitate attachment of the plurality of first members to the second member.
2. The connector as claimed in claim 1, wherein the elongate member comprises a top wall and at least one side wall.
3. The connector as claimed in claim 2, wherein fasteners are used in the at least one side wall to connect the elongate member to the second member.
4. The connector as claimed in any one of the preceding claims wherein the clips are provided with extending barbs to engage with the first members, the barbs extending outwardly from each side wall of the clips.
5. The connector as claimed in claim 4, wherein the barbs are adapted to pass into a recess on a side wall of the first members or the barbs are adapted to bite into the side wall of the first members.
6. The connector as claimed in any one of claims 4 or 5, wherein the barbs are shaped in the form of a nose having a downwardly extending surface and a lower abrupt edge to facilitate the first member pushing past the barb but making it difficult for the first member to be lifted off the connector, as the barb will bite more strongly into the side wall of the first member.
7. The connector as claimed in any one of the preceding claims, wherein the elongate member has a top wall, the clips adapted to extend upwardly or outwardly from the top wall, and an adhesive locator being provided between adjacent pairs of clips to identify correct placement of adhesive.

8. The connector as claimed in claim 7, wherein the adhesive locator comprises dimples that extend upwardly from the top wall of the elongate member.

9. The connector as claimed in any one of claims 1, and 3-8 wherein the
5 connector is in the form of a strip which is sufficiently flexible to enable it to be coiled, the clips initially being substantially coplanar and able to be bent out into the upright configuration prior to use.

10. An assembly comprising a plurality of spaced apart second members, a
10 connector attached to each, or a majority of the second members, the connector comprising an elongate member adapted for attachment to the second member, the elongate member being provided with a plurality of clips, to facilitate attachment of the plurality of first members to the second member, and a plurality of first members being attached to the connector by the clips at least, and in most cases also using an
15 adhesive.

11. The assembly of claim 10, wherein the assembly is substantially horizontal and further includes a waterproof membrane extending over and between the spaced apart second members and underneath each connector.

20

12. The assembly of claim 10 wherein the assembly is substantially vertical, and may comprise a wall or fence.

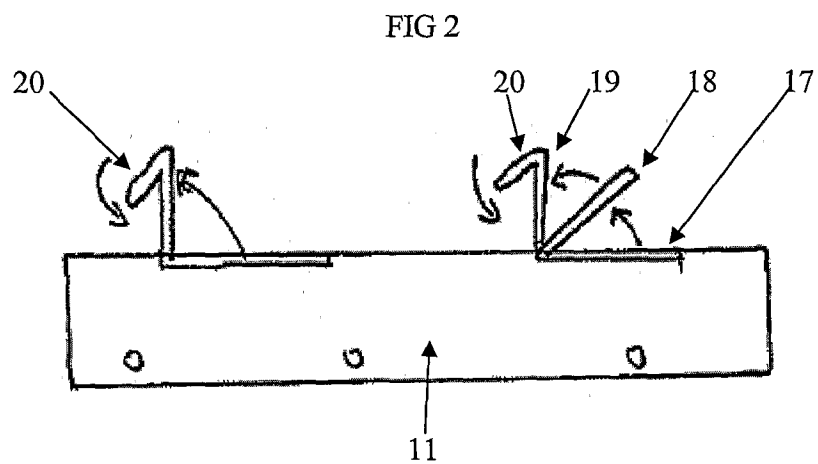
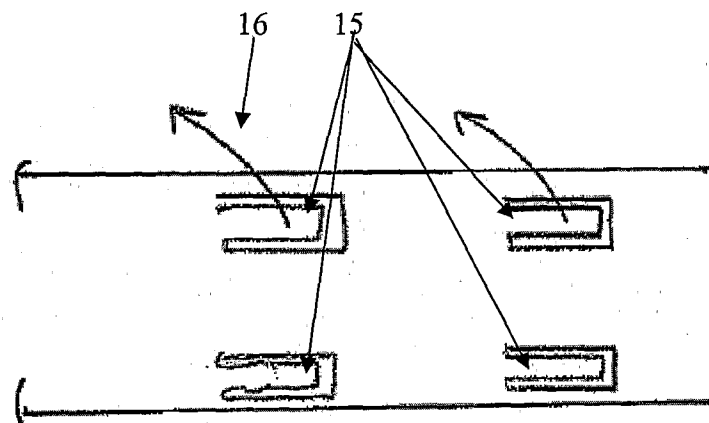
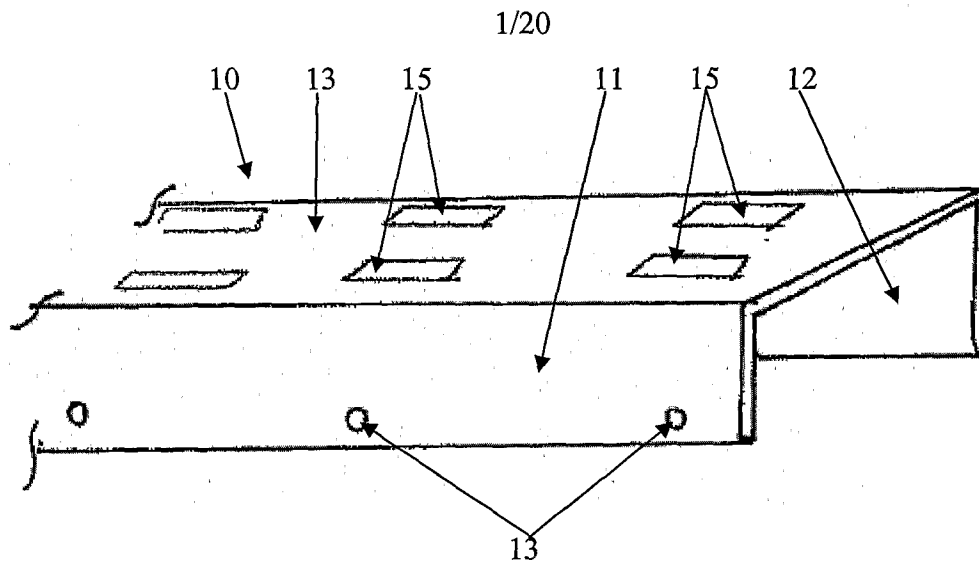
13. A connector to allow a plurality of first members to be attached to a
25 second member, the connector comprising a plurality of clips which are attached to the second member and which facilitate attachment of the plurality of first members to the second member.

14. The connector as claimed in claim 13 wherein the second member
30 comprises a purlin such as a C-purlin.

15. A connector to allow a plurality of first members to be attached to a second member, the connector comprising an elongate member adapted for

attachment to the second member, the elongate member being provided with a plurality of clips to facilitate attachment of the plurality of first members to the second member, each clip, or a majority of clips, having a free end which is bent relative to the remainder of the clip and which is adapted to pass into a groove in the side wall of

5 the first members to facilitate attachment of the first members to the second member.



2/20

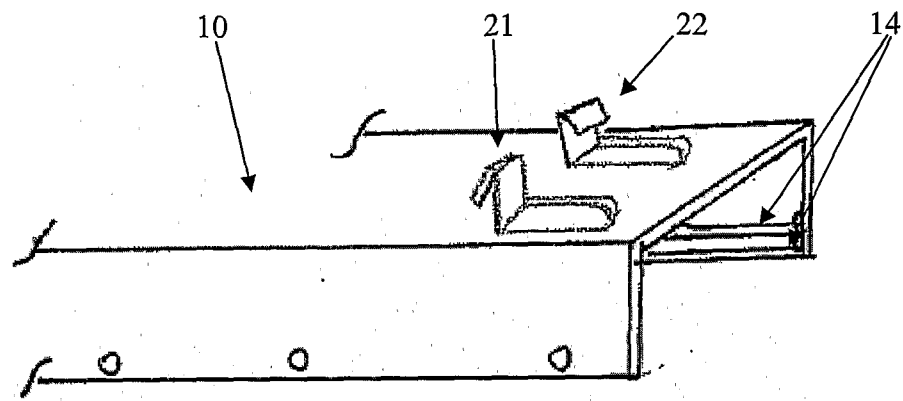


FIG 4

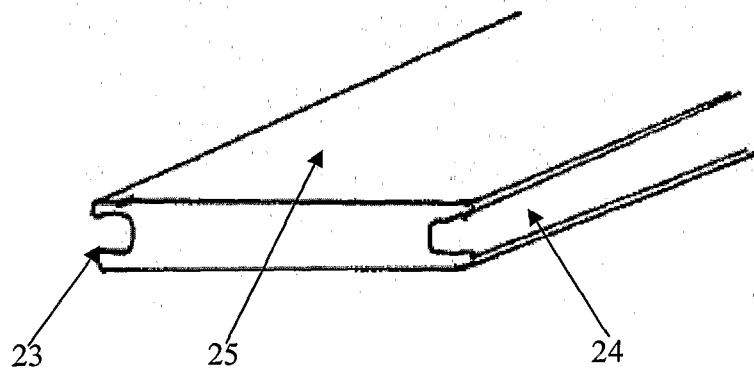


FIG 5

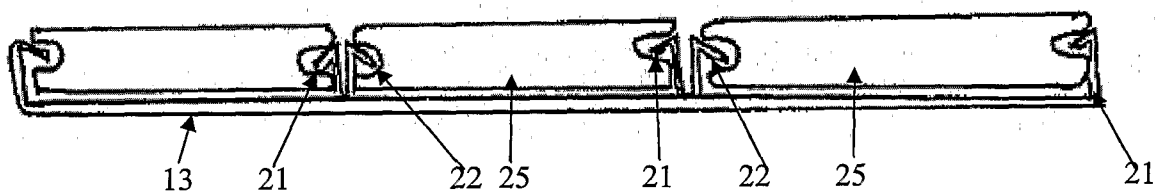


FIG 6

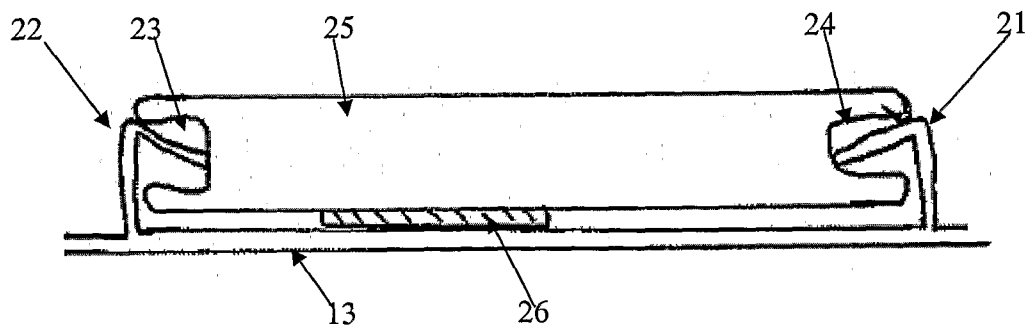


FIG 7

3/20

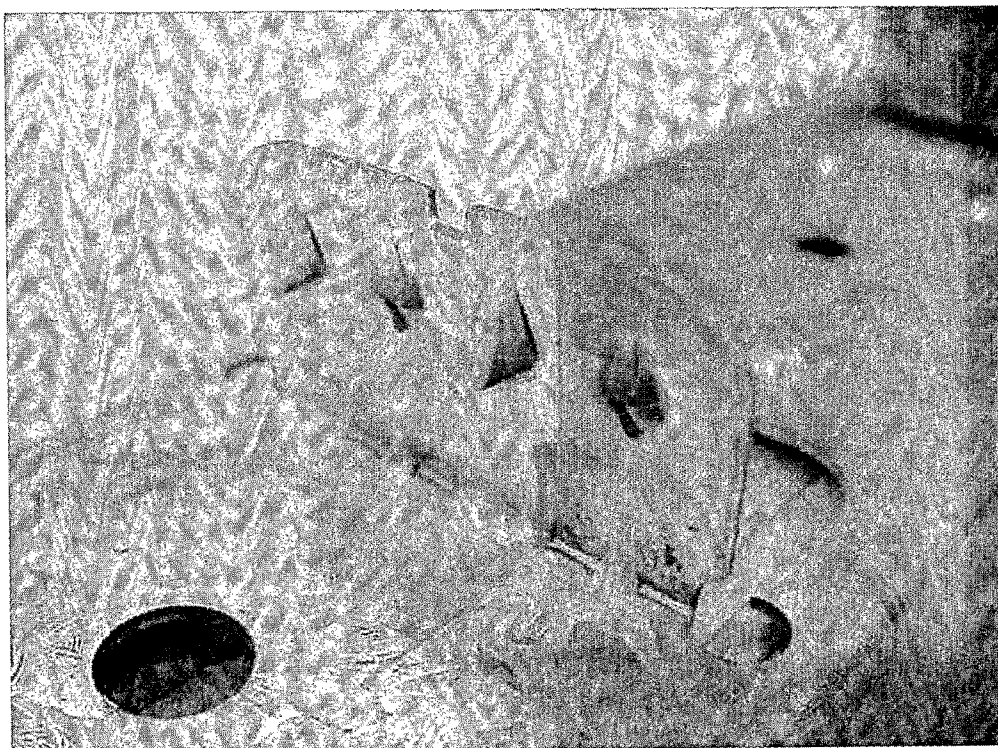


FIG 8

4/20

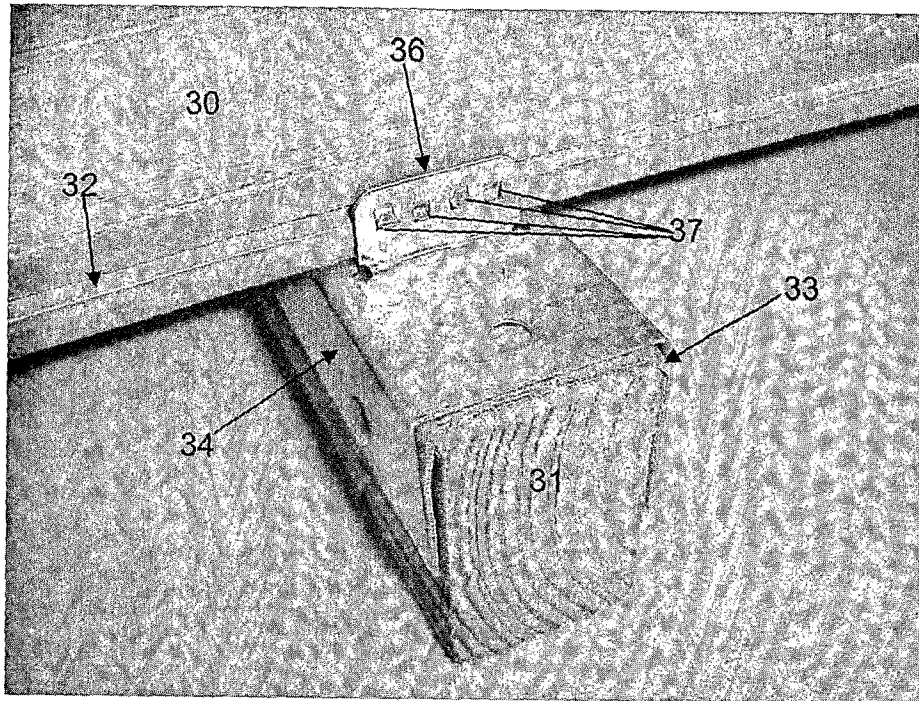


FIG 9

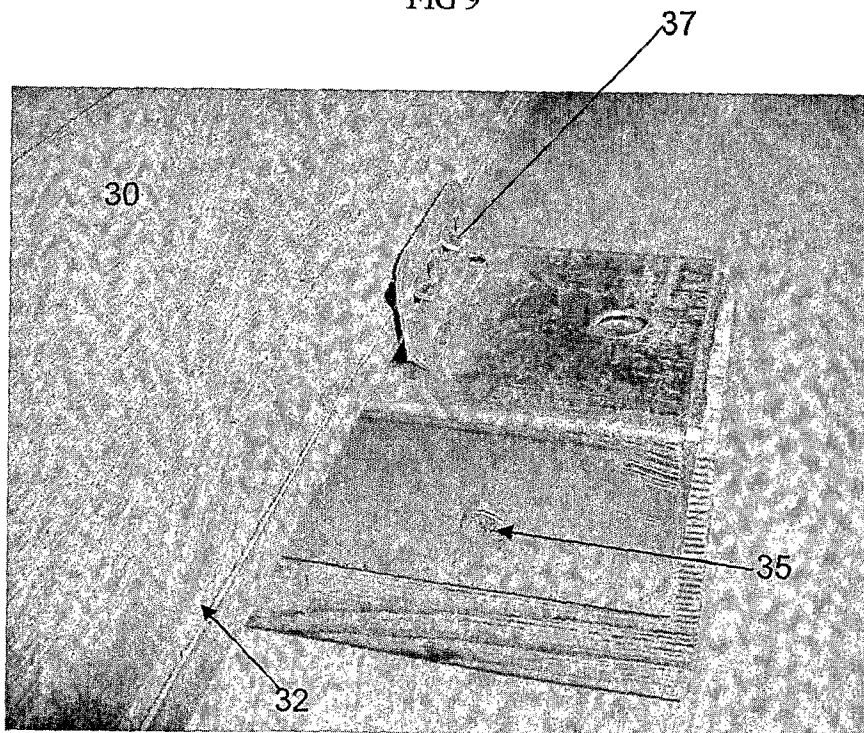


FIG 10

5/20

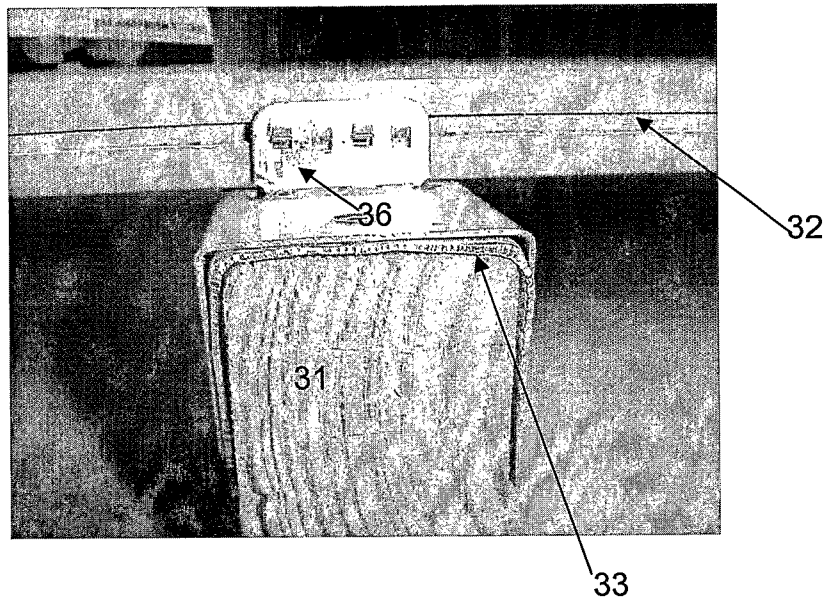


FIG 11

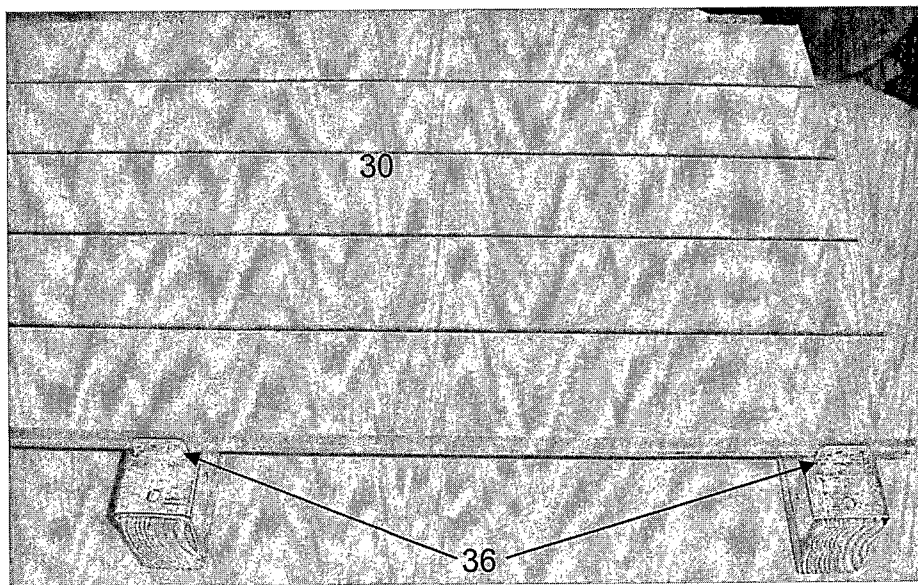


FIG 12

6/20

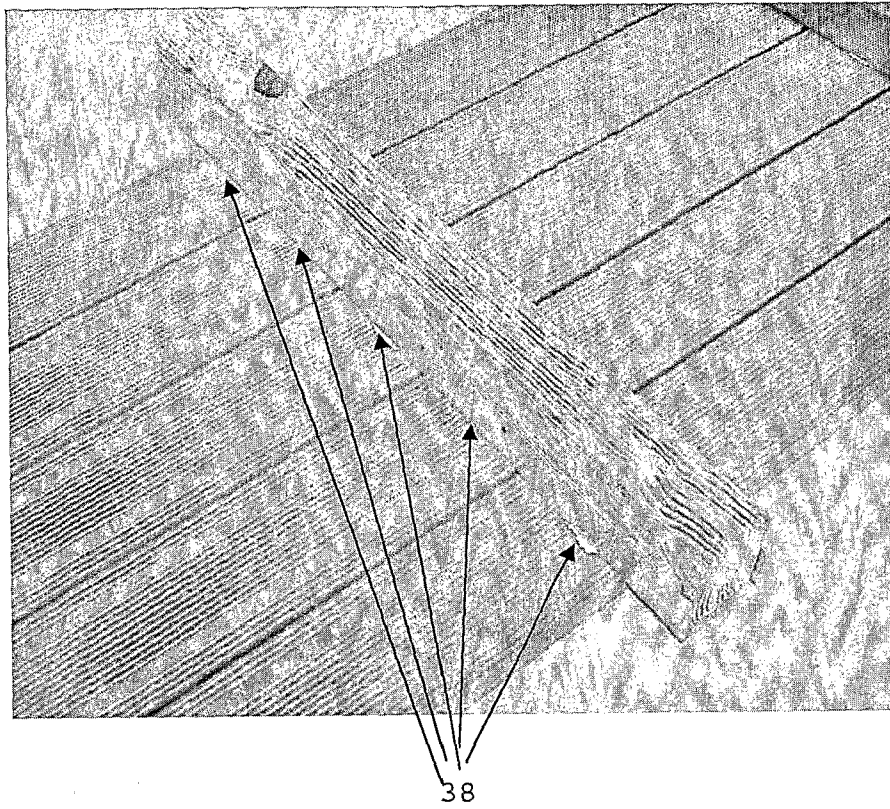


FIG 13

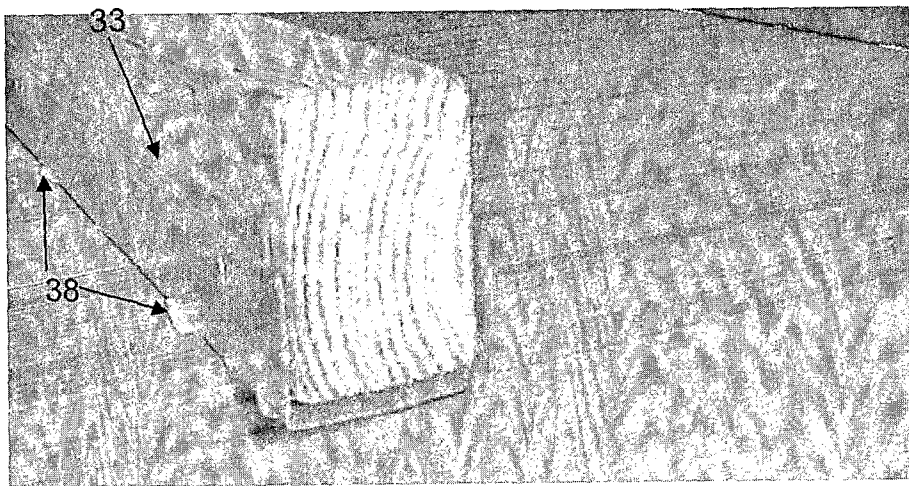


FIG 14

7/20

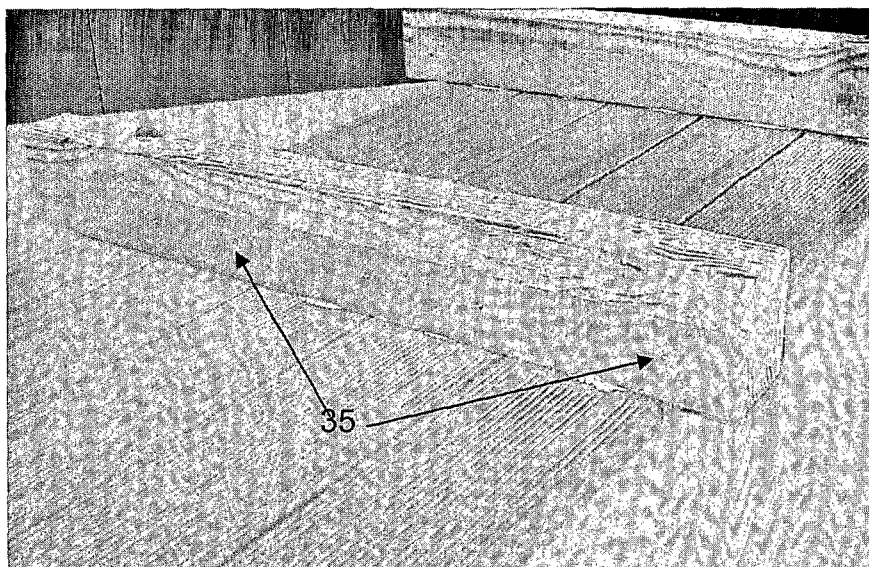


FIG 15

8/20

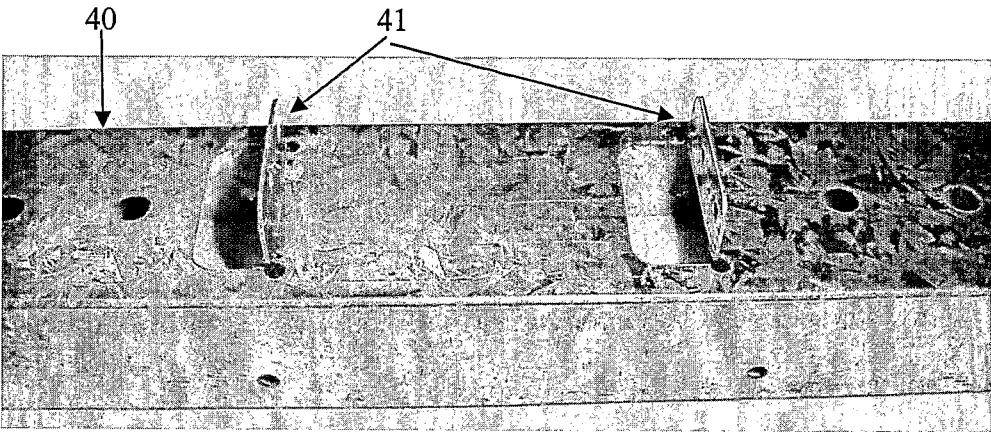


FIG 16

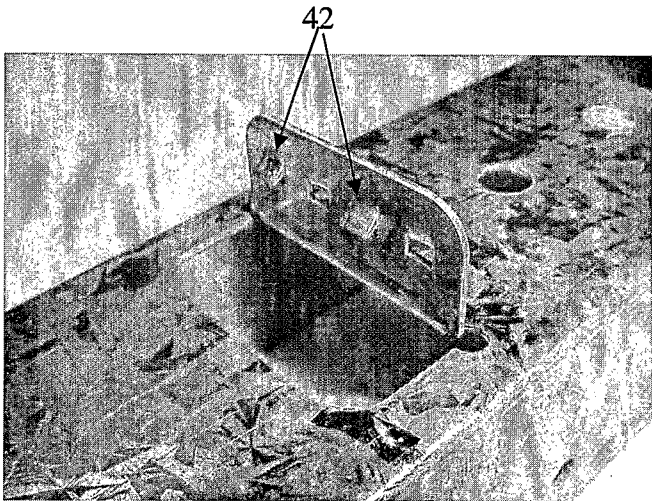


FIG 17

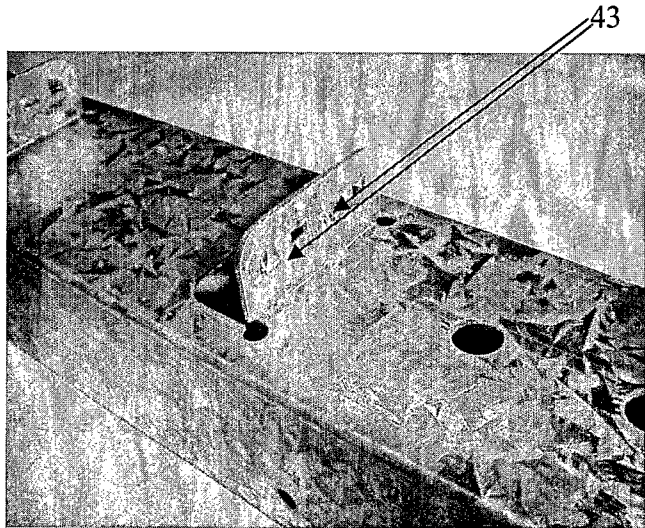


FIG 18

9/20

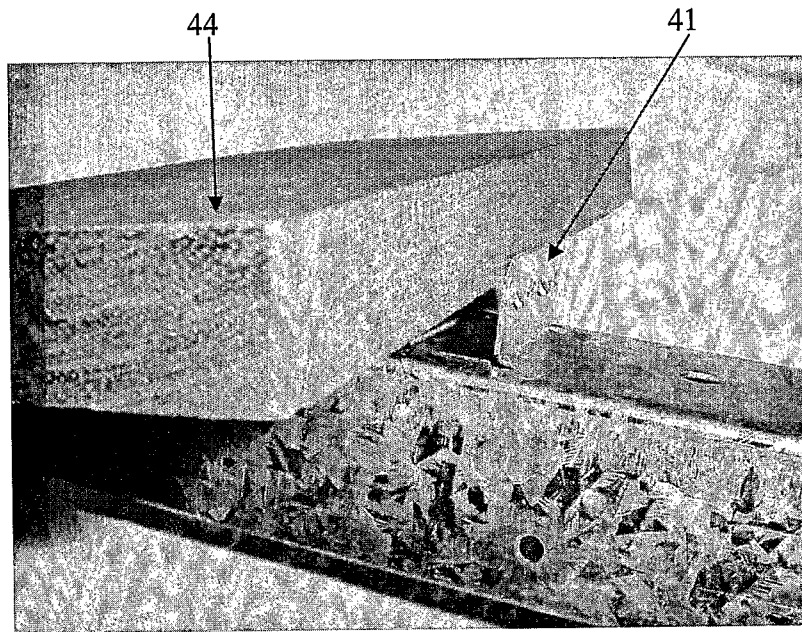


FIG 19

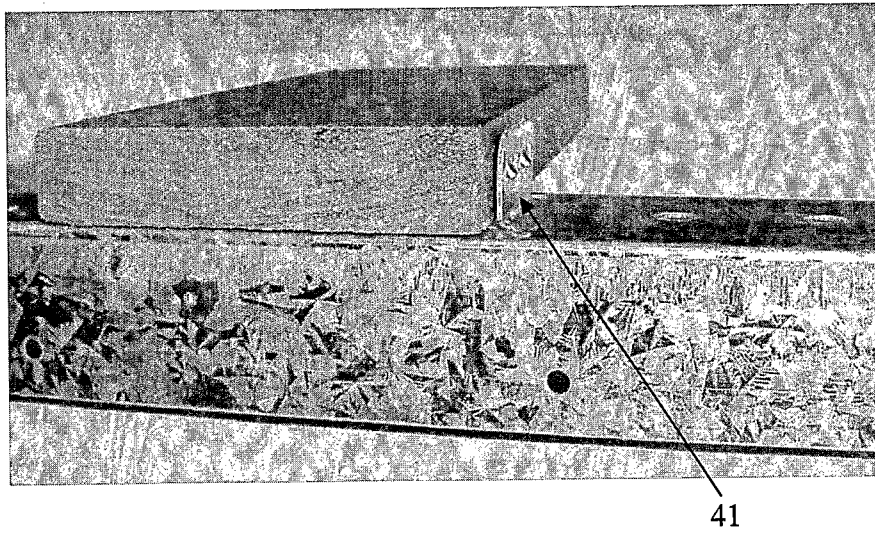


FIG 20

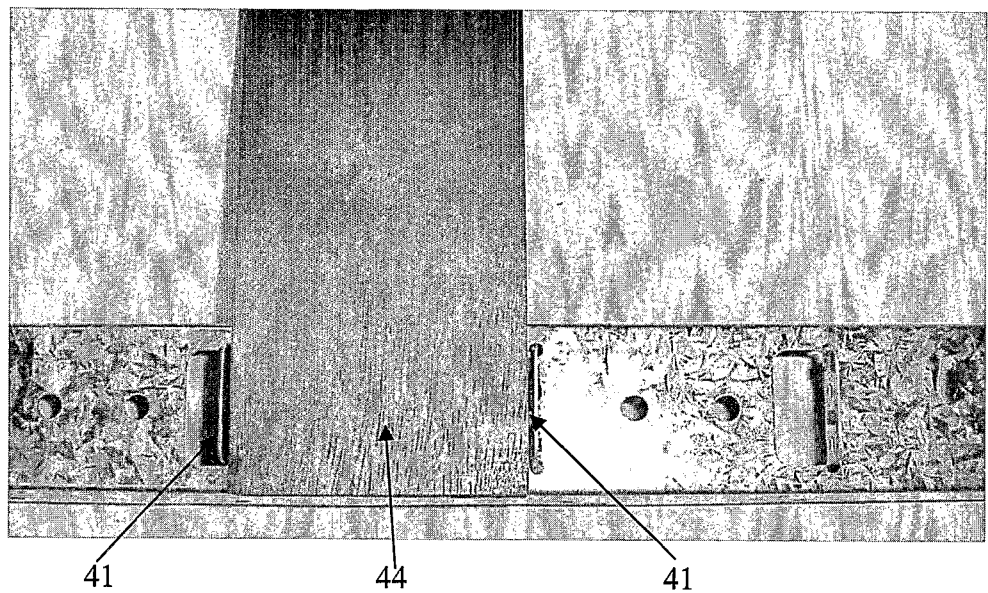


FIG 21

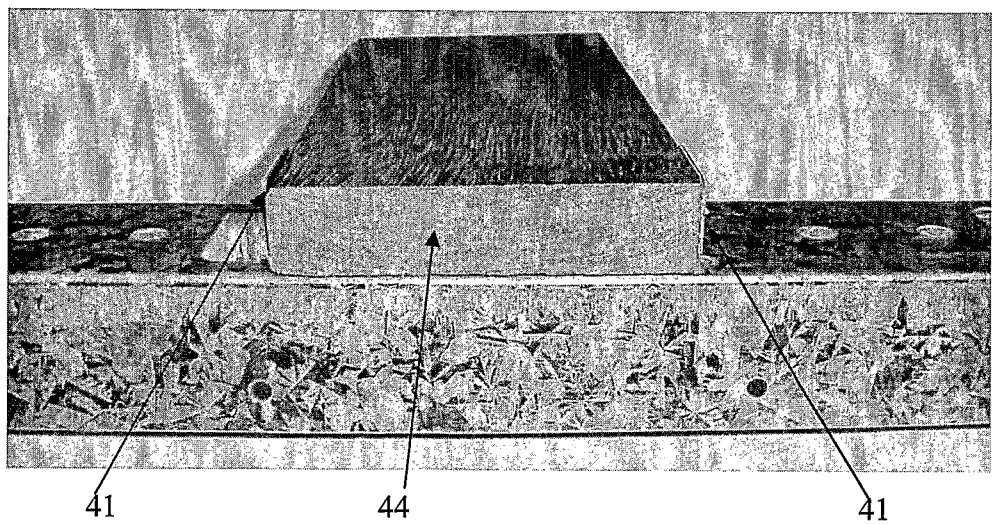


FIG 22

11/20

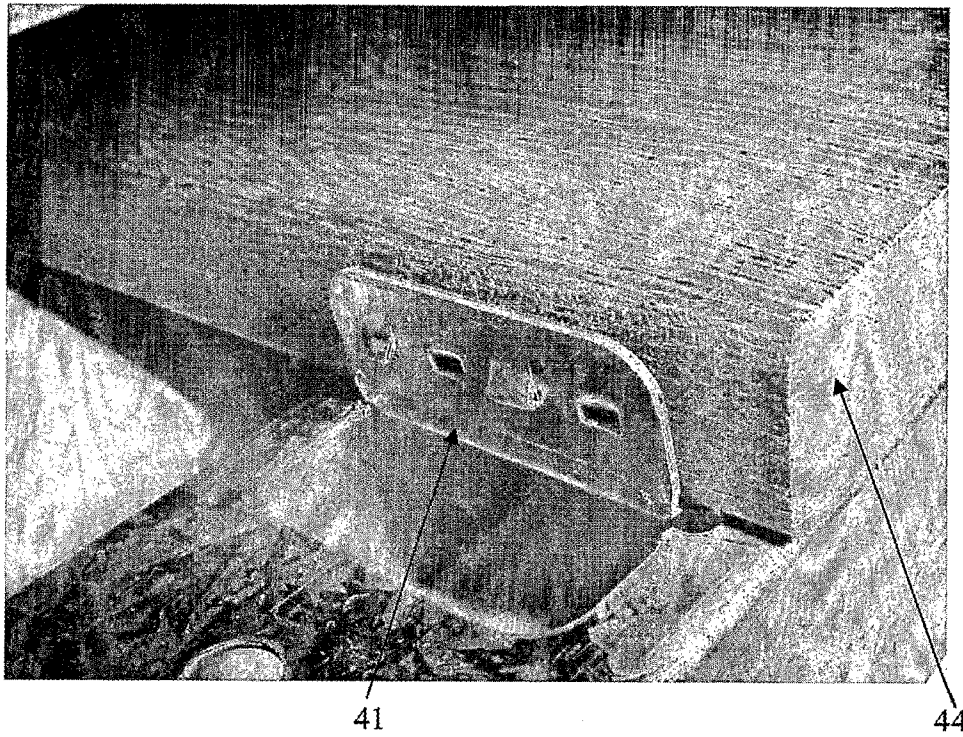


FIG 23

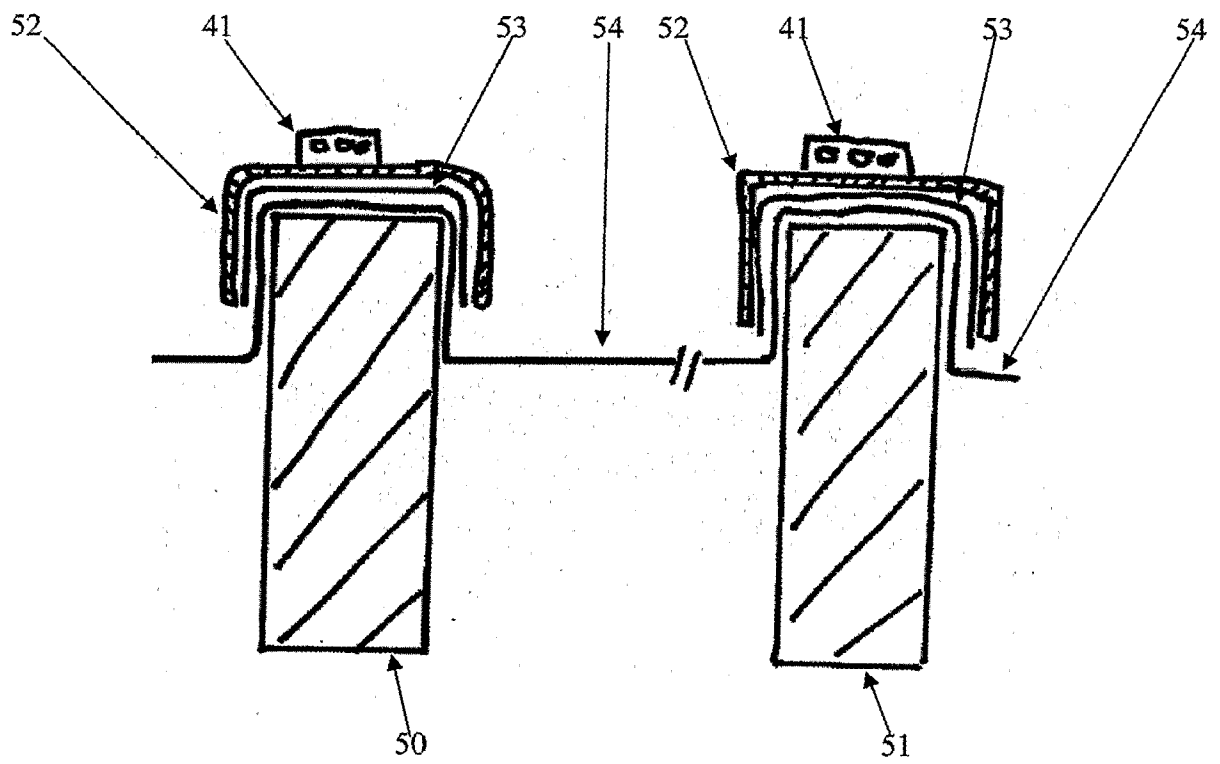


FIG 24

12/20

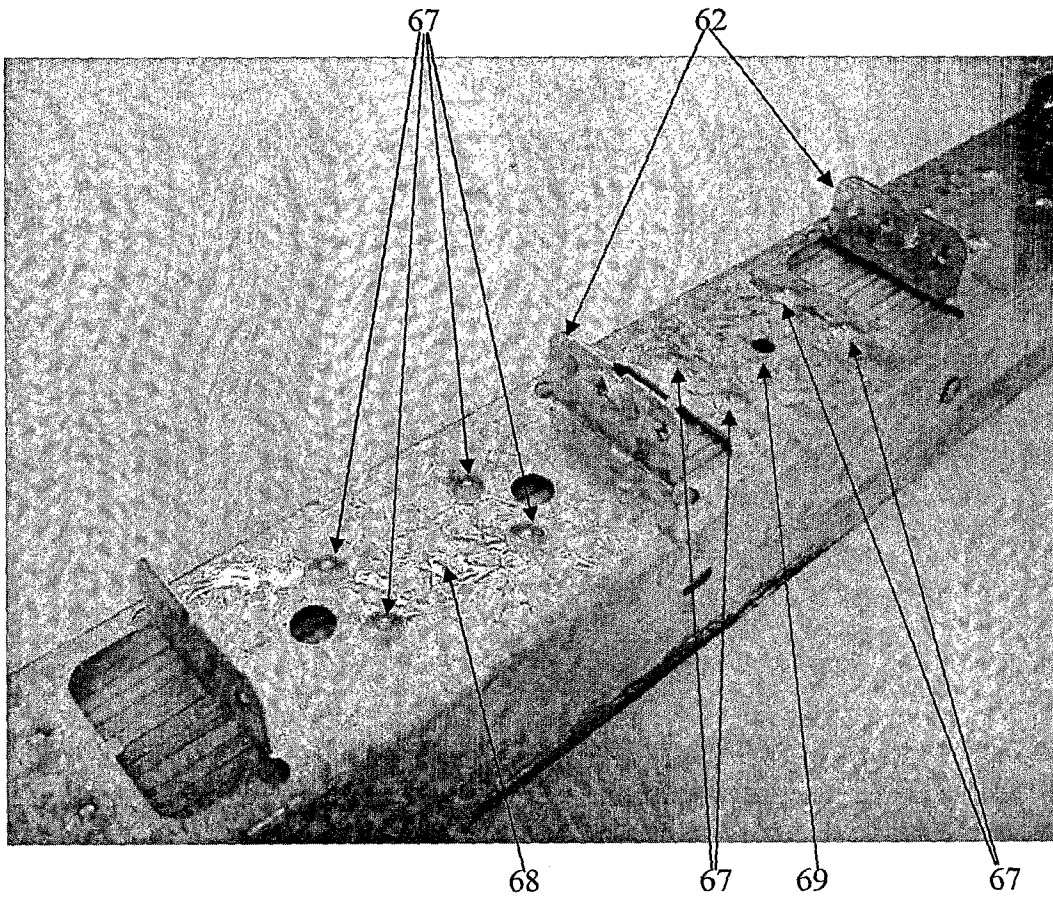


FIG 25

13/20

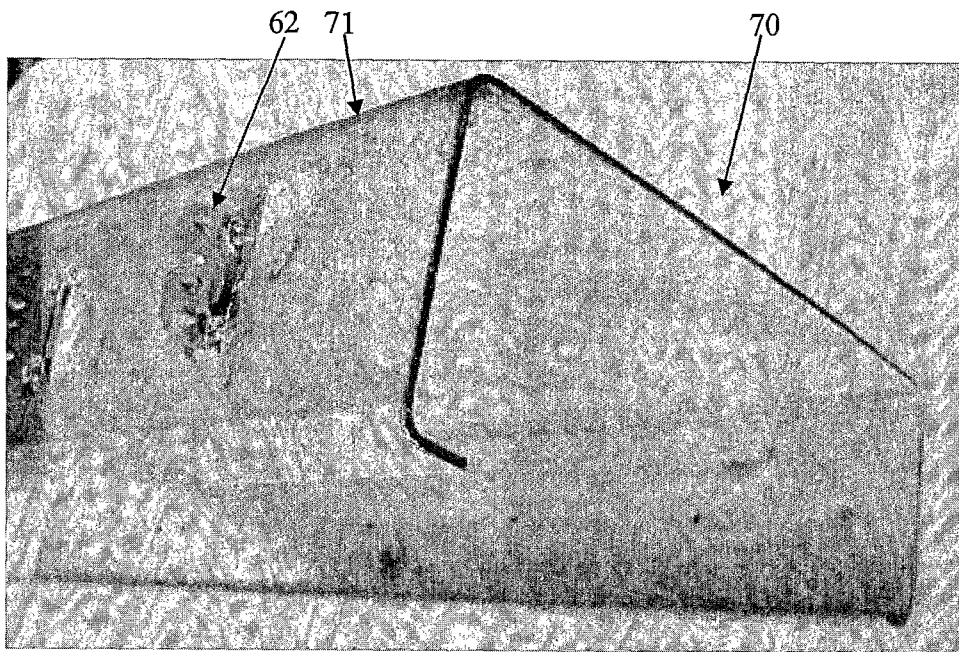


FIG 26

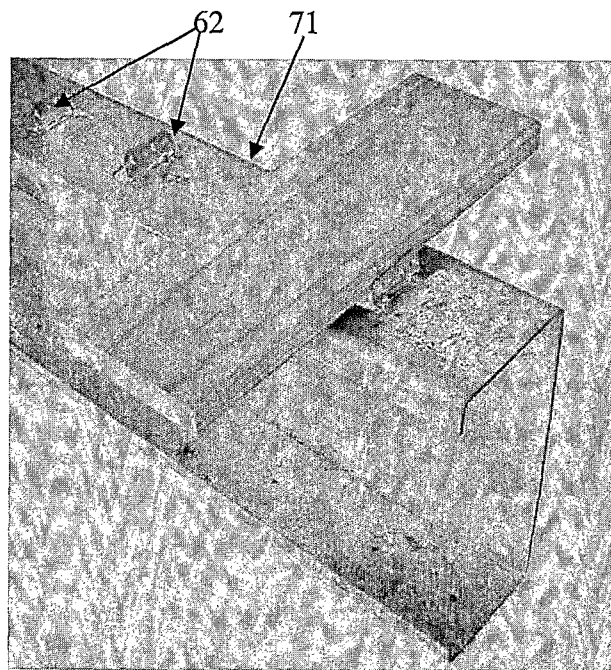


FIG 27

14/20



FIG 28

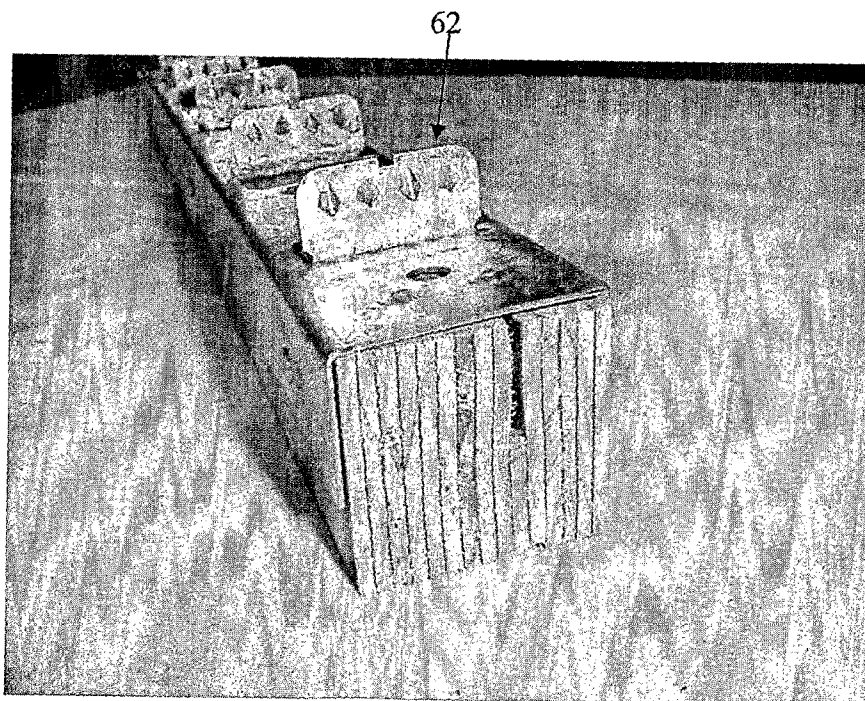


FIG 29

15/20

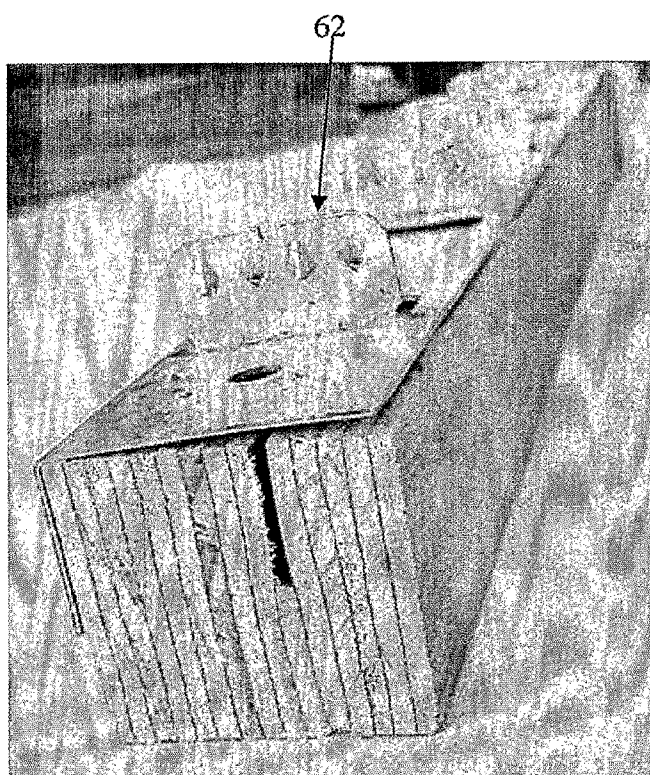


FIG 30

16/20



FIG 31



FIG 32

17/20

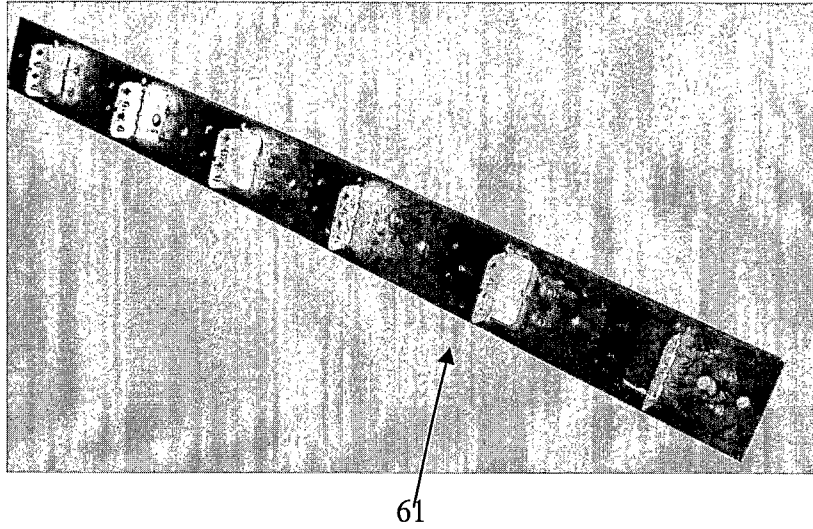


FIG 33 TOP FIX

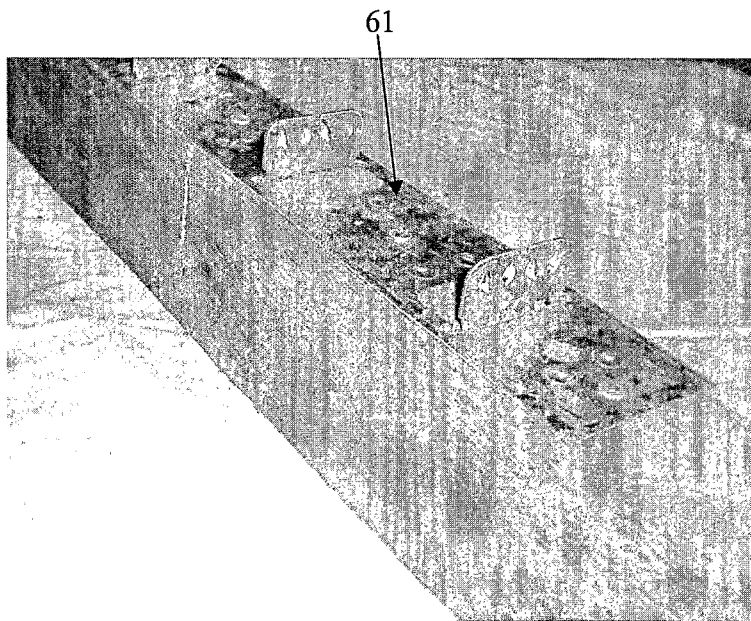


FIG 34

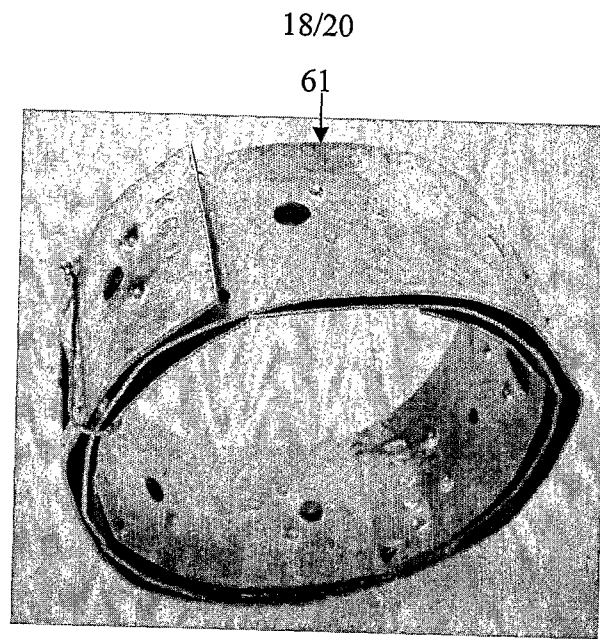


FIG 35



FIG 36

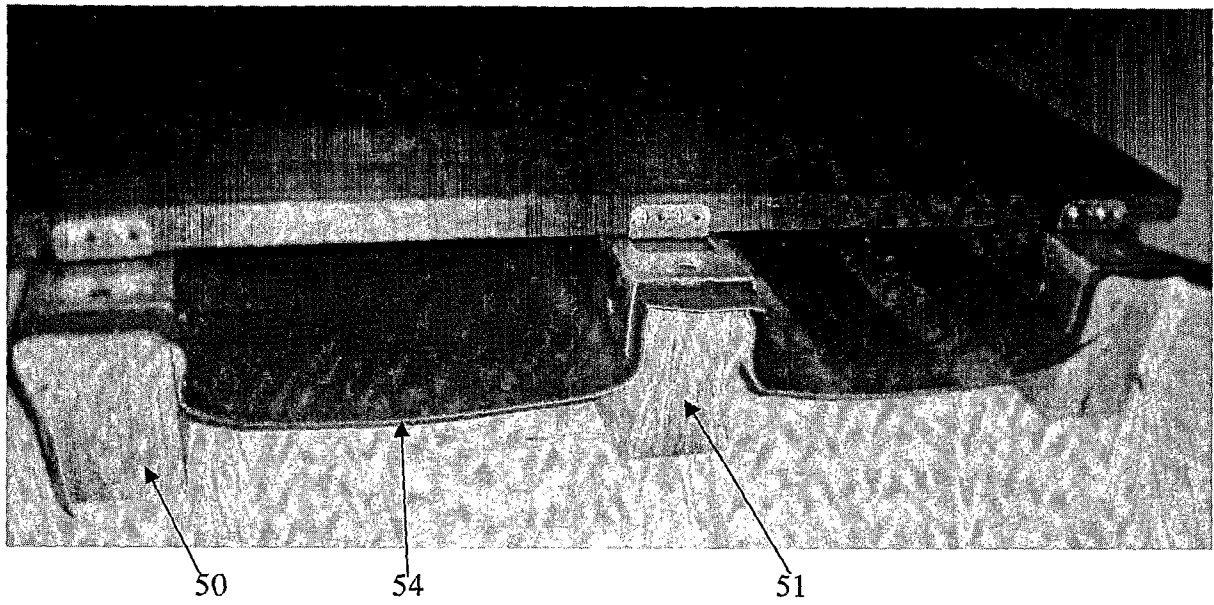


FIG 37

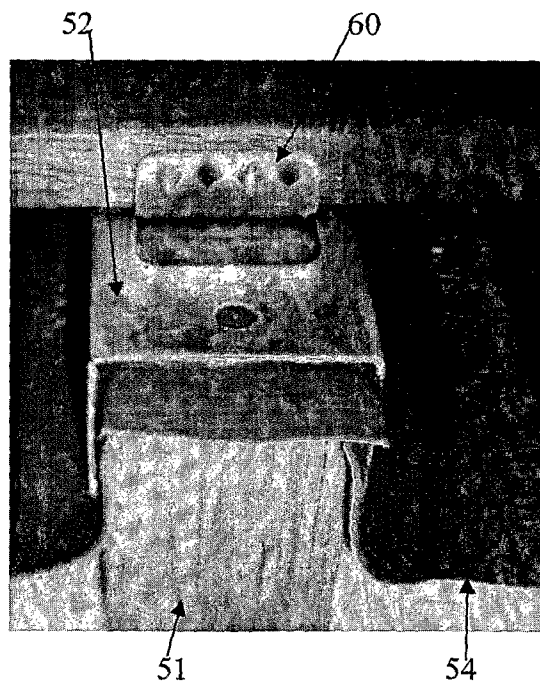


FIG 38

20/20

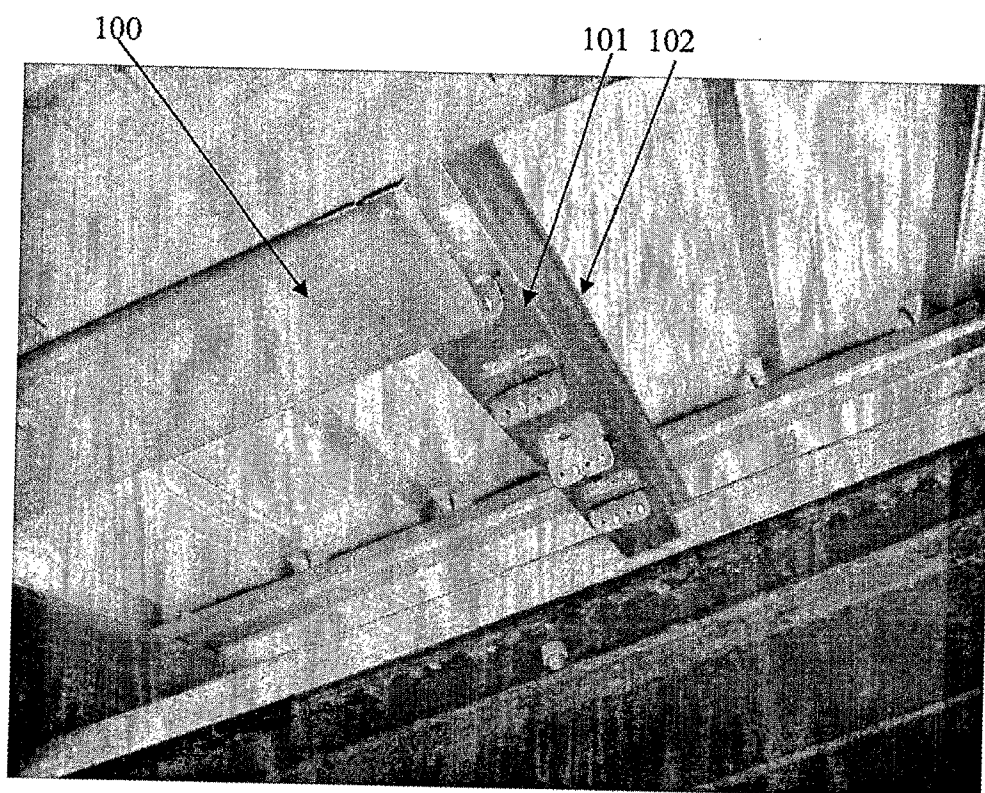


FIG 39

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2007/001062

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

E04B 1/38 (2006.01) **E04F 13/26** (2006.01) **E04H 17/24** (2006.01)
E04F 13/076 (2006.01) **E04F 15/02** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: Keywords; deck, floor, fence, plank, paling, member, screen, connect, fastener, mounting, clip, tab, barb, finger, recess, groove, joist, rail, post, space, push, pass, force, click, slip & similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 1994/001632 A1 (NYSTROM) 20 January 1994 See the drawings	
A	US 2004/0020136 A1 (HAUCK) 5 February 2004 See Figure 7	
A	US 2003/0093969 A1 (SALDANA) 22 May 2003 See Figure 10	
A	US 5953878 A (JOHNSON) 21 September 1999 See Figure 3	

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
08 August 2007

Date of mailing of the international search report
17 AUG 2007

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer
VINCE BAGUSAUSKAS
AUSTRALIAN PATENT OFFICE
(ISO 9001 Quality Certified Service)
Telephone No : (02) 6283 2110

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2007/001062

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1714738 A (SMITH) 28 May 1929 See figure 4	

INTERNATIONAL SEARCH REPORT

information on patent family members

International application No.

PCT/AU2007/001062

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	9401632	AU	46742/93	CA	2140022	EP	0651841
		US	5474831				
US	2004020136	US	7028437	US	7234281	US	2006117688
US	2003093969	AU	2002356985	US	6609344	US	6799407
		US	7021021	US	7127862	US	7216465
		US	2004049993	US	2004074196	US	2004074197
		US	2004074198	WO	03046303		
US	5953878						
US	1714738						
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							