



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.07.2011 Bulletin 2011/30

(51) Int Cl.:
E01C 11/22 (2006.01)

(21) Application number: **11151626.6**

(22) Date of filing: **21.01.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventors:
• **Runkles, Richard R.**
Windsor, CO 80550 (US)
• **Sawyer, Daniel C.**
Boulder, CO 80304 (US)

(30) Priority: **21.01.2010 US 297236 P**

(71) Applicant: **Brock USA, LLC**
Boulder, CO 80301 (US)

(74) Representative: **Weber-Bruls, Dorothee**
Jones Day
Hochhaus am Park
Grüneburgweg 102
60323 Frankfurt am Main (DE)

(54) **Self supporting paver system**

(57) A paver support system includes an edging rail (12,112,212,312) or bracket that engages an underlay-ment layer. The paver support system contains a plurality of paving elements (16a,16b) within a prescribed area

bordered by the edging rail and supported on the under-lyment layer (14). The cooperating underlayment layer and edging rail are self- supporting to maintain the rela- tive spatial relationship of the plurality of paving elements supported thereon.

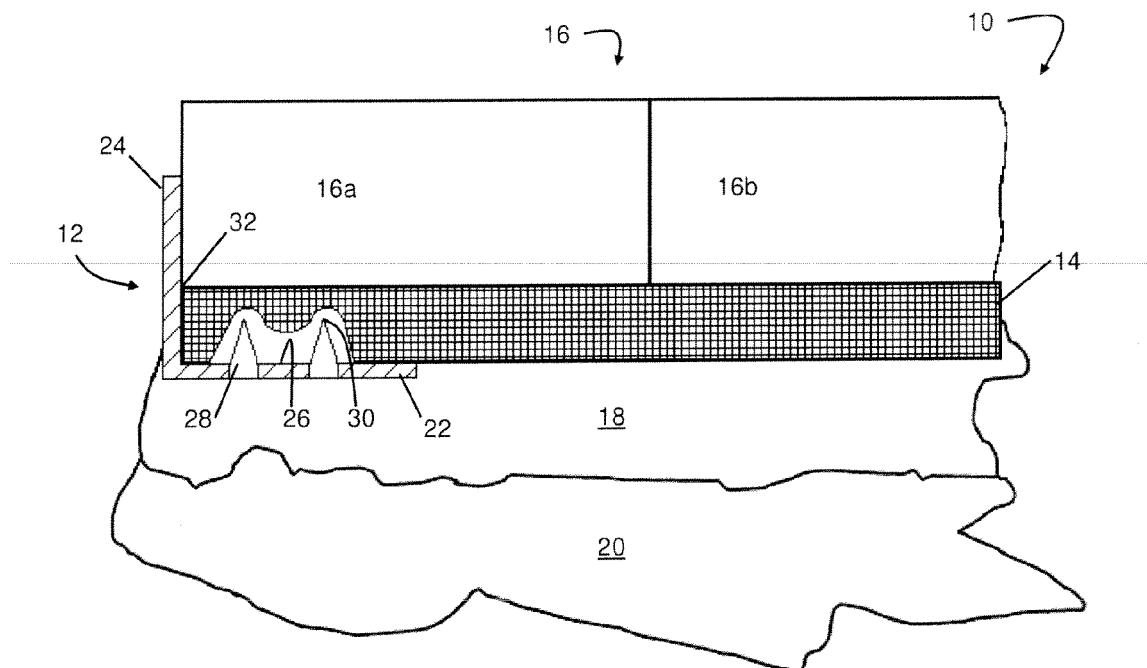


Fig. 1

Description

BACKGROUND OF THE INVENTION

[0001] This invention relates, in general, to edging structures. In particular, this invention relates to paver element supports that are part of a self-supporting paver system. Traditional edge restraint systems use spikes that are anchored to the ground to hold the edge restraint relative to the individual paving elements. One limitation of using spikes to hold the edging in place is that the spikes need a compacted base under the bedding sand to act as an anchoring structure. If there is no compacted base, the spikes will not hold the edging in place very effectively. Further, the edging material is anchored to the ground surrounding the paved walkway, for example. Any shifts in the bedding that supports the paver elements will cause the edging to move relative to the pavers, thus disrupting the perimeter containment of the paver elements. Thus, it would be desirable to provide a paving system that is generally self supporting and does not rely on a compacted bed to stabilize the paving elements.

SUMMARY OF THE INVENTION

[0002] This invention relates to a retaining structure that cooperates with an underlayment material to support and contain the relative location of paving elements. The cooperating retaining structure is in the form of an edging rail that, together with the underlayment layer, defines a self supporting paving system. In one embodiment, the self supporting paving system comprises an underlayment layer and an edging rail configured to be fixed to the underlayment layer such that the edging rail and the underlayment layer are adapted to cooperate to fully support a plurality of paver elements atop of a support surface.

[0003] In another exemplary embodiment, the paving system includes a retaining structure in the form of an edging rail or bracket that includes piercing barbs. The piercing barbs are configured to engage an underlayment sheet, such as a polymer foam sheet, and form an outer perimeter frame. The edging rail and underlayment layer are placed on soil or a prepared surface, such as for example compacted sand. Paving elements may then be placed on and supported by the underlayment layer and the edging rail. The paving elements are bounded, at least along a portion of the perimeter of the paved area, and are thus spatially contained on the surface of the underlayment by the edging rail.

[0004] Various aspects of this invention will become apparent to those skilled in the art from the following detailed description of the preferred embodiment, when read in light of the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Fig. 1 is an elevational view, in partial cross section, of a paving system having an underlayment layer and an edging rail that support and contain a plurality of paving elements.

[0006] Fig. 2 is a perspective view of an embodiment of an edging rail configured for use with an underlayment layer of a self-supporting paving system.

[0007] Fig. 3 is a plan view of the edging rail of Fig. 2 showing an underlayment attachment structure.

[0008] Fig. 4 is an elevational view of the edging rail of Fig. 2.

[0009] Fig. 5 is an end view of the edging rail of Fig. 2.

[0010] Fig. 6 is an enlarged plan view of an alternative embodiment of an edging rail having an underlayment attachment structure.

[0011] Fig. 7 is yet another alternative embodiment of an edging rail having an underlayment attachment structure.

[0012] Fig. 8 is a perspective view of another embodiment of an edging rail configured for use with an underlayment layer of a self-supporting paving system.

[0013] Fig. 9 is a plan view of the edging rail of Fig. 6 showing an underlayment attachment structure and further having frangible elements.

[0014] Fig. 10 is an embodiment of an edging rail having an underlayment attachment structure and frangible elements.

[0015] Fig. 11 is a perspective view of an edging rail having severable linking elements that are selectively removable to form a contoured configuration.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0016] Referring now to the drawings, there is illustrated in Fig. 1 a paving system, shown generally at 10, having an edging rail or bracket 12 and an underlayment support layer 14 that supports a plurality of paving elements 16. The paving elements are shown as perimeter paving elements 16a and interior paving elements 16b. The paving system 10 is a self-supporting structure that confines the paving elements 16 within a defined area. The containment area of the paving elements 16 is defined generally as a perimeter of the underlayment layer 14 that is bounded by the edging rail 12 and also the supporting surface of the underlayment layer 14 positioned below the pavers. The self supporting characteristic of the paving system 10 confines the paving elements 16 together such that disruptions of a supporting base foundation have a minimized impact on the arranged pavers. This minimizing effect reduces or prevents heaving or separation of the arranged paving elements 16. The edging rail 12 and the underlayment layer 14 of the self supporting paving system 10 are connected to function as a unitary body that supports and contains the paving elements 16 in both a lateral and a vertical

direction relative to a supporting base foundation. The paving system 10 may be placed over a layer of sand 18, that may be compacted over a layer of subgrade soil 20. Alternatively, the sand layer 18 may be raked, washed in, or otherwise topically applied. The sand layer 18 may be used to facilitate water drainage and/or to provide a consistent, graded surface formed to the desired elevation. The sand layer 18 may be omitted, if desired. The subgrade soil layer may be undisturbed, virgin soil; graded soil; or compacted material that may include stone, sand, asphalt, concrete, and the like.

[0017] The underlayment support layer 14 may be formed from a polymer foam, such as a polyethylene foam, a polypropylene foam, a polystyrene foam, and the like. The underlayment layer 14 may be a closed cell foam that is water-impervious. Alternatively, the underlayment layer 14 may provide for water drainage. Such water drainage may include one or more drain holes formed through the underlayment. The one or more drain holes may cooperate with one or more drainage channels. The drainage channels may be on the top support surface and/or the bottom surface of the underlayment layer 14. Alternatively, the underlayment layer 14 may have foam beads having interstitial voids formed therebetween to allow for water flow through the layer.

[0018] The edging rail 12 is illustrated, in cross-section, as a generally "L" shaped bracket having two legs 22 and 24. The bracket legs 22 and 24 are shown as having equal lengths, though legs of unequal lengths may be provided. The first leg 22 of the edging rail includes a surface 26 configured to support the underlayment layer 14. This underlayment support leg 22 includes one or more piercing barbs 28 formed into the leg that extend toward the underlayment layer 14. The barbs 28 are shown as triangular barbs having a point 30 configured to pierce through and retain the relative position of the edging rail 12 to the underlayment 14. The barbs 28 may alternatively be rectangular, star shaped, semi-circular cylindrical projections, and the like. Alternatively, the barbs 28 may be separate structures similar to nails that are secured to the first leg by any means, such as welding, bonding, or frictional engagement.

[0019] The second leg 24 of the edging rail 12 is illustrated extending in a generally perpendicular orientation to the first rail 22. It should be understood that the second rail 24 may extend at any desired relative angle or multiple relative angles to the first rail 22. Thus, the second leg 24 may be straight or have a contoured shape. An outer perimeter edge 32 of the underlayment 14 may locate against the second leg 24. The plurality of paving elements 16 may be placed on the underlayment layer 14 in any desired pattern or arrangement. The outermost edge paving elements, or perimeter paving elements 16a, abut a portion of the second leg 24. The interior paving elements 16b, adjacent to the edge paving elements 16a (and other interior paving elements) may directly abut the edge paving elements 16a or may have a layer of bedding material (not shown), such as sand,

infill, expansion material, and the like disposed therebetween.

[0020] Referring now to Figs. 2-5, there is illustrated an embodiment of an edging rail 112 having first and second legs 122 and 124. The first leg 122 includes a plurality of barbs 128 disposed between windows 140 formed into the first leg 122. The windows 140 may be omitted if so desired. The barbs 128 and the windows 140 may be stamped, cut or otherwise formed into the first leg 122. The barbs 128 are generally shown having a triangular shape that extends upwardly toward the underlayment 14 and having a piercing point 130 and generally flat sides or faces 130a and 130b. The generally flat faces 130a and 130b are all positioned in parallel planar orientations, as shown in Fig. 5. Alternatively, the barbs 128 may be positioned in a perpendicular arrangement or any other angular orientation relative to each other. In addition to the barbs 128, nail holes 142 may be provided to permit external anchoring of the edge rail 112 to the surrounding soil or other support structure.

[0021] Referring now to Figs. 6 and 7, there are illustrated alternative arrangements of barbs, positioned at relative angles to each other. As shown in Fig. 6, primary barbs 228a are formed into a first leg 222, that is shown perpendicularly oriented relative to a second leg 224, where flat faces 230a and 230b are oriented along generally parallel planes. The primary barbs 228a are staggered relative to one another so that they are spread over most of the width of the first leg 222. The first leg 222 is shown having optionally formed windows 240 that are partially bounded by a front tie 244 and, optionally, a back flange 246 between the window 240 and the second leg 224.

[0022] The front tie 244 is configured to be readily severable by way of light hand tools, such as pliers, tin snips, and the like. Thus, as will be explained below, the edging rail 212, as well as other embodiments described herein, may be contoured to follow the perimeter of the underlayment. In order to be cut and bent, the edging is preferably formed from a relatively thin material. The edging rail 12 may be formed from metal, including sheet metal, or plastic, including thermoplastics, fiberglass/resin composites, and the like. Sheet metal materials may be on the order of a Gauge 3 or greater, and may be more specifically provided between a Gauge 10 and Gauge 15 thickness. Plastic and non-metallic materials may be thicker, if so desired.

[0023] Secondary barbs 228b are shown formed into the front tie 244 and having flat sides that are oriented in a generally perpendicular orientation relative to the primary barbs 228a. The barbs 228a and 228b have their broad surfaces oriented in two perpendicular planes to restrain the underlayment 14 in two directions. This barb orientation further prevents substantial cutting or elongation of the pierced holes in the underlayment 14 by the thin edge of the barbs 228a and 228b in one plane by virtue of the broad surface in the other plane. Alternatively, the secondary barbs 228b may also be positioned

adjacent to the primary barbs 228a between the windows 240 or in lieu of the windows 240. As shown in Fig. 7, the primary barbs 228a may be positioned in a row closer toward the center of the first leg 222. The back flange 246 is preferably narrow to permit the second leg 224 to be bent or formed to follow the contour of the intended pathway or shape of the paved area, as will be described below. The embodiments of Figs. 6 and 7 show optional nail holes 242 formed into the first leg 222 to provide for nails, spikes, or staples to anchor the edging rail to the base layer, if so desired.

[0024] Referring now to Figs. 8 and 9, there is illustrated another embodiment of an edging rail, shown generally at 312, that includes first and second legs 322 and 324, respectively, and barbs 328 that may be similar in geometry and relative orientation to the barbs 28, 128, and 228a,b described above. The first leg 322 includes frangible elements 350 positioned on a front tie 344 along a window 340 between spaced-apart underlayment anchoring sections having the extending barbs 328. The barbs 328 may be oriented in any desired relative position. Additionally, the frangible elements 350 may also include barbs (not shown), similar to secondary barbs 228b described above. The frangible elements 350 are defined by scribes 352 configured as thinner section score marks formed onto the front tie 344. The scribes 352 may be formed on one side of the first leg 322 or both upper and lower sides. The scribes 352 may be bounded by chamfers 354 on either end or both ends to facilitate removal of the frangible elements 350. When selected frangible elements 350 are removed, the second leg 324 and a back flange 346 may be formed to correspond to the contour of the paved area perimeter. The frangible elements 350 may be left connected to provide for straight sections of pavement. In order to bend or contour the edging 312 according to the shape of the desired pathway, the frangible elements 350 may be removed by breaking or cutting. The frangible elements 350 may be broken using light hand tools, such as pliers, where the element 350 is bent back and forth to fatigue the front tie 344 at the scribes 352. Alternatively, the frangible elements 350 may be more easily cut by light hand tools, such as tin snips, at the scribes 352. Once the frangible elements 350 are removed, the second leg 324 may be more easily bent, contoured, or otherwise formed to conform to the edge of the paved area and provide better attachment to the underlayment layer 14.

[0025] Referring now to Fig. 10, there is illustrated an embodiment of an edging rail 412 having a first leg 422 and a second leg 424. The first leg 422 includes an alternative arrangement of barbs 428, shown having one barb 428a arranged generally parallel to the second leg 424 and two barbs 428b and 428c oriented generally at 45 degree angles to the second leg 424 and perpendicular to each other. The first leg includes a window 440 having a front tie 444 and a reduced or minimal-width back flange 446. In other embodiments, the back flange 446 may be removed. The front tie 444 includes a single

scribe 452 that may be optionally bounded by chamfers 454. The single scribe 452 is positioned generally in the center of the front tie 444 and, when broken, forms two halves of the front tie 444. Alternatively, the scribe 452 may be located anywhere along the front tie 444 and may form one extra tie leg. The two halves of the front tie 444 may be bent up to provide additional securement with the underlayment 14 or may be bent down into the sub-grade to prevent shifting of the paver system relative to the ground.

[0026] Referring now to Fig. 11, there is illustrated another embodiment of an edging rail, shown generally at 512. The edging rail 512 includes first and second legs 522 and 524, respectively. The first leg 522 is illustrated having windows 540 bordered by a front tie 544 that is positioned opposite the second leg 524. The front tie 544 may be severed in order to bend the second leg to form a contour, such as a curve with a radius, R. Alternatively, the front tie 544 may include one or more scribes or a frangible element (not shown) to facilitate the severing and bending operations. The bends in the second leg 524 may be formed in any desired direction, for example, such as is illustrated in Fig. 11 or in an opposite direction of curvature. The first leg 522 is illustrated having a plurality of attachment holes 542 that are each configured to accept an anchor 528. The anchor holes 542 may be omitted such that the anchors 528 are pierced through the first leg 522. The edging rail 512 is illustrated as a multiple component assembly where the plurality of anchors 528 are inserted through the first leg 522 and extend upwardly to engage the underlayment 14. The anchors 528 may be frictionally engaged within the holes 542 or may be bonded, glued, welded, or otherwise attached to the first leg 522.

[0027] The principle and mode of operation of this invention have been explained and illustrated in its preferred embodiment. However, it must be understood that this invention may be practiced otherwise than as specifically explained and illustrated without departing from its spirit or scope. Furthermore, each of the elements illustrated and described with respect to each embodiment may be incorporated into any other embodiment or substituted for another element in another embodiment.

Claims

1. A self supporting paving system comprising an underlayment layer; and an edging rail configured to be fixed to the underlayment layer such that the edging rail and the underlayment layer are adapted to cooperate to support a plurality of paver elements atop of a support surface.
2. The self supporting paving system of claim 1 wherein the edging rail includes a first leg and a second leg, the first leg having a front tie that is severable such that the second leg is formable to accommodate a

contour.

3. The self supporting paving system of claim 2 wherein the front tie includes at least one scribe configured to facilitate severing of the front tie. 5
4. The self supporting paving system of claim 2 wherein the front tie includes a frangible element.
5. The self supporting paving system of claim 1 wherein the edging rail includes a first leg and a second leg, the first leg having a plurality of barbs configured to pierce the underlayment layer such that the edging and the underlayment layer are fixed together. 10
6. The self supporting paving system of claim 5 wherein the plurality of barbs each include a flat face, the flat faces being oriented at a relative angle to each other such that the flat face resists movement of the underlayment layer relative to the first leg. 15
7. The self supporting paving system of claim 5 wherein the first leg includes at least one window formed therethrough, the at least one window being bounded by a front tie that is spaced opposite to the second leg, the front tie being configured to be readily severed such that the second leg is formable to accommodate a contour. 20
8. The self supporting paving system of claim 7 wherein the front tie includes at least one scribe configured to facilitate severing of the front tie. 25
9. The self supporting paving system of claim 8 wherein the at least one scribe is bounded by spaced apart chamfers. 30
10. The self supporting paving system of claim 8 wherein the at least one scribe is a pair of spaced apart scribes that define a frangible element. 35
11. The self supporting paving system of claim 5 wherein the first leg includes a plurality of windows that are each bounded by a front tie and the plurality of barbs are a plurality of primary and secondary barbs, the primary barbs being spaced between adjacent windows and the secondary barbs being provided on the front tie. 40
12. The self supporting paving system of claim 11 wherein each of the plurality of windows includes a back flange. 45
13. The self supporting paving system of claim 1 wherein the edging rail and the underlayment support the plurality of paving elements in a generally lateral and vertical direction relative to the support surface and the underlayment layer is configured to drain water 50

away.

14. The self supporting paving system of claim 13 wherein the underlayment layer is formed from a closed cell foam material and includes a plurality of channels and drain holes adapted for water drainage.
15. The self supporting paving system of claim 13 wherein the underlayment layer includes interstitial voids that facilitate water drainage.
16. A self supporting paving system comprising:
 - a plurality of paving elements;
 - an underlayment layer configured to support the plurality of paving elements in a vertical direction relative to a subgrade layer; and
 - an edging rail configured to support the plurality of paving elements in a lateral direction relative to a subgrade layer, the edging rail being further configured to be fixed to the underlayment layer such that the edging rail and the underlayment layer are adapted to cooperate to support the plurality of paver elements atop of a support surface.
17. The self supporting paving system of claim 16 wherein the edging rail includes a first leg and a second leg, the first leg having a plurality of windows formed therethrough, the plurality of windows being bounded by a front tie that is spaced opposite to the second leg, the front tie including a frangible element configured to be severed such that the second leg is formable to accommodate a contour.
18. The self supporting paving system of claim 17 wherein the first leg includes a plurality of barbs formed between adjacent windows, the plurality of barbs each including a flat face, wherein at least two of the flat faces are oriented at a 45 degree relative angle to each other such that the flat faces resist movement of the underlayment layer relative to the first leg.
19. A self supporting paving system comprising:
 - a plurality of paving elements configured as perimeter paving elements and interior paving elements, the interior paving elements having a bedding material disposed therebetween;
 - an underlayment layer configured to support the plurality of paving elements in a vertical direction relative to a subgrade layer, the underlayment layer having a plurality of drainage channels and drain holes that cooperate to direct water away from the paving elements; and
 - an edging rail configured to support the plurality of paving elements in a lateral direction relative to a subgrade layer, the edging rail having a plu-

ality of primary and secondary barbs that are configured to pierce the underlayment layer such that the edging rail and the underlayment layer are fixed together and to adapted to cooperate to fully support a plurality of paver elements atop of a support surface. 5

20. The self supporting paving system of claim 19 wherein the subgrade layer is one of a graded soil layer and a compacted sand layer. 10

15

20

25

30

35

40

45

50

55

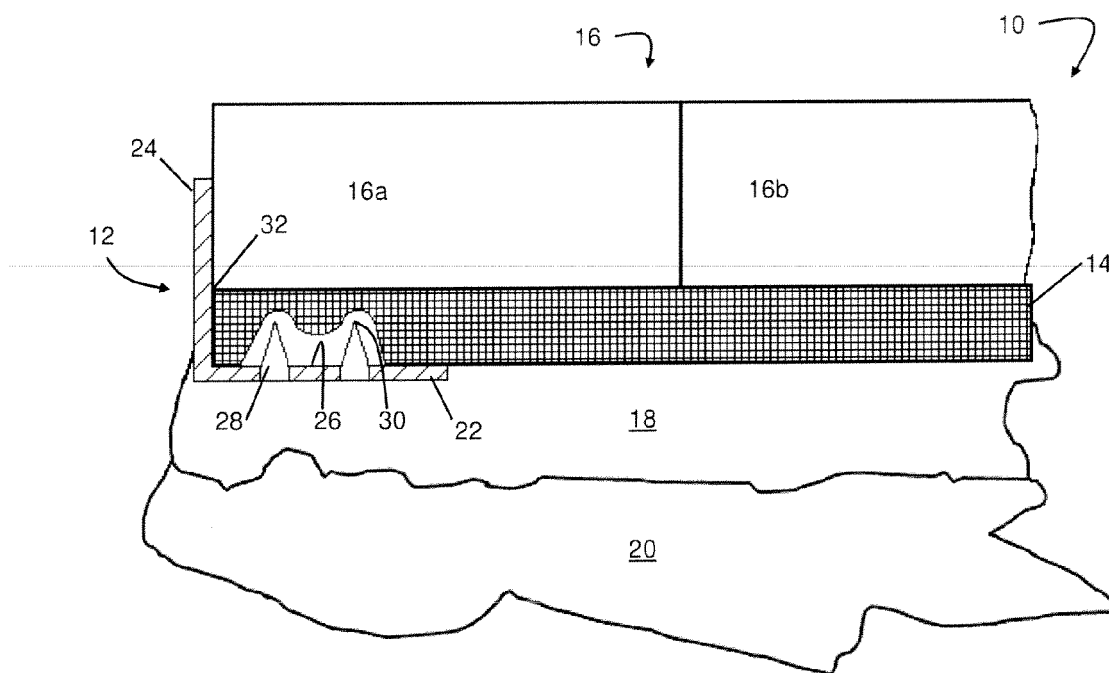
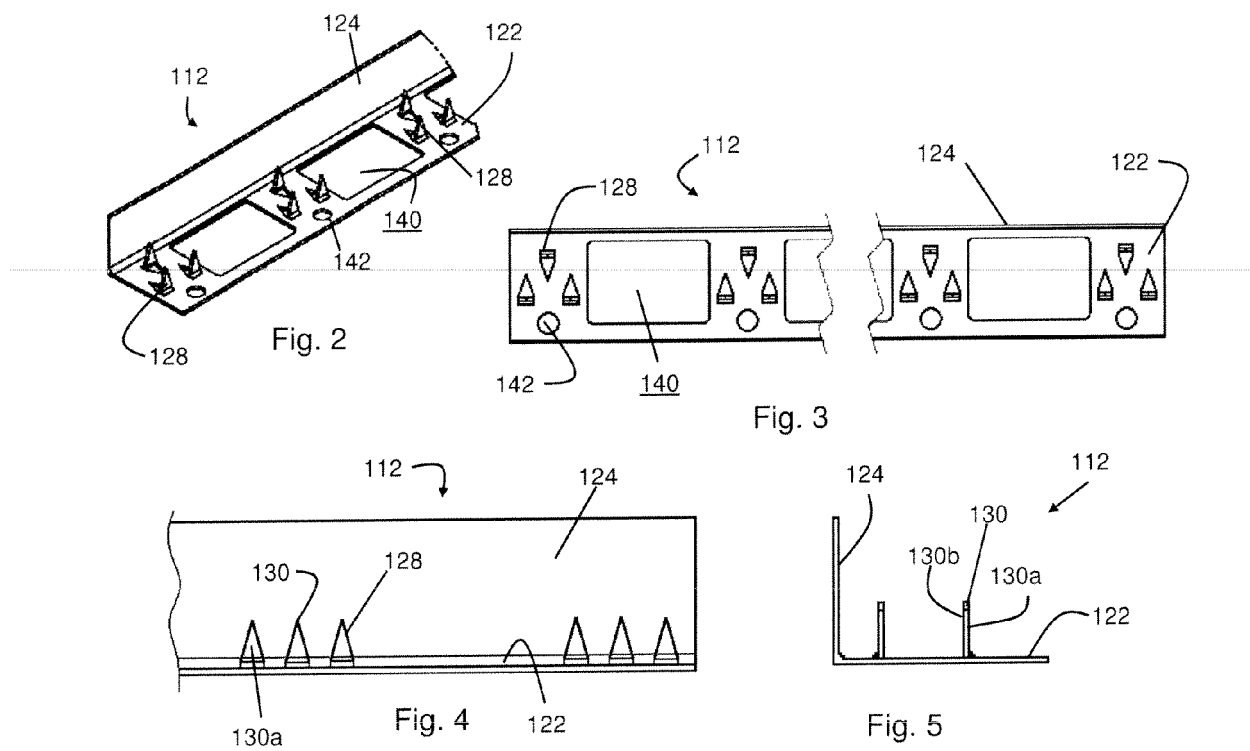
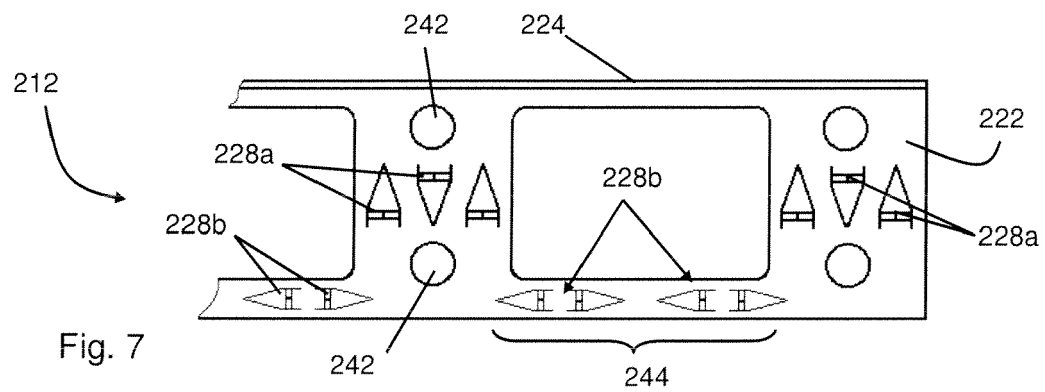
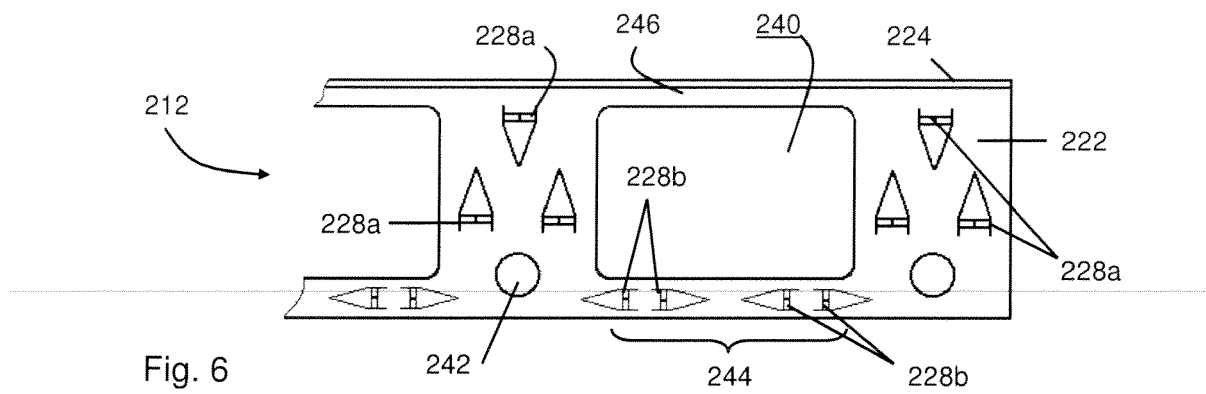


Fig. 1





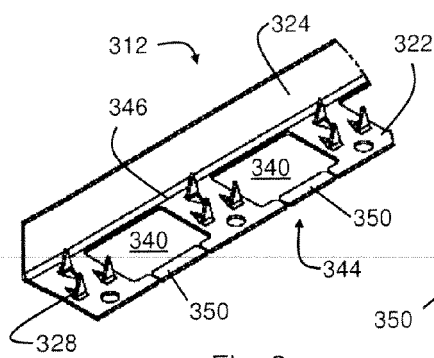


Fig. 8

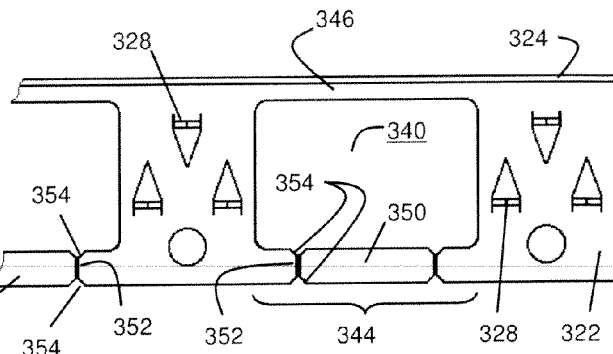


Fig. 9

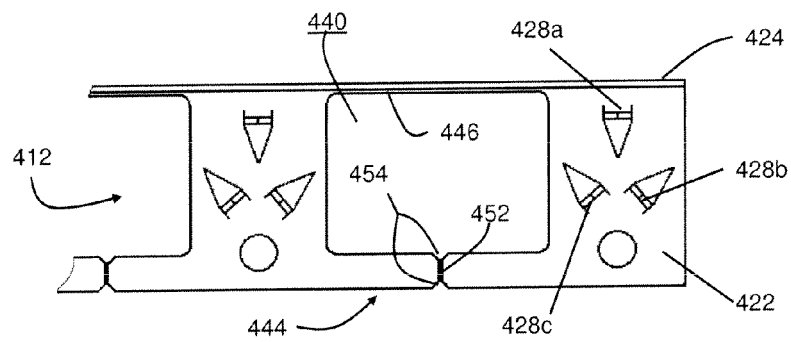


Fig. 10

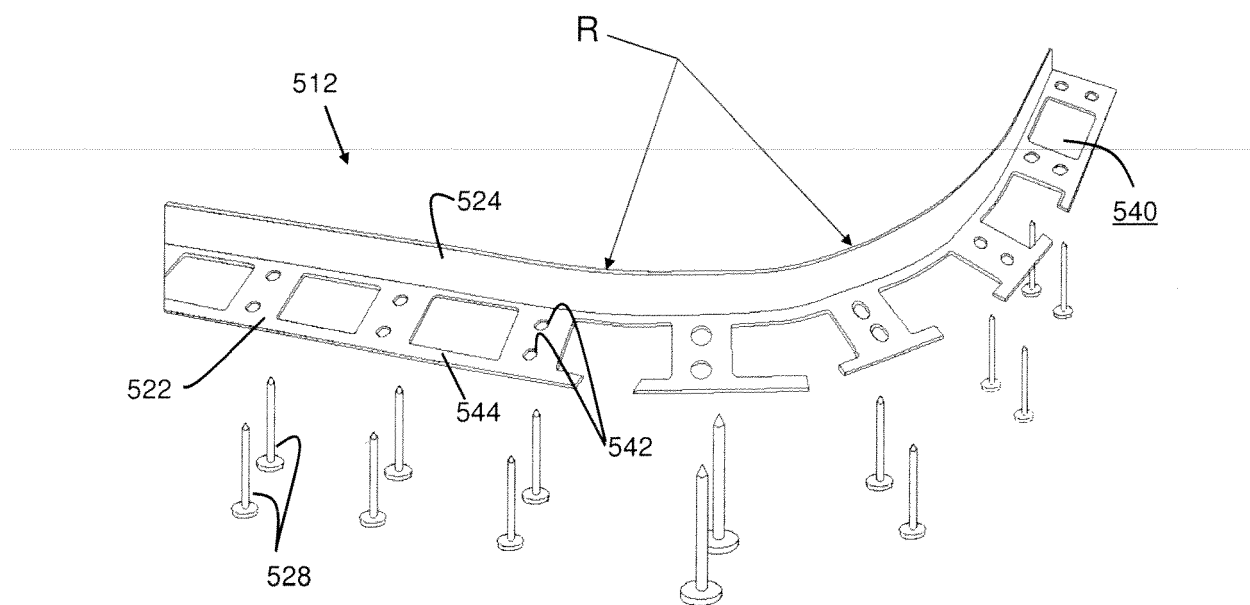


Fig. 11