



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 441 072 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.07.2004 Bulletin 2004/31

(51) Int Cl.7: **E01F 15/04**

(21) Application number: **04250234.4**

(22) Date of filing: **17.01.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

(72) Inventor: **Mustard, Trevor Raymond
Rutland LE15 6HB (GB)**

(74) Representative: **Downing, Michael Philip et al
Fry Heath & Spence LLP,
The Gables,
Massetts Road
Horley, Surrey RH6 7DQ (GB)**

(30) Priority: **25.01.2003 GB 0301758
25.01.2003 GB 0301759**

(71) Applicant: **Corus UK Limited
London SW1P 4WY (GB)**

(54) **Parapet**

(57) A parapet comprises a plurality of uprights and at least one rail supported by the uprights, the rail being connected to the upright via a bracket comprising an annular section, the bracket being attached on one side to the upright by at least one first bolt and on another side to the rail by at least one second bolt, the first and second bolts passing through respectively first and second pre-formed elongate apertures in the bracket, the first and second apertures being elongate in mutually transverse directions. It is preferred that the annulus is a box section of a suitable material, such as steel. It is also preferred that the length of the section (i.e. along its axis) is less than its width (i.e. the distance between the

upright and the rail). An advantageous arrangement is for the length (as defined above) to be greater on one side of the bracket than the other, preferably shorter on the rail side than the upright side. In another aspect of the invention, there is provided a parapet comprising a plurality of uprights and at least one rail supported by the uprights, the rail being connected to the upright via a bracket comprising upwardly aligned annular section including a shelf extending from a rear part of the annulus to a front part, the bracket being attached at a rear part to the upright and at a front part to the rail. It is also preferred that stainless steel bolts are provided to join the galvanised steel sections.

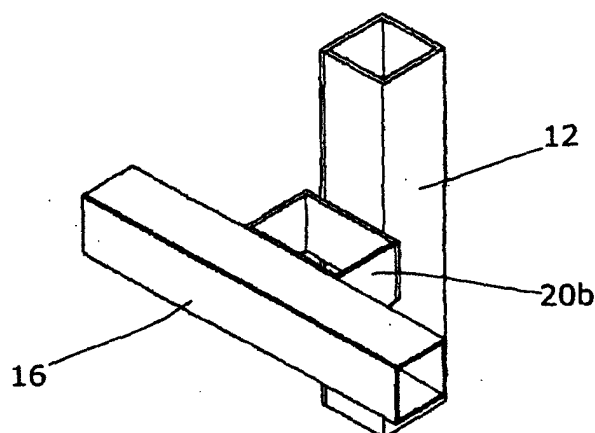


Fig 11

EP 1 441 072 A2

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a parapet. It has particular (but not exclusive) use alongside roads and other transport infrastructure links, for example at bridges or adjacent steep inclines.

BACKGROUND ART

[0002] Where a road passes over a bridge or adjacent to a steep downward incline, there is a risk that vehicles travelling thereon will fall from the roadway if poorly steered or if deflected from their intended steering line following accidental impact, for example with other vehicles. In such cases, the consequences would be serious both for the occupants of the vehicle and any personnel or installations below.

[0003] It is therefore normal to protect against such occurrences through the installation of parapets alongside the roadway. Regulations govern the properties of the parapet, in particular its effect on the deviating vehicle and the severity of impact that it must withstand.

[0004] Parapets generally consist of a plurality of uprights affixed to the bridge or roadside and to which are attached a plurality of rails running alongside the road. Some parapets are in the form of an upright wall of concrete or other suitable material. Rails can also be attached to such parapets to cushion an impact. A deviating vehicle that impacts the rails is then 'shepherded' along the road and prevented from leaving same. This will typically involve some deformation of the parapet structure, and the maximum permissible outward deflection is referred to as the working width.

[0005] Similar considerations apply to rail and other transport infrastructure. Accordingly, where this application refers to roads or the like, the skilled reader should understand that reference to other forms of transport infrastructure is to be inferred.

SUMMARY OF THE INVENTION

[0006] The present invention therefore provides a parapet comprising a plurality of uprights and at least one rail supported by the uprights, the rail being connected to the upright via a bracket comprising an annular section, the bracket being attached on one side to the upright by at least one first bolt and on another side to the rail by at least one second bolt, the first and second bolts passing through respectively first and second pre-formed elongate apertures in the bracket, the first and second apertures being elongate in mutually transverse directions.

[0007] It is preferred that the annulus is a box section of a suitable material, such as steel. It is also preferred that the length of the section (i.e. along its axis) is less than its width (i.e. the distance between the upright and

the rail).

[0008] An advantageous arrangement is for the length (as defined above) to be greater on one side of the bracket than the other, preferably shorter on the rail side than the upright side.

[0009] In another aspect of the invention, there is provided a parapet comprising a plurality of uprights and at least one rail supported by the uprights, the rail being connected to the upright via a bracket comprising upwardly aligned annular section including a shelf extending from a rear part of the annulus to a front part, the bracket being attached at a rear part to the upright and at a front part to the rail.

[0010] In a further aspect, the present invention also provides a parapet comprising a plurality of uprights and at least one rail supported by the uprights, the uprights and rail being formed of steel and connected via bolts of stainless steel. It is preferred that the uprights and rails are galvanised.

[0011] Hitherto, when installing steel parapets it has been necessary to touch up the bolts and any other fastenings with zinc paint, in order to provide continuous galvanic protection to the entire structure. We propose to use stainless steel bolts to fasten the part together, thereby avoiding this step.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] An embodiment of the present invention will now be described by way of example, with reference to the accompanying figures in which;

Figure 1 schematically illustrates the parapet of the present invention,

Figure 2 shows a front view of a first embodiment of the invention,

Figure 3 shows a section on III-III of figure 2;

Figure 4 shows a section on IV-IV of figure 2;

Figure 5 shows a rear view of the first embodiment;

Figure 6 shows a perspective view of the first embodiment;

Figure 7 shows a front view of a second embodiment of the invention,

Figure 8 shows a section on VIII-VIII of figure 7;

Figure 9 shows a section on IX-IX of figure 7;

Figure 10 shows a rear view of the second embodiment;

Figure 11 shows a perspective view of the second

embodiment;

Figure 12 shows a front view of a third embodiment of the invention,

Figure 13 shows a section on XIII-XIII of figure 12;

Figure 14 shows a section on XIV-XIV of figure 12;

Figure 15 shows a rear view of the third embodiment;

Figure 16 shows a front view of a fourth embodiment of the invention,

Figure 17 shows a section on XVII-XVII of figure 16; and

Figure 18 shows a section on XVIII-XVIII of figure 16

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0013] Referring to Figure 1, a parapet generally designated as 10 comprises an array of 90x90mm or 100x100mm uprights 12, of which two are shown. These uprights are typically of a square hollow section between 90 and 100mm dimension. These are secured on mountings 14 to a substrate (not shown). The substrate may be (for example) the edge of a bridge or a roadside verge adjacent a steep drop, or any location where it is important that vehicles do not leave the roadway.

[0014] Three 80x80x3.2mm square hollow section rails 16a, 16b, 16c are attached to the uprights 12 in a generally parallel arrangement. Preferred sections are 70 to 90mm square hollow section. These are preferably 3.0 to 5.0mm thick. It is comparatively normal for there to be between one and 3 rails although the invention is applicable to parapets having any number. As can be seen in Figure 1, all 3 rails have a join at 18a, 18b, 18c.

[0015] Figures 2 - 6 show a first embodiment of a bracket for joining the rails 16 to the posts 12. The bracket 20a is a 70mm length of 150x100x8mm box section, as visible in Figure 4, and has a front face 22 intended to abut the rail 16, a rear face 24 intended to abut the upright 12, and two side faces 26, 28 extending on either side of the bracket from the rear face 24 to the front face 22. Suitable thicknesses for the section are between 5 and 10mm.

[0016] As shown in Figure 2, the front face 22 has a pair of elongate 115x15mm rounded slots 29, 30. These are sized to accept stainless steel bolts for fixing the bracket to a rail 16. As the slots 29, 30 are elongate, until the bolts are tightened there will be a degree of flexibility in the exact longitudinal positioning of the rail. This allows for tolerances in the position of the bolt holes formed in the rail 16 and the position of the anchorage in the substrate.

[0017] In the rear face 24, there is a round oversized

20mm diameter hole 32 sized to accept a bolt for attaching the bracket 20 to the upright 12. This provides vertical and rotational alignment prior to bolt tightening.

[0018] Figures 7-11 show a second embodiment of the bracket 20b, which shares many common features with the bracket 20a of Figures 2-6. Like reference numerals are therefore used to denote like parts.

[0019] The bracket 20b differs from the bracket 20a in that the hole 34 on the rear face 24 is elongate at 58x18mm, aligned in a vertical direction and thus transverse to the elongate slots 29, 30 of the front face 22. Thus, slight tolerances in the precise vertical position of the corresponding hole formed in the upright 12 can be compensated for during assembly. With the bracket 20b, tolerances can be catered for in both directions and therefore a greater level of flexibility is obtained.

[0020] Other changes of a dimensional nature are to the slots 29, 30 which (in this embodiment) are between 113x13mm rounded (as shown) and 118x18mm.

[0021] Figures 12 - 15 show a third embodiment of the bracket, designated as 20c. This embodiment shares many features with the second embodiment 20b and therefore (again) like reference numerals are employed. Other than further dimensional changes to suit specific combinations of uprights and rails, the difference shown in the bracket 20c is that the side walls 36, 38 (replacing the side walls 26, 28 of the first and second embodiments) are trapezoidal in profile, and thus increase in height from the front wall 22 to the back wall 24. This means that the back wall 24 is significantly larger and can accommodate a larger slot 34. In this way, the front face 22 can still be matched to the dimensions of the rail 16 whilst providing a greater footprint for the rear face 24 on the upright 12 and a larger slot 34 thereby allowing greater adjustability.

[0022] The dimensional changes are to employ a 100x100x5mm box section cut to 120mm length on the rear face and 80mm on the front. Suitable thicknesses are between 4 and 10mm. Slots 29, 30 are now 58x18mm rounded and slot 34 is 98x18mm rounded.

[0023] The first, second and third embodiments are all formed of a suitably fabricated box section. Box sections are themselves typically formed by deformation and joining of a rolled steel sheet. Once the brackets are formed, they should then be hot dip galvanised to provide corrosion protection. After installation, the bolts used for fixing the brackets in place should then be touched up with a zinc-containing paint to ensure that the complete structure is protected. We however propose that stainless steel bolts are used, in order to avoid this additional step.

[0024] Figures 16 - 18 show a fourth embodiment of the present invention. This is again formed around a basic annular or box section-like structure, but is suitable for production via casting.

[0025] In the fourth embodiment, the bracket 50 comprises a front face 52 and a rear face 54. These are connected via two side faces 56, 58, each of which extends

approximately half way towards the rear face 54 and which are then continued via angled faces, 60, 62 which extend at approximately 45 degrees from the end of the side faces 56, 58 to the edges of the rear face 54.

[0026] A horizontal slot 64 is formed in the front face 52 to allow the bracket to be connected to the rail 16 (not shown). A vertical slot 66 is formed in the rear face 54 to allow the bracket to be connected to an upright 12.

[0027] Within the annulus formed by the rear, front, side and angled walls, a shelf 68 is formed. This provides additional rigidity to the structure. Drain holes 70 are formed in the two corners of the shelf 68 adjacent the front face 52 and the side faces 56, 58.

[0028] The front face 52 is placed slightly higher than the rear face 54. Thus, the shelf at 68 meets the rear face 54 at its top edge and the front face 52 at its bottom edge. The upper and lower edges of the side and angled faces 56, 58, 60, 62 are appropriately inclined so as to lead from the lower edge of the rear face 54 to the lower edge of the front face 52 and from the upper edge of the rear face 54 to a position near the upper edge of the front face 52.

[0029] Through the use of a box section, the bracket is provided with a certain amount of flexibility under impact. This allows a certain amount of recoil in the rails 16 which assists in absorbing the impact of the car and limiting entry of the rails into the vehicle body. The fourth embodiment employs the shelf 68 which will provide additional rigidity and reduce this effect, in arrangements where this is desired. In other arrangements, the shelf 68 of the fourth embodiment could be omitted.

[0030] It will be generally appreciated that specific features of the individual embodiments could be applied in other embodiments, as required by circumstance.

[0031] This invention shows distinct benefits as compared to existing designs, and solves problems inherent therein. It provides a standardised post, solves problems associated with the base being slightly out of position solution and/or the vertical post (upright) or rail not being horizontal, it allows for a collapse mechanism in the event of overload, and it allows a simplified fabrication process. Stainless steel bolts solve former corrosion issues, and the design is susceptible to implementation in steel of J2 impact quality.

[0032] It will of course be understood that many variations may be made to the above-described embodiment without departing from the scope of the present invention.

Claims

1. A parapet comprising a plurality of uprights and at least one rail supported by the uprights;

the rail being connected to the upright via a bracket comprising an annular section;
the bracket being attached on one side to the

upright by at least one first bolt and on another side to the rail by at least one second bolt;
the first and second bolts passing through respectively first and second pre-formed elongate apertures in the bracket;
the first and second apertures being elongate in mutually transverse directions.

2. A parapet according to claim 1 in which the annulus is a box section.
3. A parapet according to claim 2 in which the length of the section is less than its width.
4. A parapet according to any one of the preceding claims in which the length of the bracket is greater on one side than the other.
5. A parapet according to claim 4 in which the bracket is shorter on the side adjacent the rail than the side adjacent the upright.
6. A parapet comprising a plurality of uprights and at least one rail supported by the uprights, the rail being connected to the upright via a bracket comprising upwardly aligned annular section including a shelf extending from a rear part of the annulus to a front part, the bracket being attached at a rear part to the upright and at a front part to the rail.
7. A parapet according to any one of the preceding claims, formed of steel.
8. A parapet according to claim 7 in which the steel is galvanised.
9. A parapet comprising a plurality of uprights and at least one rail supported by the uprights, the uprights and rail being formed of steel and connected via bolts of stainless steel.
10. A parapet according to claim 9 in which the uprights and rails are galvanised.

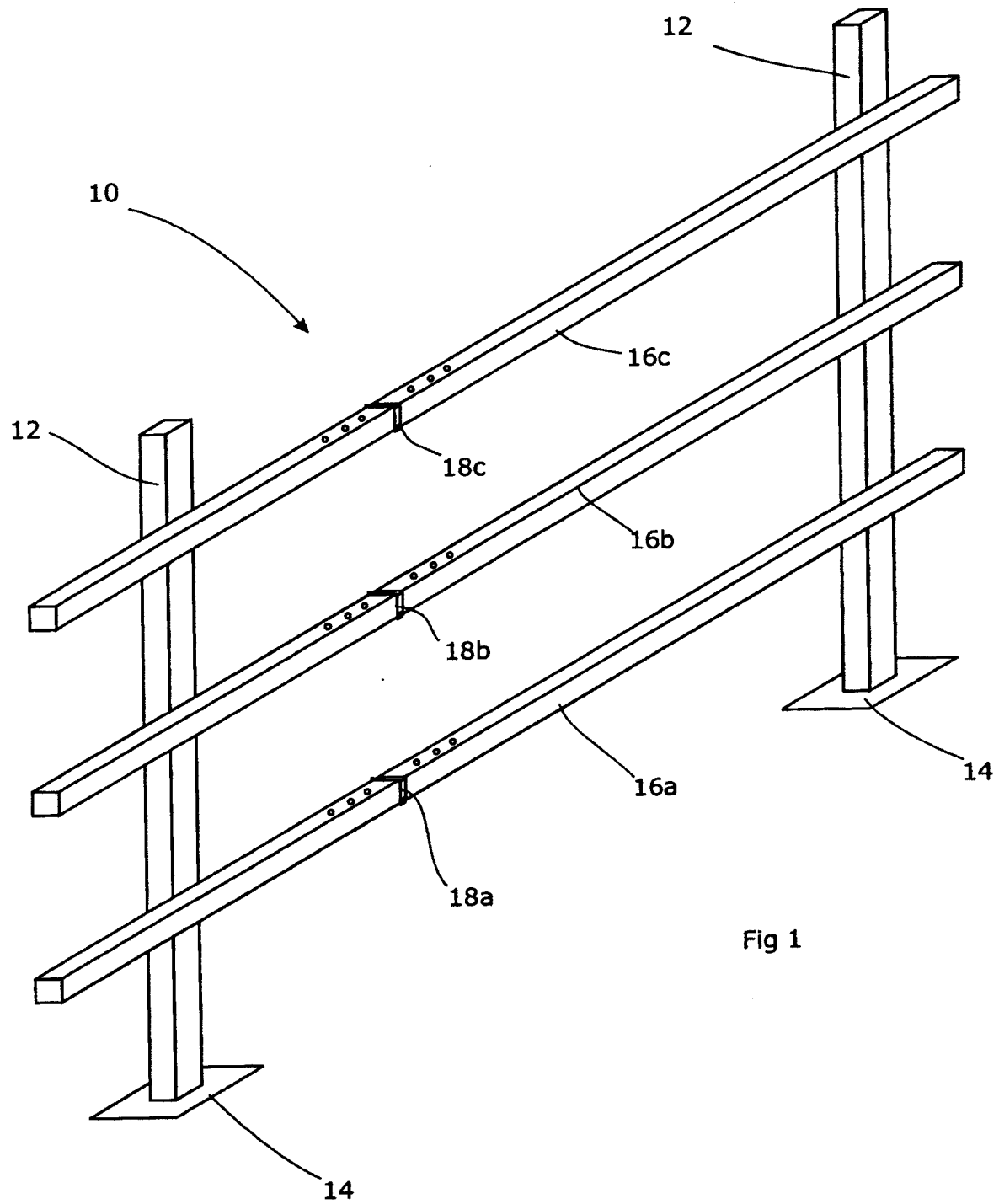
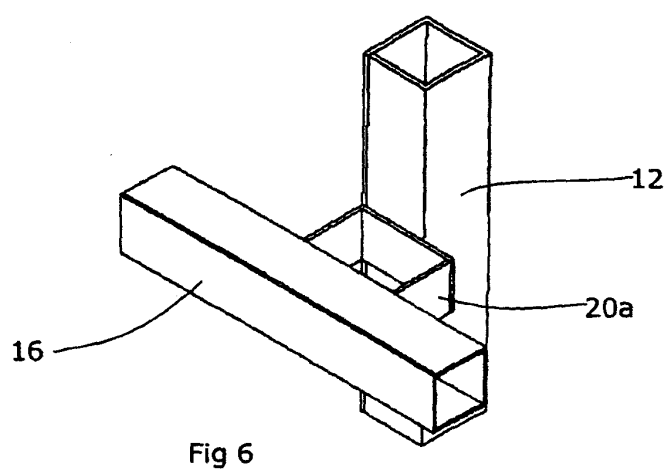
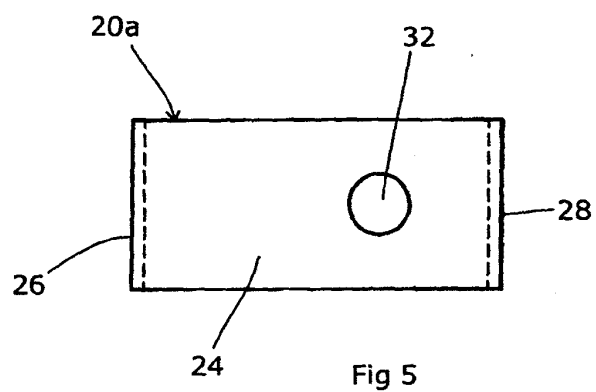
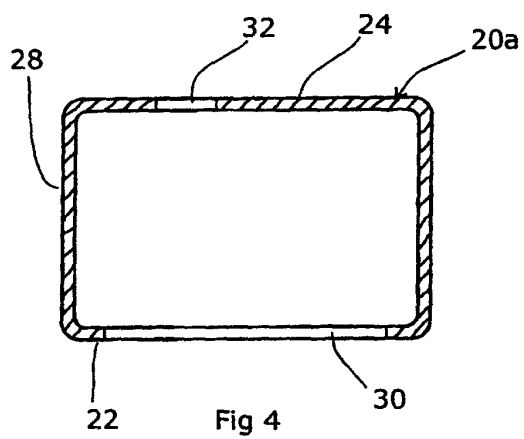
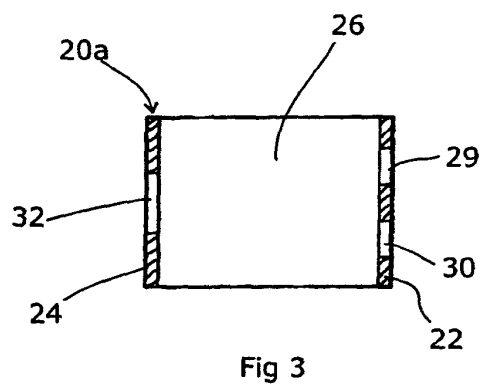
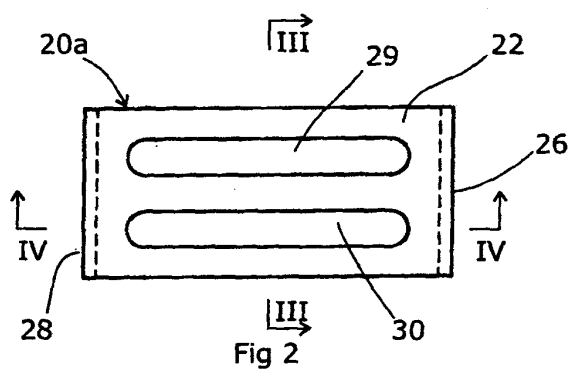


Fig 1



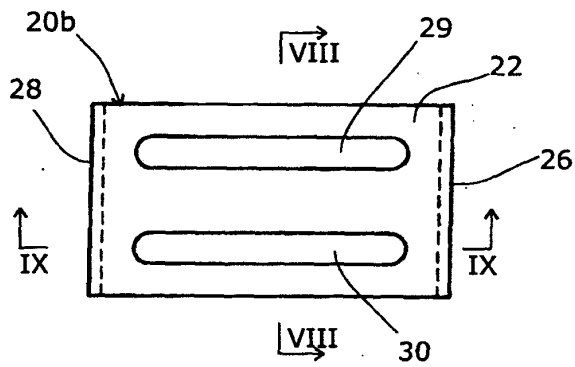


Fig 7

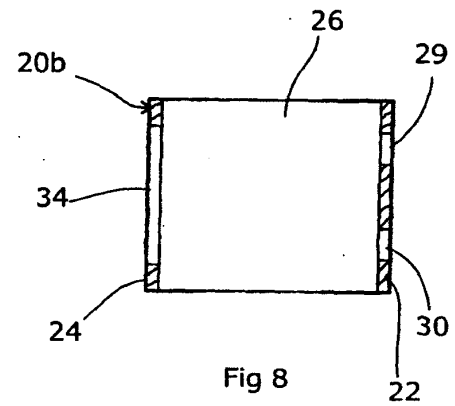


Fig 8

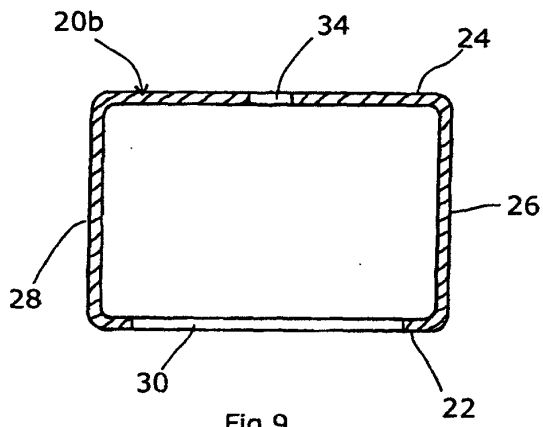


Fig 9

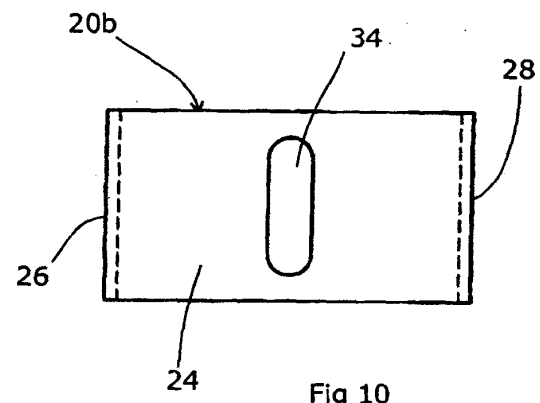


Fig 10

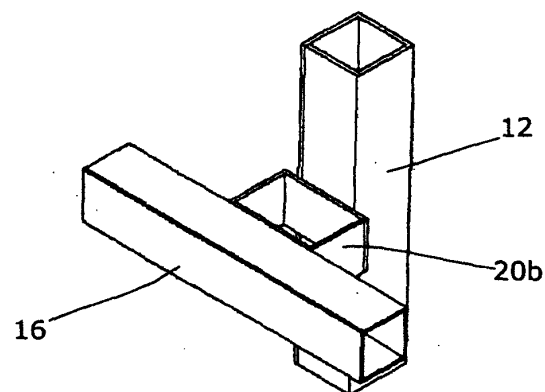


Fig 11

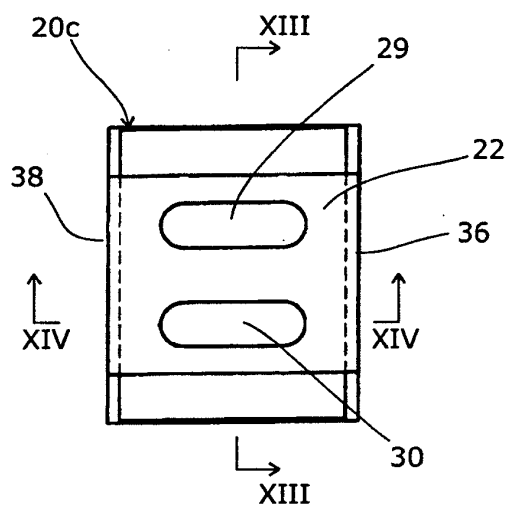


Fig 12

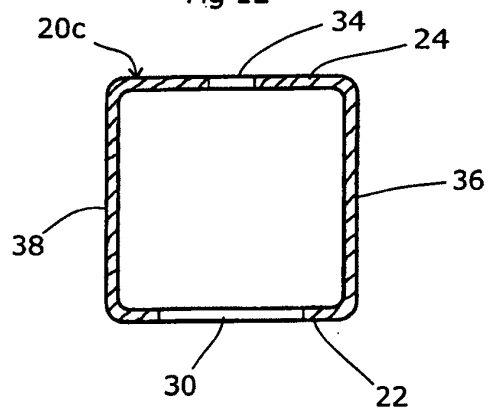


Fig 14

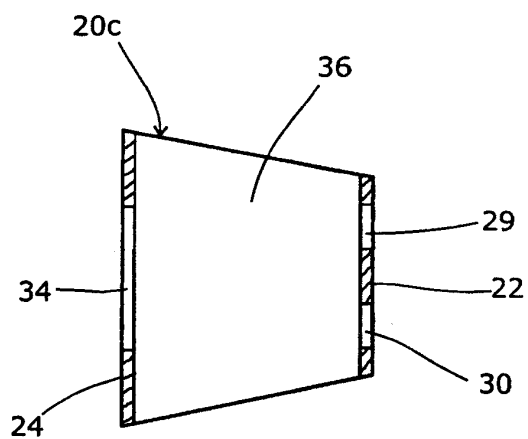


Fig 13

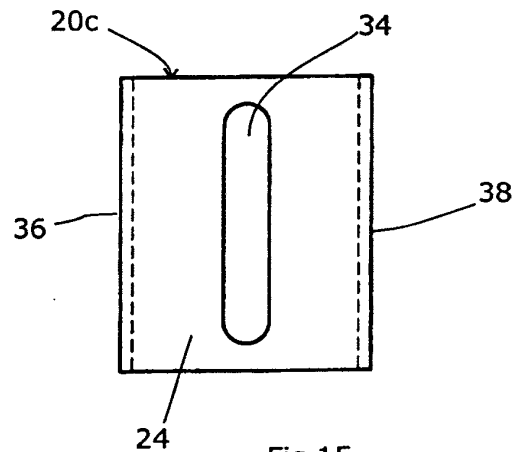


Fig 15

