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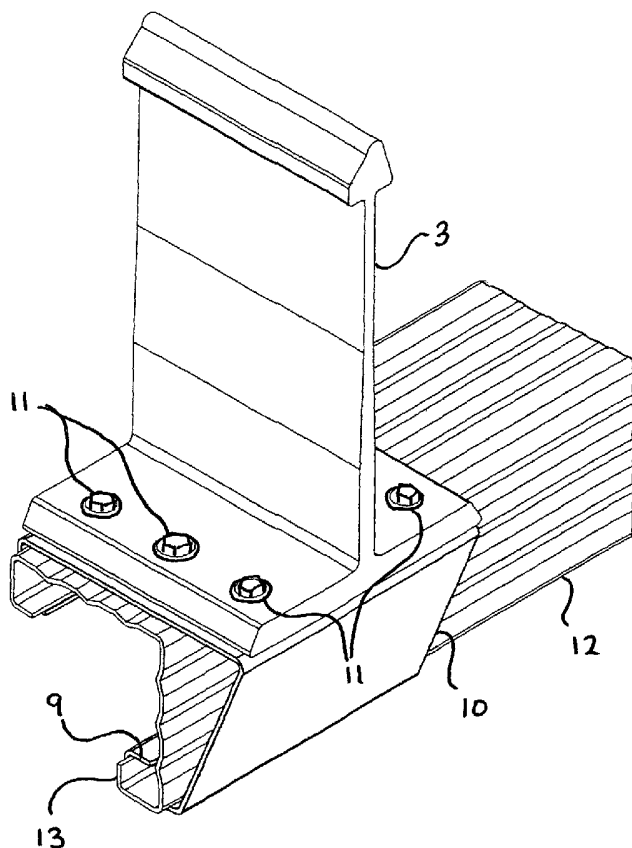
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(54) Title: IMPROVEMENTS IN AND RELATING TO STANDING SEAM ROOF STRUCTURES



(57) Abstract: An alignment clip (5) for connection between a standing seam roof panel halter bracket (1) and a roofing support bar (12), the clip comprising hook formations (7, 8 and 9) cooperable with the bar by which the clip may be releasably secured thereto and be slidable therealong, the clip including a platform (6) for receiving a base portion (2) of the bracket, the platform having an overhang region (6a) adapted to, in use, overhang the bar and to which part of the base portion of the halter bracket may be secured prior to the clip being secured to the bar.



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IMPROVEMENTS IN AND RELATING TO STANDING SEAM ROOF STRUCTURES

This invention relates to standing seam roof structures in which preformed roofing panels with edge seams extending along the major axis of each panel are supported above a grid of roof support bars extending at right angles to the seams by means of halter brackets, each bracket having a base portion fixed to the grid and a seam-engaging upper portion for retaining the roofing panels in place whilst allowing seamwise movement thereof in response to expansion and contraction.

A known problem in the construction and maintenance of standing seam roofing structures, where each roofing panel may be up to 80 metres long, is that adjoining panels and hence adjoining seams have to be seamed or “zipped” together *in situ* and for this reason the roofing panels are often formed on site through the use of specialist roll forming equipment which may typically be vehicle mounted, thereby enabling continuous lengths of roofing panels to be rolled and cut as required. Since the halter brackets serve the important function of retaining the subsequently seamed/zipped together edges of adjacent roofing panels *in situ* it will be apparent that their positioning and alignment above an underlying roofing support grid comprised of an array of roofing support bars positioned at right angles to the direction of the seam has to be accurate if problems of potential buckling of the roofing panels due to snagging are to be avoided. If such halter brackets are wrongly positioned even by being out of alignment relative to the seam by only a few degrees it has been

known for expansion or contraction of the roofing panels to cause the seam to split and for the structure to therefore become mechanically unstable or allow the ingress of e.g. water.

The problem of correct alignment is exacerbated by on-site conditions which may be inclement, noisy and have other distractions for those securing the halter brackets to the support bars making up the underlying support grid, and such persons may also not be particularly skilled at ensuring alignment of rows of halter brackets.

Although such halter brackets can be made from e.g. pressed steel, they are more usually made from extruded aluminium so as to ensure that the seam engaging parts thereof closely match the seam produced when adjacent roof panel edges have been seamed/zipped together leaving, typically, only a minimal clearance spacing between the inner walls of the seam and the seam engaging part of the halter bracket. Because of this, although each halter bracket essentially has to be fixed at right angles to the major axis of the underlying support bars, it is not possible to e.g. extrude halter brackets with a built in lip which runs transverse to the major axis of the seam-engaging portion thereof, which could otherwise then simply engage an edge portion of the roofing support bar to ensure that it is set precisely normal thereto.

The present invention stems from the realisation that by using an intermediate alignment clip the otherwise opposing major axes of, respectively, the seam engaging portion of the halter brackets and the roofing support bars can be set at right angles with respect to each other, whilst even allowing for sliding adjustment of the halter bracket relative to the major axis of the support

bar until satisfactory alignment of respective halter brackets has been completed, whereafter such brackets can then be fixed in place, e.g. by self-drilling and tapping fasteners.

According to the invention there is provided an alignment clip for connection between a standing seam roof panel halter bracket and a roofing support bar, the clip comprising hook formations cooperable with the bar by which the clip may be releasably secured thereto and be slidable therealong, the clip including a platform for receiving a base portion of the bracket, the platform having an overhang region adapted to, in use, overhang the bar and to which part of the base portion may be secured prior to the clip being secured to the bar.

With this arrangement a halter bracket can be secured to the clip through the use of e.g. a pair of fasteners driven through the bar overhang region at a position remote from the bar itself, such as elsewhere on site or at a factory where more precise orientation of the halter bracket relative to the clip can be assured, whereafter the combination of clip and bracket can simply be clipped onto the bar *in situ* and respective rows of halter brackets then slidingly aligned before final fixing of each halter bracket through the remainder of the platform and the bar, the hook formations preventing twisting of the clip and hence the halter bracket during fixing.

A further significant advantage of the invention is that the hook formation adjacent the platform bar overhang can be used to support a side wall of the clip beneath this region such that a larger halter bracket relative to the size of the support bar can be used than would otherwise be the case.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a conventional halter bracket;

Figure 2 is a perspective view of a clip according to the invention;

Figure 3 is an end elevation of the clip of Figure 2;

Figure 4 is a perspective view of the bracket of Figure 1 fixed to the clip of Figures 2 and 3; and

Figure 5 is a perspective view of the combination bracket and clip of Figure 4 fixed to part of a roof support bar.

Referring firstly to Figure 1, a conventional halter bracket shown generally at 1 made of extruded aluminium comprises a base portion 2, an upright stem 3 which has a height relative to the base corresponding to a required thickness of insulating material, such as glass fibre blanket, and a generally triangular head portion 4 adapted to receive generally correspondingly shaped edge portions of adjacent pairs of metal roofing panels which are thereafter seamed together or "zipped", all in a conventional manner.

In Figures 2 and 3 there is shown a halter bracket alignment clip 5, made from e.g. a suitably resilient spring steel, the clip 5 comprising in part a platform 6, part of which includes an overhang region 6a (shown in Figure 3), the entire platform 6 being of shape and size to receive the base portion 2 of the halter bracket 1 in a manner to be described.

The clip 5 also includes hook formations 7,8 by which it may be retained on a correspondingly shaped roofing bar, the hook formation 8 ending in a return lip 9 providing mechanical support for a support leg 10 which supports, in use,

the overhang region 6a of the platform 6.

In Figure 4 the halter bracket 1 is shown fixed to the clip 5 by means of a pair of self-drilling and tapping bolts 11 driven through respective preformed holes 11a in the base portion 2 of the bracket 1. As will be apparent, this step does not need to be undertaken at the actual location of the final fixing of the bracket 1 but may be undertaken elsewhere on site or even at a remote location such as in a factory. This permits precise alignment of the major axis of the head portion 4 of the bracket 1 normal i.e. transverse to the clipping axis of clip 5 so that, as can be seen in Figure 5, the combination bracket 1 and clip 5 can simply be clipped over and onto a conventional roof support bar 12 of generally 'L' section, the hook formations 7,8 on the clip 5 ensuring that it is correctly positioned.

As will be appreciated, the overhang region 6a of the platform 6 provides an area of potential mechanical weakness, but in the embodiment described the return lip 9 of the hook formation 8 provides mechanical support to the support leg 10 and hence the overhang region 6a by engaging a corresponding return lip 13 on the bar 12. This has the further advantage in that a relatively large halter bracket 1 can be used with a relatively narrow support bar 12, which bar 12 may still be sufficiently strong to support the roof structure, thereby providing for reductions in the amount, size and cost of the roofing installation.

CLAIMS

1.

An alignment clip (5) for connection between a standing seam roof panel halter bracket (1) and a roofing support bar (12), the clip comprising hook formations (7, 8 and 9) cooperable with the bar by which the clip may be releasably secured thereto and be slidable therealong, the clip including a platform (6) for receiving a base portion (2) of the bracket, the platform having an overhang region (6a) adapted to, in use, overhang the bar and to which part of the base portion may be secured prior to the clip being secured to the bar.

2.

An alignment clip according to Claim 1 further characterised in being provided with one or more rows of preformed holes (11a) substantially at right angles to the major axis of the roofing support bar when the clip is mounted thereon, an end hole of the or each row permitting attachment of a halter bracket to the clip in the overhang region.

3.

An alignment clip and associated standing seam roof panel halter bracket (1) for connection to a roofing support bar, the clip comprising formations (7, 8 and 9) cooperable with the bar by which the clip may be releasably secured thereto and be slideable therealong, the clip including a platform (6) for receiving a base portion (2) of the bracket, the platform having an overhang region (6a) adapted to, in use, overhang the bar and to which part of the base portion of the halter bracket is secured prior to the clip being secured to the bar.

4.

An alignment clip substantially as hereinbefore described with reference to Figures 2, 3 4 & 5

5.

An alignment clip and associated halter bracket assembly substantially as hereinbefore described with reference to Figures 4 & 5.

6.

An alignment clip, associated halter bracket and roofing bar assembly substantially as hereinbefore described with reference to Figure 5.

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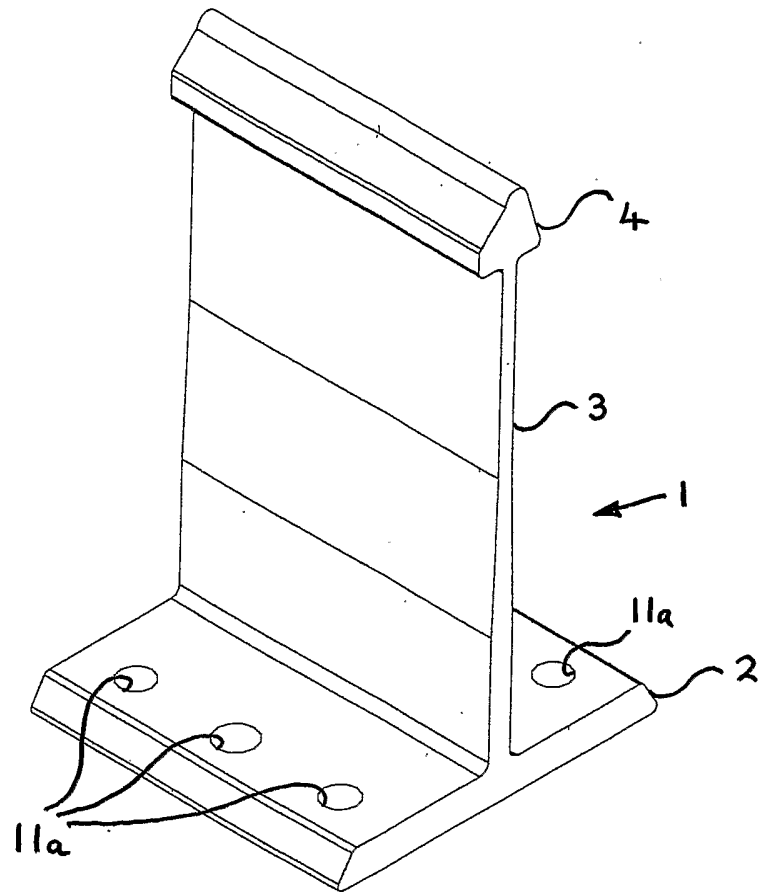


FIGURE 1

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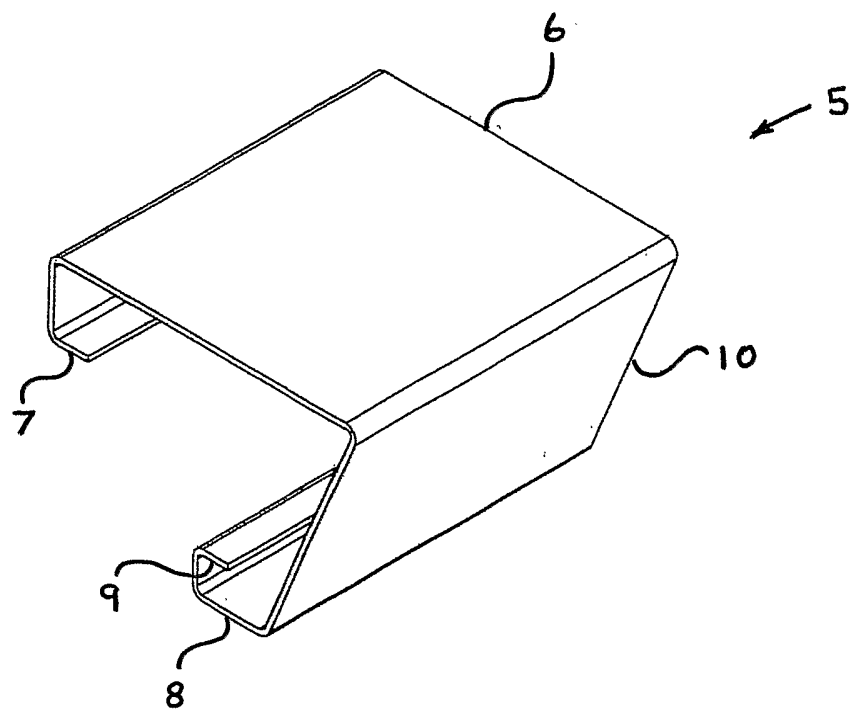


FIGURE 2

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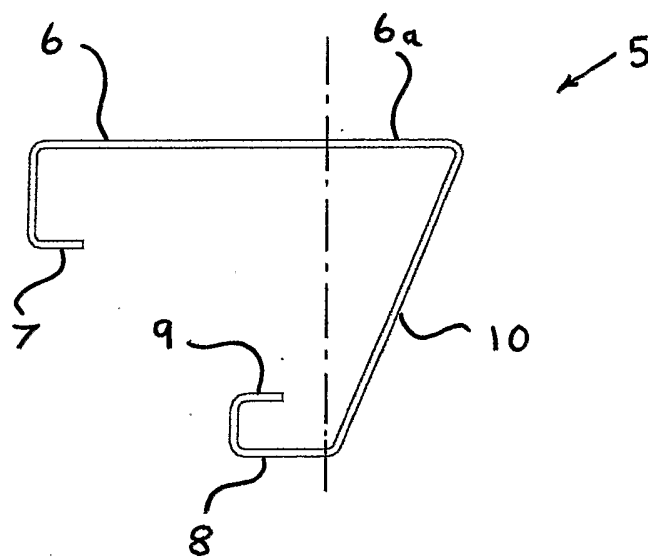


FIGURE 3

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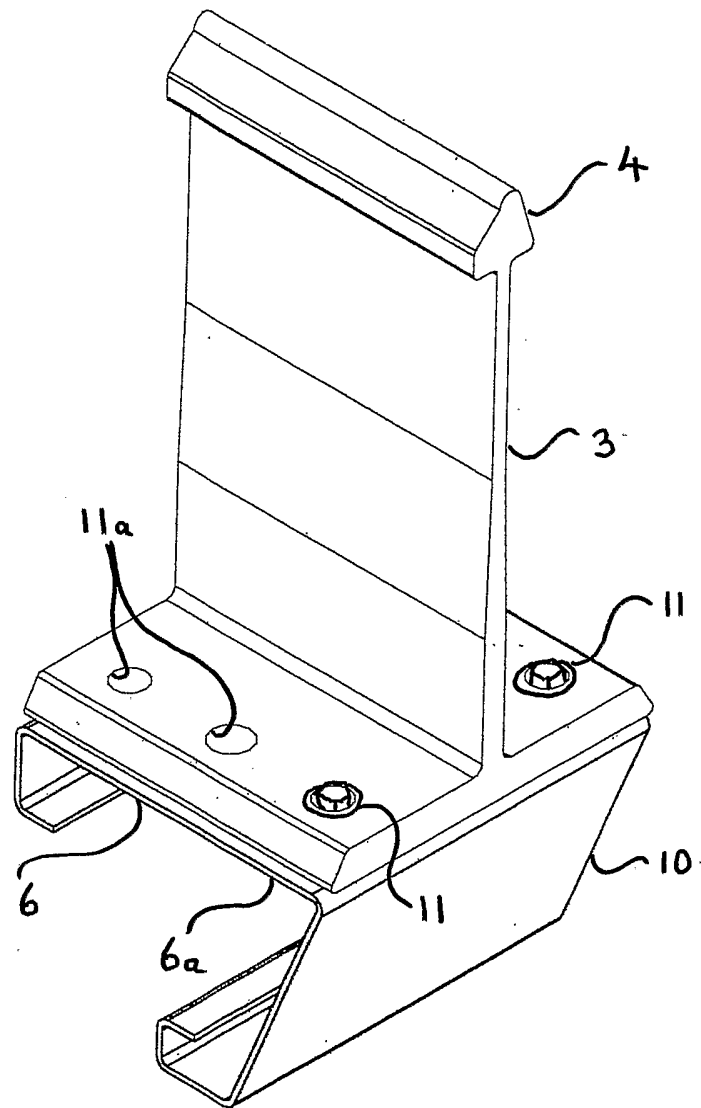


FIGURE 4

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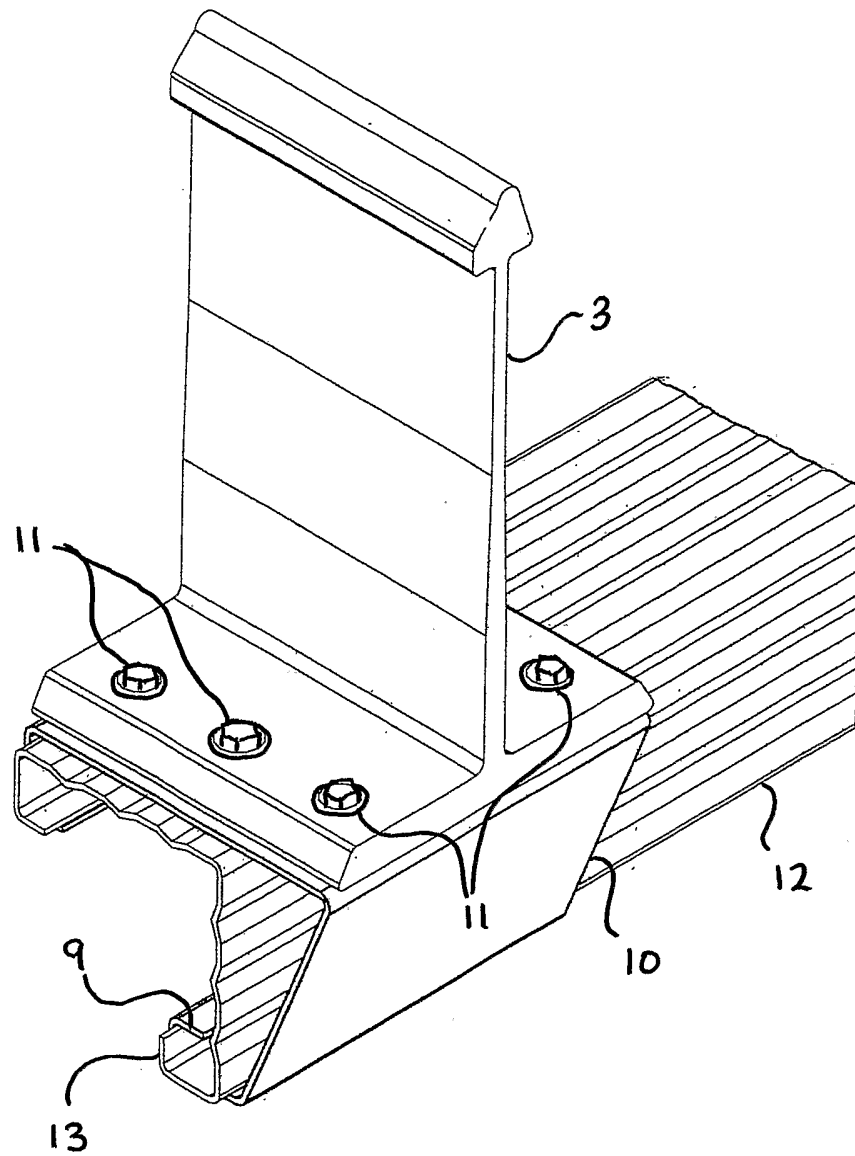


FIGURE 5

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E04D3/362 E04D3/363

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)

IPC 7 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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1 810 287 A (MAHON ET AL.) 16 June 1931 (1931-06-16)	4-6
A	the whole document ---	1-3
X	DE 93 15 037 U (WITTENAUER) 13 October 1994 (1994-10-13)	4-6
A	figures ---	1-3
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INTERNATIONAL SEARCH REPORT

Inter..... Application No

PCT/GB 03/03665

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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Information on patent family members

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