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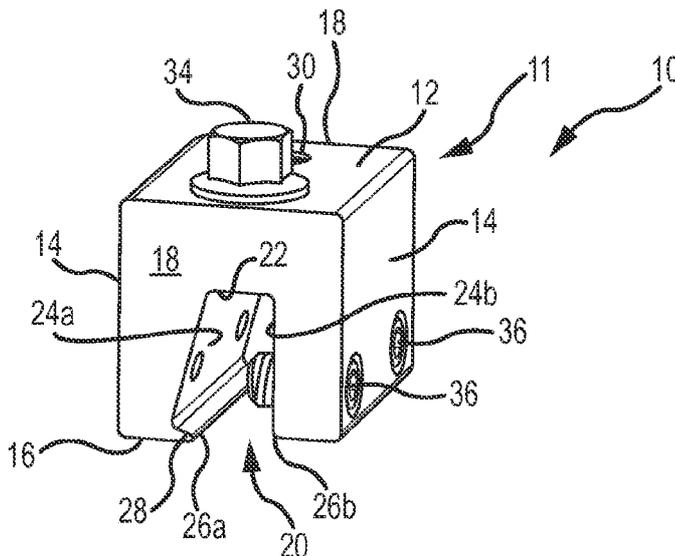
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(54) **Title:** MOUNTING DEVICE FOR NAIL STRIP PANELS



**FIG. 1**

(57) **Abstract:** A mounting device (10) is disclosed having a one-piece body (1). A slot (20) extends into this body (1), and is defined by a slot base (22) and a pair of spaced slot sidewalls (24a, 24b) that each extend from the slot base (22). The slot sidewalls (24a, 24b) are disposed in non-parallel relation to each other.

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## MOUNTING DEVICE FOR NAIL STRIP PANELS

CROSS-REFERENCE TO RELATED APPLICATIONS

5           This patent application is a non-provisional patent application of, and claims priority to, pending U.S. Provisional Patent Application Serial No. 61/581,305, that is entitled "MOUNTING DEVICE FOR NAIL STRIP PANELS," that was filed on 29 December, 2011, and the entire disclosure of which is hereby incorporated by reference in its entirety herein.

10 FIELD OF THE INVENTION

          The present invention generally relates to mounting devices and, more particularly, to mounting devices that may be used with nail strip panels.

BACKGROUND

15           Metal panels are being increasingly used to define building surfaces such as roofs and sidewalls. One type of metal panel is a standing seam panel, where portions of adjacent standing seam panels of the building surface are interconnected/nested in a manner that defines a standing seam. Standing seam panels are expensive compared to other metal panels, and building surfaces defined by metal panels may be more costly than other types of building surface  
20 constructions.

          It is often desirable to install various types of structures on building surfaces, such as heating, air conditioning, and ventilation equipment. Installing structures on standing seam panel building surfaces in a manner that punctures the building surface at one or more locations is undesirable in a number of respects. One is simply the desire to avoid puncturing what is a  
25 relatively expensive building surface. Another is that increasing the number of locations where a metal panel building surface is punctured may increase the potential for leakage and/or corrosion.

SUMMARY

A first aspect of the present invention is directed to a mounting device that is adapted for installation on a standing seam of a panel assembly. This mounting device includes a mounting body. A slot extends into this mounting body and is defined by first slot sidewall, a second slot sidewall, and a slot base, where the first and second slot sidewalls are disposed in non-parallel relation to one another (i.e., the first slot sidewall is not parallel to the second slot sidewall), and where the first and second slot sidewalls are always maintained in a fixed position relative to one another (e.g., the position/orientation of the first and second slot sidewalls is not adjustable). At least one seam fastener may be extended through the mounting body and into the slot (e.g., to retain a standing seam within the slot). At least one mounting fastener may be extended at least into the mounting body (e.g., to mount one or more attachments to the mounting body).

A number of feature refinements and additional features are applicable to the first aspect of the present invention. These feature refinements and additional features may be used individually or in any combination. The following discussion is applicable to the first aspect, up to the start of the discussion of a second aspect of the present invention.

The mounting body may be of one-piece construction. For instance, the mounting body may be of an integral construction (e.g., an extruded part). The mounting body may be characterized as lacking any joints of any kind. Each portion of the mounting body may be characterized as always being maintained in a fixed position relative to a remainder of the mounting body (e.g., by having the mounting body be of one-piece construction; such that the mounting body itself includes no separable parts). The mounting body may be formed from any appropriate material or combination of materials (e.g., a metal alloy).

The first and second slot sidewalls may each include at least one flat or planar section. The entirety of the second slot sidewall may be in the form of a single flat/planar surface. The first slot sidewall may include a first nose or projection that extends in a direction in which the second slot sidewall is spaced from the first slot sidewall. However, this first nose does not extend all the way to the second slot sidewall (e.g., to provide a continual opening to the slot; such that the mounting body may be positioned over/onto a standing seam of a panel assembly via the noted slot). A recess or depression may be incorporated on the first slot sidewall in alignment with each seam fastener that extends through the second slot sidewall and into the slot.

Other than any such first nose and/or recess(s), the remainder of the first slot sidewall may be in the form of a single flat/planar surface.

The second slot sidewall may include a second nose or projection that extends in a direction in which the first slot sidewall is spaced from the second slot sidewall. However, this second nose does not extend all the way to the first slot sidewall (e.g., to provide a continual opening to the slot; such that the mounting body may be positioned over/onto a standing seam of a panel assembly via the noted slot). Other than this second nose, the remainder of the second slot sidewall may be in the form of a single flat/planar surface. In the case where the first slot sidewall includes the noted first nose and where the second slot sidewall includes the noted second nose, each such nose may define the lowermost extreme of the corresponding slot sidewall when the depth dimension of the slot coincides with the vertical dimension, and the first nose (first slot sidewall) may be disposed at a lower elevation than the second nose (second slot sidewall).

A first included angle may exist between the slot base and the first slot sidewall. A second included angle may exist between the slot base and the second slot sidewall. The magnitudes of the first and second included angles may be different from one another. The magnitude of the first included angle may be larger than the magnitude of the second included angle. In one embodiment, the first included angle is greater than  $90^\circ$  while the second included angle is at least substantially  $90^\circ$ . One embodiment has this first included angle being within a range of about  $100^\circ$  to about  $110^\circ$ . Another embodiment has this first included angle being about  $105^\circ$ .

Consider the case where a reference plane extends in the depth dimension of the slot (e.g., so as to intersect the slot base and be disposed between and in spaced relation to each of the first and second slot sidewalls). The first slot sidewall may be characterized as extending both away from the slot base and away from this reference plane (e.g., the first slot sidewall may diverge from this reference plane when proceeding away from the slot base), while the second slot sidewall may be characterized as extending away from the slot base in at least substantially parallel relation to this reference plane.

The spacing between the first and second slot sidewalls may progressively increase when proceeding away from the slot base. The spacing between the first and second slot sidewalls may progressively and continually increase proceeding away from the slot base until reaching

one of the above-noted noses, where the spacing between the first and second slot sidewalls would be then be reduced.

The first and second slot sidewalls may be characterized as terminating at different elevations when a depth dimension of the slot coincides with a vertical dimension. The "side" of the mounting body that incorporates the first slot sidewall may be characterized as being "taller" than the "side" of the mounting body that incorporates the second slot sidewall when a depth dimension of the slot coincides with a vertical dimension.

The first slot sidewall may be characterized as extending from the slot base to a first edge (where the above-noted first nose may define/include this first edge), while the second slot sidewall may be characterized as extending from the slot base to a second edge (where the above-noted second nose may define/include this second edge). In one embodiment, the first edge of the first slot sidewall is spaced from the slot base by a first distance when measured in a first dimension that is orthogonal to the slot base, while the second edge of the second slot sidewall is spaced from the slot base by a second distance when measured in this same first dimension, where the second distance is less than the first distance. In one embodiment, the first edge of the first slot sidewall is spaced a first distance from a reference plane that contains at least a substantial portion of an upper surface of the mounting body (when measured in a first dimension that is orthogonal to this reference plane), while the second edge of the second slot sidewall is spaced a second distance from this same reference plane (when measured in this same first dimension), where the second distance is less than the first distance. The noted "first dimension" may correspond with the vertical dimension when the depth dimension of the slot coincides with this vertical dimension.

The mounting body may include an upper surface and an oppositely disposed lower surface, where the upper surface includes at least one flat section, and where the lower surface incorporates the above-noted slot (e.g., the depth dimension of the slot may be characterized as proceeding in the direction of this upper surface of the mounting body, where the slot base is spaced from the upper surface of the mounting body such that the slot does not extend entirely through the mounting body). The first slot sidewall may be characterized as extending from the slot base and at least generally away from the second slot sidewall, while the second slot sidewall may be characterized as being oriented at least substantially orthogonal to a reference plane that contains the noted flat section(s) of the upper surface (this reference plane could

contain at least a substantial portion of the upper surface of the mounting body). Such a first slot sidewall may include the above-noted first nose, where this first nose is spaced further from the slot base than a remainder of the first slot sidewall.

A second aspect of the present invention is directed to a mounting device that is adapted  
5 for installation on a standing seam of a panel assembly. This mounting device includes a one-  
piece mounting body (e.g., such that the mounting body itself includes no separable parts) having  
an upper surface and an oppositely disposed lower surface, where the upper surface includes at  
least one flat section, and where the lower surface incorporates a slot. This slot extends into the  
10 mounting body and is defined by first slot sidewall, a second slot sidewall, and a slot base that  
extends between the first and second slot sidewalls. The first slot sidewall extends from the base  
and at least generally away from the second slot sidewall until reaching a first nose or projection,  
which then extends back in a direction that the second slot sidewall is spaced from the first slot  
sidewall. The second slot sidewall is oriented at least substantially orthogonal to a reference  
15 plane that contains the noted flat section(s) of the upper surface (at least a substantial portion of  
the upper surface of the mounting body could be contained within this reference plane). The first  
nose of the first slot sidewall may be disposed at a lower elevation than a lowermost edge of the  
second slot sidewall when the noted reference plane associated with the flat section(s) of the  
upper surface is horizontally disposed and further is disposed vertically above the slot base. At  
20 least one seam fastener may be extended through the mounting body and into the slot (e.g., to  
retain a standing seam within the slot). At least one mounting fastener may be extended into the  
mounting body (e.g., to mount one or more attachments to the mounting body).

The various features of the mounting device of the first aspect may be used in  
conjunction with the second aspect, individually or in any combination.

The mounting devices of each of the first and second aspects may be used in conjunction  
25 with a panel assembly defined by a plurality of nail strip panels. Each such nail strip panel may  
include a first seam rib and a second seam rib. Nesting the first seam rib on one nail strip panel  
with the second seam rib of another nail strip panel defines a standing seam. At least an upper  
portion of this standing seam may be received in the slot of the above-noted types of mounting  
devices. A lower portion of such a seam may include a recess, and the above-noted nose on the  
30 first slot sidewall may extend into this recess (e.g., to provide resistance to a "lifting off" of the  
mounting device relative to the standing seam).

Any feature of any other various aspects of the present invention that is intended to be limited to a "singular" context or the like will be clearly set forth herein by terms such as "only," "single," "limited to," or the like. Merely introducing a feature in accordance with commonly accepted antecedent basis practice does not limit the corresponding feature to the singular (e.g.,  
5 indicating that the mounting device includes "a seam fastener" alone does not mean that the mounting device includes only a single seam fastener). Moreover, any failure to use phrases such as "at least one" also does not limit the corresponding feature to the singular (e.g., indicating that a mounting device includes "a seam fastener" alone does not mean that the mounting device includes only a single seam fastener). Use of the phrase "at least generally" or  
10 the like in relation to a particular feature encompasses the corresponding characteristic and insubstantial variations thereof (e.g., indicating that a surface is at least generally flat encompasses the surface being flat). Finally, a reference of a feature in conjunction with the phrase "in one embodiment" does not limit the use of the feature to a single embodiment.

#### 15 BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a perspective view of one embodiment of a mounting device for use with nail strip panels.

Figure 2 is an end view of the mounting device of Figure 1.

Figure 3 is an end view of the mounting device of Figure 1, positioned on a standing  
20 seam of a panel assembly defined by multiple nail strip panels of a first configuration.

Figure 4 is a perspective view of the mounting device of Figure 1, positioned on a standing seam of a panel assembly of the type presented in Figure 3.

Figure 5 is a perspective view of another embodiment of a mounting device for nail strip panels.

Figure 6 is a perspective view of the mounting device of Figure 5, positioned on a seam  
25 of a panel assembly defined by multiple nail strip panels of a second configuration.

Figure 7 is an enlarged end view of a standing seam from the panel assembly of Figure 6.

## DETAILED DESCRIPTION

One embodiment of a mounting device is illustrated in Figures 1 and 2, and is identified by reference numeral 10. This mounting device 10 is in the form of a mounting body 11, at least one mounting fastener 34, and at least one seam fastener 36. The mounting body 11 may be of one-piece construction (e.g., an extruded part). The mounting body 11 may be characterized as lacking any joints of any kind. The mounting body 11 may be configured so as to have no separable parts.

The mounting body 11 may be formed from any appropriate material or combination of materials (e.g., a metal alloy), and includes an upper surface 12, an oppositely disposed lower surface 16, a pair of oppositely disposed side surfaces 14, and a pair of oppositely disposed ends 18. The spacing between the ends 18 coincides with a length dimension for the mounting body 11, the spacing between the side surfaces 14 coincides with a width dimension for the mounting body 11, and the spacing between the upper surface 12 and lower surface 16 coincides with a height or depth dimension for the mounting body 11 (as well as for slot 20, discussed below).

The upper surface 12 of the mounting body 11 includes at least one flat section. A substantial portion of the upper surface 12 is flat in the illustrated embodiment - all except the transition between the upper surface 12 and each of the two side surfaces 14, which may be rounded and/or chamfered. A single reference plane may contain at least a substantial portion of the upper surface 12 of the mounting body 11. In any case, typically the mounting device 10 will be installed on a panel assembly such that its upper surface 12 projects at least generally upwardly to accommodate supporting one or more attachments that may be appropriately secured to the mounting body 11. In this regard, the upper surface 12 may include at least one threaded hole 30 on a flat section thereof (two in the illustrated embodiment; any appropriate number of threaded holes 30 may be utilized; multiple threaded holes 30 typically being spaced along the length dimension of the mounting body 11) for receiving a corresponding mounting fastener 34 (e.g., the mounting fastener 34 may be threaded into a pre-defined threaded hole 30 on a flat section of the upper surface 12 and that extends into the mounting body 11). Another option is for the mounting fastener 34 to be self-tapping (i.e., so as to not require a threaded hole in the mounting body 11 prior to initially installing the mounting fastener 34 on the mounting body 11).

The lower surface 16 of the mounting body 11 includes a slot 20 that extends between the two ends 18 of the mounting body 11, and it is located between the pair of side surfaces 14 of the mounting body 11. This slot 20 is defined by a slot base 22 and a pair of slot sidewalls 24a, 24b. The slot sidewalls 24a, 24b are spaced apart to receive at least an end section of a standing seam  
5 of a panel assembly (e.g., standing seam 52 of panel assembly 40, discussed below in relation to Figures 3 and 4). As the mounting body 11 is of one-piece construction, the first slot sidewall 24a is always maintained in a fixed position relative to the second slot sidewall 24b.

Each of the slot sidewalls 24a, 24b includes at least one flat section. In the illustrated embodiment, the entirety of the second slot sidewall 24b is flat or planar, while the entirety of  
10 the first slot sidewall 24a is also flat or planar other than for a nose or projection 28 located at a lower extreme thereof and for optional depressions or recesses (where each such recess is axially aligned with a seam fastener 36). Any such nose or projection 28 extends at least generally in the direction that the second slot sidewall 24b is spaced from the first slot sidewall 24a.

At least one threaded hole 32 (two in the illustrated embodiment; any appropriate number  
15 of threaded holes 32 may be utilized; multiple threaded holes 32 typically being spaced along the length dimension of the body 11) may extend from one of the side surfaces 14, through the body 11, and intersects the first slot sidewall or the second slot sidewall 24b. In the illustrated embodiment, the threaded hole(s) 32 intersect with the second slot sidewall 24b (e.g., it may be that no threaded holes 32 extend through the mounting body 11 to intersect with the first slot  
20 sidewall 24a).

An appropriate seam fastener 36 may be directed through a given threaded hole 32 of the mounting device 10 so as to extend into the slot 20 to engage a standing seam and secure the same against the opposing slot sidewall 24a or 24b (the first slot sidewall 24a in the illustrated  
25 embodiment). A cavity of any appropriate type may be included on this opposing slot sidewall 24a or 24b (the first slot sidewall 24a in the illustrated embodiment) to allow the aligned seam fastener 36 to deflect a corresponding portion of the standing seam into this cavity, although such may not be required in all instances. In any case and in one embodiment, the seam fastener 34 only interfaces with an exterior surface of a standing seam disposed in the slot 20. For instance, the end of the seam fastener 36 that interfaces with such a standing seam may be convex,  
30 rounded, or of a blunt-nosed configuration to provide a desirable interface with this standing seam (e.g., non-penetrating). Another option is for the seam fastener(s) 36 to be self-tapping

(i.e., so as to not require a threaded hole prior to initially installing the seam fastener 34 on the body 11).

A number of characterizations may be made in relation to the slot 20 of the mounting device 10, and which may apply individually or in any combination. The first slot sidewall 24a and the second slot sidewall 24b are disposed other than in parallel relation - the first slot sidewall 24a is not parallel to the second slot sidewall 24b. The first slot sidewall 24a and the second slot sidewall 24b may be characterized as being disposed in different orientations.

A first included angle  $\alpha_1$  is defined between the slot base 22 and the first slot sidewall 24a (e.g., between a flat section of the slot base 22 and an adjacent flat section of the first slot sidewall 24a). In the illustrated embodiment, this included angle  $\alpha_1$  is greater than  $90^\circ$ . A second included angle  $\alpha_2$  is defined between the slot base 22 and the second slot sidewall 24b (e.g., between a flat section of the slot base 22 and an adjacent flat section of the second slot sidewall 24b). In the illustrated embodiment, this included angle  $\alpha_2$  is at least substantially  $90^\circ$ . The magnitude of the included angle  $\alpha_1$  is thereby greater than the magnitude of the included angle  $\alpha_2$ . One embodiment has the included angle  $\alpha_1$  being within a range of about  $100^\circ$  to about  $110^\circ$ . Another embodiment has the included angle  $\alpha_1$  being about  $105^\circ$ .

Figure 2 illustrates a reference plane 60 that extends through the slot 20 at a location that is between the first slot sidewall 24a and the second slot sidewall 24b. The reference plane 60 may be orthogonal to one or more of the slot base 22 and the upper surface 12. The reference plane 60 may extend in the above-noted height or depth dimension for the mounting device 10. One characterization of the configuration of the slot 20 is that the first slot sidewall 24a extends from the slot base 22 and away from the reference plane 60, while the second slot sidewall 24b extends from the slot base 22 at least substantially parallel to this same reference plane 60.

The slot 20 may be characterized as having a variable width, including a continually variable width for at least a substantial portion of its depth (up to the nose 28 of first slot sidewall 24a). The spacing between the first slot sidewall 24a and the second slot sidewall 24b may progressively increase proceeding away from the slot base 22 up to the nose 28 of the first slot sidewall 24a. In one embodiment, the second slot sidewall 24b is disposed orthogonally to at least one of the upper surface 12 and the slot base 22, while the first slot sidewall 24a extends from the slot base 22 at least generally away from the second slot sidewall 24b.

The first slot sidewall 24a and the second slot sidewall 24b may be characterized as terminating at different elevations when the depth of the slot 20 extends in the vertical dimension. The up-and-down dimension in the view presented in Figure 2 corresponds with this depth dimension for the slot 20. The width dimension of the slot 20 coincides with the spacing  
5 between the first slot sidewall 24a and the second slot sidewall 24b. The length dimension of the slot 20 coincides with the spacing between the ends 18 of the mounting body 11. The lower surface 16 at its intersection with the first slot sidewall 26a may be offset in the vertical dimension (when the depth of the slot 20 extends in the vertical dimension) from the lower surface 16 at its intersection with the second slot sidewall 26b.

10 The first slot sidewall 24a may be characterized as extending from the slot base 22 to a first/lower edge 26a, while the second slot sidewall 24b may be characterized as extending from the slot base 22 to a second/lower edge 26b. In the illustrated embodiment, the nose 28 includes the first edge 26a of the first slot sidewall 24a. The upper surface 12 and the first edge 26a of the first slot sidewall 24a are separated by a distance  $D_1$  measured in a first dimension (the vertical  
15 dimension in the view presented in Figure 2, and that is orthogonal to a flat section of the upper surface 12), while the upper surface 12 and the second edge 26b of the second slot sidewall 24b are separated by a distance  $D_2$  measured in this same first dimension. As illustrated in Figure 2, the distance  $D_1$  is greater than the distance  $D_2$ . The spacing between the slot base 22 and the first edge 26a of the first slot sidewall 24a, measured in this same first dimension, is also greater than  
20 the spacing between the slot base 22 and the second edge 26b of the second slot sidewall 24b.

Figures 3 and 4 show the mounting device 10 positioned on a standing seam 52 of one embodiment of a panel assembly 40. The panel assembly 40 may be used to define any appropriate surface, including a roofing surface. The panel assembly 40 is defined by a plurality of what are commonly referred to as nail strip panels 42 or the like. Each nail strip panel 42  
25 includes a nail strip flange 44, a left seam rib 46a (a rib used to define a seam 52), and a right seam rib 46b (a rib used to define a seam 52). The left seam rib 46a and right seam rib 46b of a given nail strip panel 42 are spaced in the width dimension of the nail strip panel 42. Each nail strip panel 42 may include one or more flat sections, as well as one or more other structures such as crests, minor ribs, intermediate ribs, pencil ribs, striations, fluting, or flutes.

30 The left nail strip panel 42 in Figures 3 and 4 would be secured to an underlying support structure (e.g., a deck) by extending a plurality of suitable fasteners (e.g., nails, screws) through

the nail strip flange 44 (e.g., spaced along the length of the nail strip flange 44 - the length dimension extending into the page in the view presented in Figure 3) and into the underlying support structure. The left seam rib 46a for the right nail strip panel 42 illustrated in Figures 3 and 4 may then be positioned over the right seam rib 46b for the left nail strip panel 42 illustrated in Figures 3 and 4 to define a standing seam 52. Nail strip panels 42 may be installed in this manner to define a panel assembly 40 of a desired size (both in the length and width dimensions).

Each standing seam 52 of the panel assembly includes a recess 50 on one side thereof (the left side in the views of Figures 3 and 4). This recess 50 is defined below an end section 48 of the left seam rib 46a of the standing seam 52, a lower portion of the right seam rib 46b of this same standing seam 52, and a base of the nail strip panel 42 associated with the noted right seam rib 46b. The nose 28 on the lower portion of the first slot sidewall 24a may be directed into this recess 50 so as to be disposed under the end section 48 of the corresponding left seam rib 46a in the view shown in Figure 3. This provides increased lift-off resistance for the mounting device 10 on this standing seam 52. One embodiment has the nose 28 extending a distance  $D_3$  (measured in the width dimension) of at least about 0.1" from the adjacent flat portion of the first slot sidewall 24a. Another embodiment has this distance  $D_3$  being at least about 0.15".

Figure 5 illustrates a variation of the mounting device 10 of Figures 1-2. Corresponding components are identified by the same reference numeral. Those corresponding components that differ in at least some respect are identified by a "single prime" designation in Figure 5. One difference between the mounting device 10' of Figure 5 and the mounting device 10 of Figures 1-2 is that the mounting device 10' accommodates a single seam fastener 36 (versus the multiple seam fasteners 36 used by the mounting device 10 of Figures 1-2). Another difference is that the mounting device 10' of Figure 5 accommodates a single mounting fastener 34 (versus the multiple mounting fasteners 34 used by the mounting device 10 of Figures 1-2). As such, the mounting body 11' of the mounting device 10' may be characterized as being "shorter" in the length dimension (coinciding with the spacing between the ends 18) than the mounting body 11 of the mounting device 10.

Figure 6 shows the mounting device 10' of Figure 5 being positioned on a standing seam 52' of another embodiment of a panel assembly 40'. The panel assembly 40' is defined by nail strip panels 42' at least generally of the above-described type, but which use a left seam rib 46a'

and right seam rib 46b' of a different configuration that discussed above, which in turn collectively define a standing seam 52' of a different configuration. The nose 28 of the mounting device 10' is again positioned within the recess 50' on one side of the standing seam 52' and at least generally in accordance with the foregoing. However, the recess 50' is of a different configuration, being defined primarily by the end section 48' of one nail strip panel 42' and a base section of the other nail strip panel 42' that defines this seam 52'.

It should be appreciated that the mounting device 10 may be used on the panel assembly 40', and that the mounting device 10' may be used on the panel assembly 40. Each of the mounting devices 10, 10' may be used by any panel assembly defined by nail strip panels of the type described herein (where each nail strip panel includes two seam ribs that are spaced in its width dimension, such that one seam rib of one nail strip panel may be "nested" with a seam rib of an adjacent nail strip panel to define a standing seam).

The foregoing description of the present invention has been presented for purposes of illustration and description. Furthermore, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications commensurate with the above teachings, and skill and knowledge of the relevant art, are within the scope of the present invention. The embodiments described hereinabove are further intended to explain best modes known of practicing the invention and to enable others skilled in the art to utilize the invention in such, or other embodiments and with various modifications required by the particular application(s) or use(s) of the present invention. It is intended that the appended claims be construed to include alternative embodiments to the extent permitted by the prior art.

What is claimed:

1. A standing seam mounting device comprising:

a mounting body;

a slot extending into said mounting body and defined by a first slot sidewall, a second  
5 slot sidewall, and a slot base extending between said first and second slot sidewalls, wherein said  
first and second slot sidewalls are disposed other than in parallel relation to one another, wherein  
said first slot sidewall is always maintained in a fixed position relative to said second slot  
sidewall, and wherein said slot is configured to receive at least part of standing seam of a panel  
assembly;

10 at least one seam fastener extendable through said mounting body and into said slot; and  
at least one mounting fastener extendable into said mounting body.

2. The standing seam mounting device of claim 1, wherein said mounting body is  
of a one-piece construction.

3. The standing seam mounting device of any of claims 1-2, wherein said first  
15 and second slot sidewalls each comprise a planar section.

4. The standing seam mounting device of any of claims 1-3, wherein a first  
included angle exists between said slot base and said first slot sidewall, wherein a second  
included angle exists between said slot base and said second slot sidewall, and wherein said first  
and second included angles are of different magnitudes.

20 5. The standing seam mounting device of claim 4, wherein said first included  
angle is greater than said second included angle.

6. The standing seam mounting device of any of claims 4-5, wherein said first  
included angle is greater than  $90^\circ$ , and wherein said second included angle is at least  
substantially  $90^\circ$ .

25 7. The standing seam mounting device of any of claims 1-6, wherein a reference  
plane intersects said slot base, and is disposed between and is spaced from each of said first and  
second slot sidewalls, wherein said first slot sidewall extends both away from said slot base and  
away from said reference plane, and wherein said second slot sidewall is at least substantially  
parallel to said reference plane.

30

8. The standing seam mounting device of any of claims 1-7, wherein a spacing between said first slot sidewall and said second slot sidewall progressively and continually increases proceeding away from said slot base for at least a substantial portion of a height of each of said first and second slot sidewalls.

5           9. The standing seam mounting device of any of claims 1-8, further comprising:  
a first nose that extends from a lower portion said first slot sidewall at least generally in a direction in which said second slot sidewall is spaced from said first slot sidewall.

10           10. The standing seam mounting device of any of claims 1-9, wherein said first slot sidewall and said second slot sidewall terminate at different elevations when a depth of said slot extends in a vertical dimension.

15           11. The standing seam mounting device of any of claims 1-10, wherein said first slot sidewall extends from a first edge to said slot base, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first edge of said first slot sidewall is spaced from said slot base by a first distance measured in a first dimension, wherein said second edge of said second slot sidewall is spaced from said slot base by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

20           12. The standing seam mounting device of any of claims 1-11, wherein said mounting body comprises an upper surface and an oppositely disposed lower surface, wherein said upper surface comprises a flat section, wherein said lower surface comprises said slot, wherein said first slot sidewall extends from said slot base in a direction that is away from said second slot sidewall, and wherein said second slot sidewall is oriented at least substantially orthogonal to said flat section of said upper surface.

25           13. The standing seam mounting device of claim 12, wherein said first slot sidewall terminates in a first nose that extends in a direction that said second slot sidewall is spaced from said first slot sidewall.

14. The standing seam mounting device of claim 13, wherein said first slot sidewall extends from a first edge to said slot base, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first nose comprises said first edge, wherein said first edge of said first slot sidewall is spaced from said flat section of said upper surface by a first distance measured in a first dimension, wherein said second edge of said second slot sidewall is spaced from said flat section of said upper surface by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

15. The standing seam mounting device of claim 13, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first nose of said first slot sidewall is spaced from said flat section of said upper surface by a first distance measured in a first dimension that is orthogonal to said flat section, wherein said second edge of said second slot sidewall is spaced from said flat section of said upper surface by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

16. A standing seam mounting device comprising:  
15 a one-piece mounting body comprising an upper surface and an oppositely disposed lower surface, wherein said upper surface comprises a first flat section, wherein said lower surface comprises a slot defined by a first slot sidewall, a second slot sidewall, and a slot base that extends between said first and second slot sidewalls, wherein said first slot sidewall extends from said slot base in a direction that is away from said second slot sidewall, wherein said first slot sidewall comprises a first nose that extends in a direction in which said second slot sidewall is spaced from said first slot sidewall, wherein said second slot sidewall is oriented at least substantially orthogonal to a reference plane that contains said first flat section of said upper surface, and wherein said first nose of said first slot sidewall is disposed at a lower elevation than a lowermost edge of said second slot sidewall when said first flat section of said upper surface is horizontally disposed and located vertically above said slot base;

at least one seam fastener extendable through said mounting body and into said slot; and

at least one mounting fastener extendable through said flat section of said upper surface and into said mounting body.

17. The standing seam mounting device of claim 16, wherein said first and second slot sidewalls each comprise a planar section.

18. The standing seam mounting device of any of claims 16-17, wherein a first included angle exists between said slot base and said first slot sidewall, wherein a second included angle exists between said slot base and said second slot sidewall, and wherein said first and second included angles are of different magnitudes.

5           19. The standing seam mounting device of claim 18, wherein said first included angle is greater than said second included angle.

20. The standing seam mounting device of any of claims 18-19, wherein said first included angle is greater than  $90^\circ$ , and wherein said second included angle is at least substantially  $90^\circ$ .

10           21. The standing seam mounting device of any of claims 16-20, wherein a reference plane intersects said slot base, and is disposed between and is spaced from each of said first and second slot sidewalls, wherein said first slot sidewall extends both away from said slot base and away from said reference plane, and wherein said second slot sidewall is at least substantially parallel to said reference plane.

15           22. The standing seam mounting device of any of claims 16-21, wherein a spacing between said first slot sidewall and said second slot sidewall progressively and continually increases proceeding away from said slot base for at least a substantial portion of a height of each of said first and second slot sidewalls.

20           23. The standing seam mounting device of any of claims 16-22, wherein said first slot sidewall and said second slot sidewall terminate at different elevations when a depth of said slot extends in a vertical dimension.

25           24. The standing seam mounting device of any of claims 16-23, wherein said first slot sidewall extends from a first edge to said slot base, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first edge of said first slot sidewall is spaced from said slot base by a first distance measured in a first dimension, wherein said second edge of said second slot sidewall is spaced from said slot base by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

25. The standing seam mounting device of any of claims 16-23, wherein said first slot sidewall extends from a first edge to said slot base, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first nose comprises said first edge, wherein said first edge of said first slot sidewall is spaced from said flat section of said upper surface by a first distance measured in a first dimension, wherein said second edge of said second slot sidewall is spaced from said flat section of said upper surface by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

26. The standing seam mounting device of any of claims 16-23, wherein said second slot sidewall extends from a second edge to said slot base, wherein said first nose of said first slot sidewall is spaced from said flat section of said upper surface by a first distance measured in a first dimension that is orthogonal to said flat section, wherein said second edge of said second slot sidewall is spaced from said flat section of said upper surface by a second distance measured in said first dimension, and wherein said second distance is less than said first distance.

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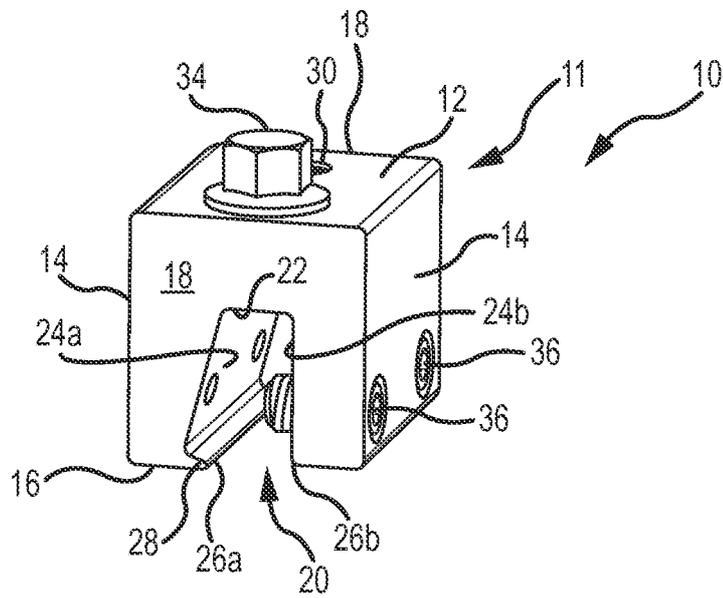


FIG. 1

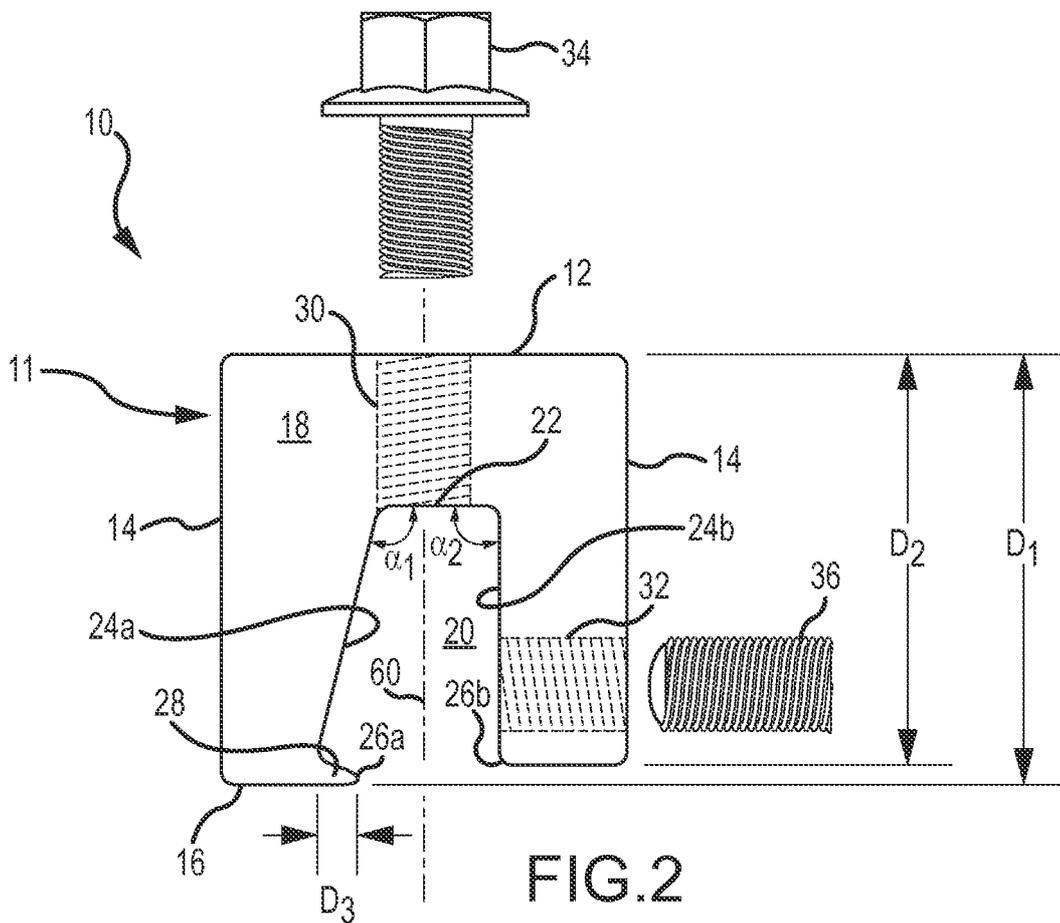
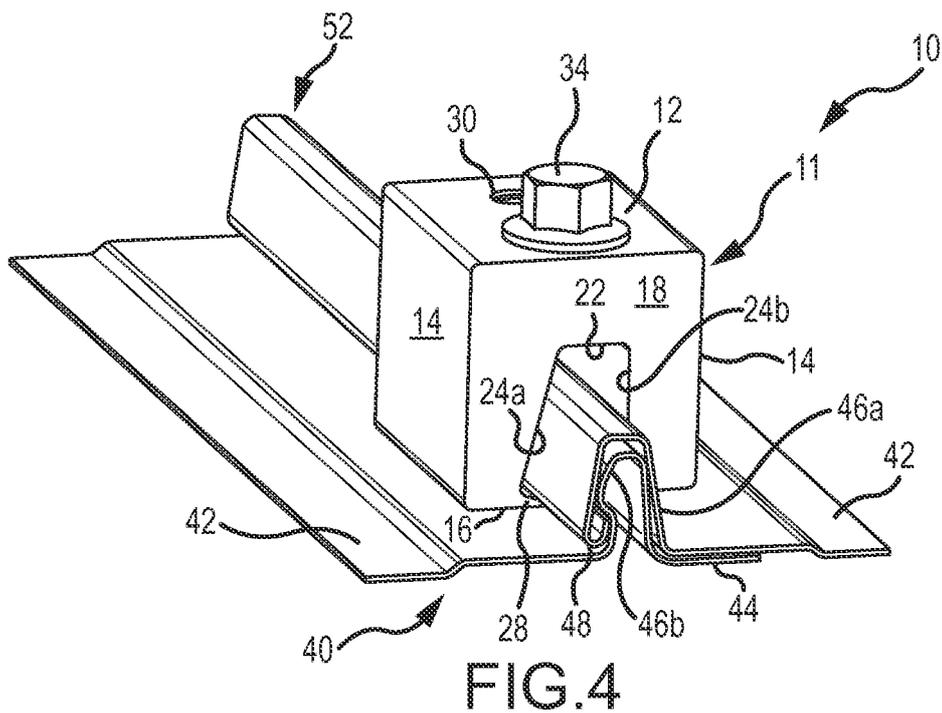
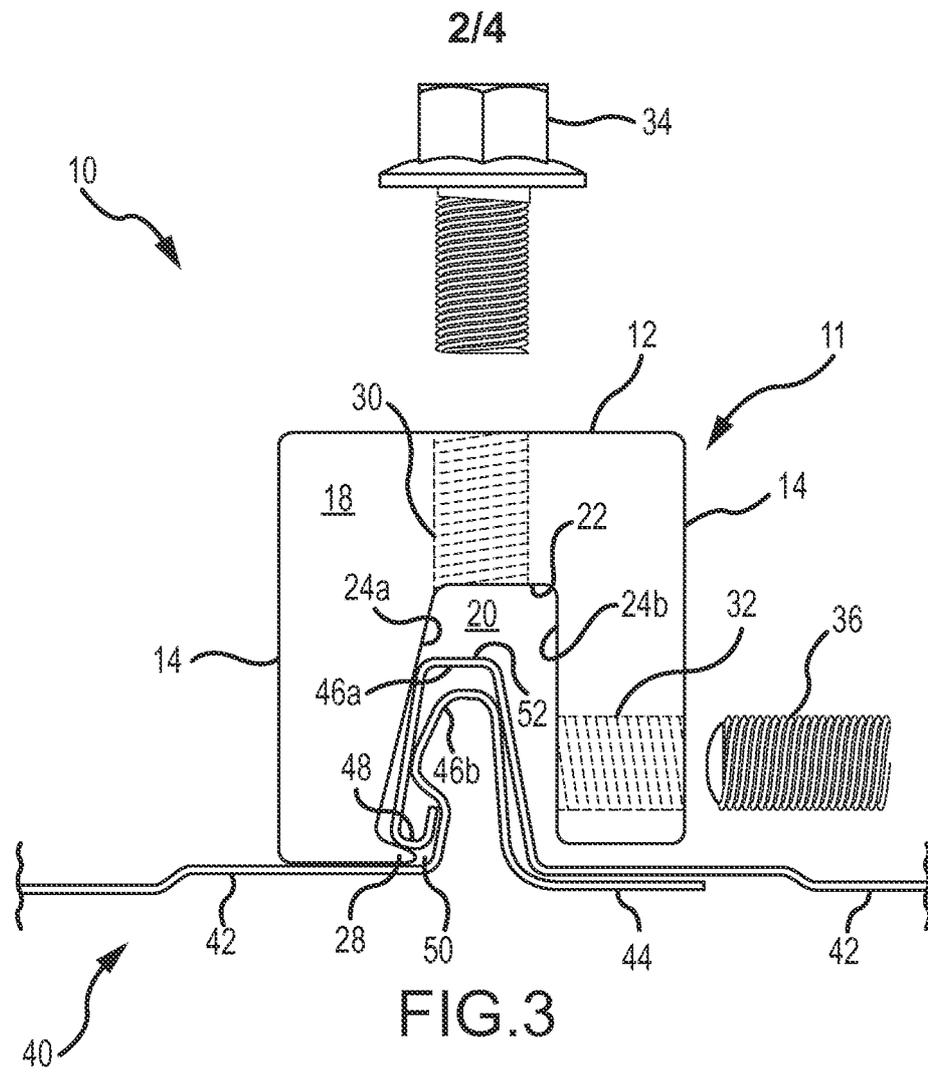


FIG. 2



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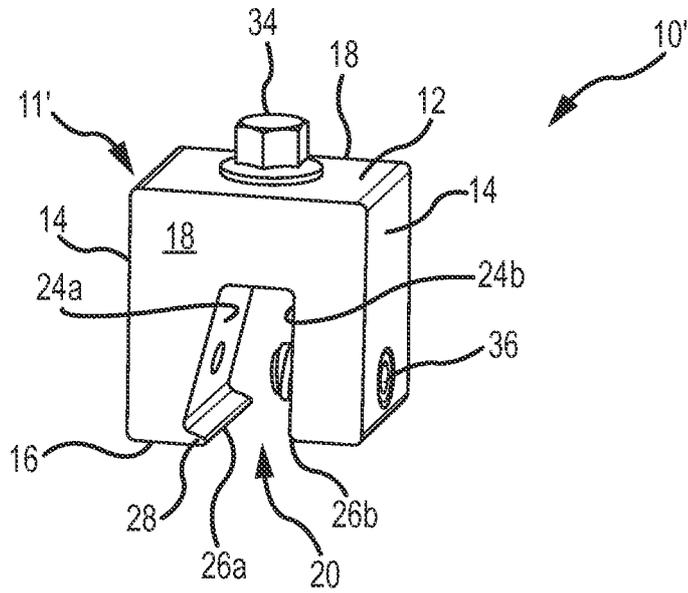


FIG. 5

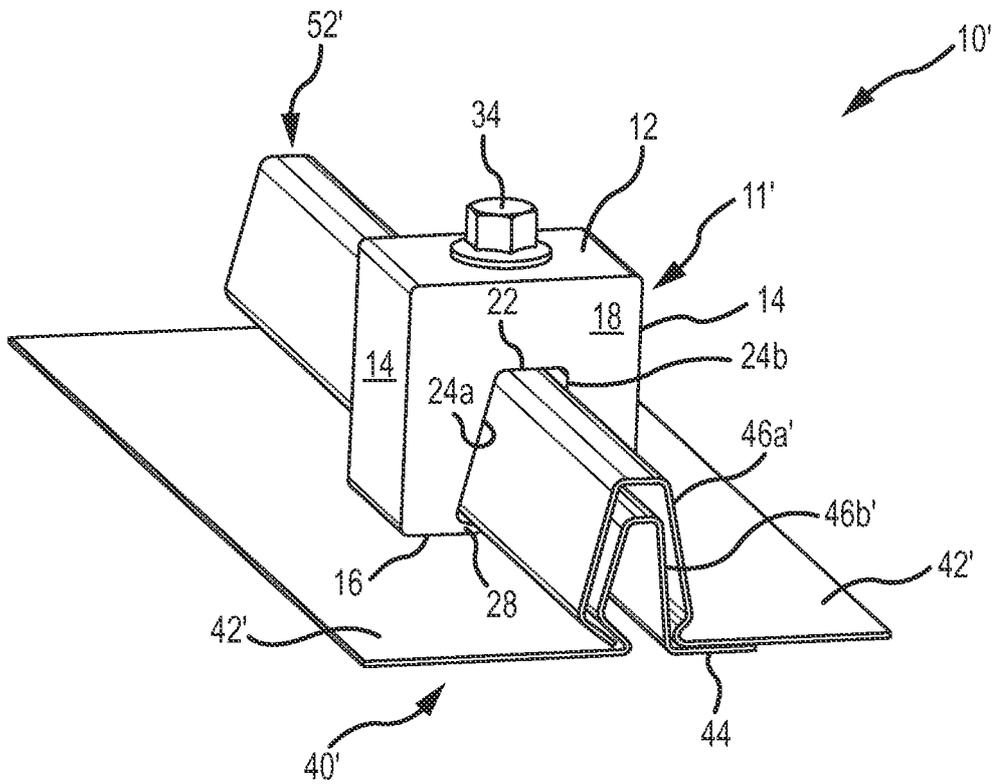


FIG. 6

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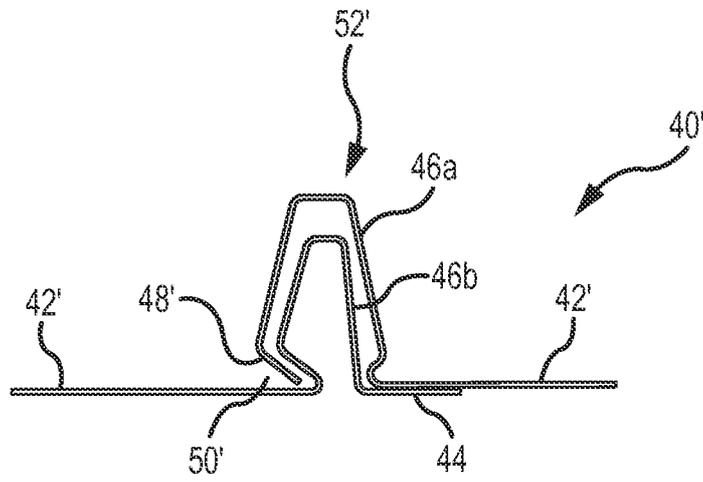


FIG. 7

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/US2012/070653

A. CLASSIFICATION OF SUBJECT MATTER  
 INV. F24J2/52 E04D13/10  
 ADD.  
 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)  
 F24J E04D

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)  
 EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	JP 2011 236611 A (JFE GALVANIZING & COATING CO LTD; JFE STEEL CORP; JFE NIKKENBAN CO LTD) 24 November 2011 (2011-11-24) figure 2 -----	1-3 ,7-11
X	GB 2 476 104 A (FURSE W J & CO LTD [GB] ) 15 June 2011 (2011-06-15) figures 3-5 -----	1-10, 12 , 13
X	KR 100 957 530 BI (YOUIL ENSYS CO LTD [KR] ) 11 May 2010 (2010-05-11) figure 2 -----	1-8, 12
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Further documents are listed in the continuation of Box C.       See patent family annex.

\* Special categories of cited documents :

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"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  21 May 2013	Date of mailing of the international search report  31/05/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Leroux, Corenti ne
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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2012/070653

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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