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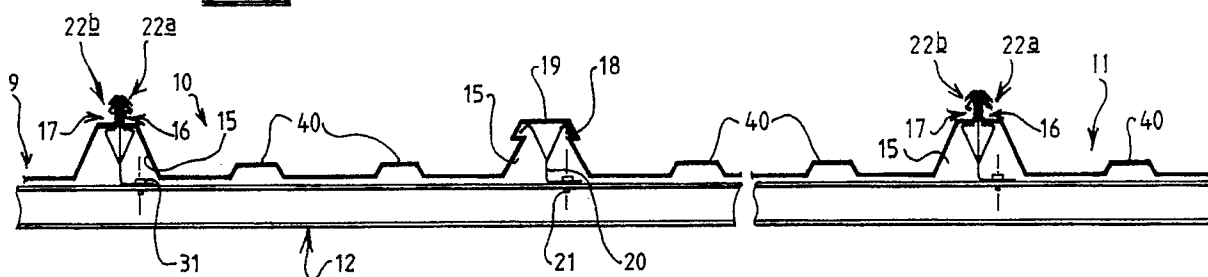
0 421 727 A1

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(57) A sheet cladding system for a roof comprises a plurality of cladding panels 9, 10, 11 which are supported by an underlying support structure comprising a plurality of support members 12. The cladding panels each include a plurality of recesses 15

and, at transverse edges thereof, edge formations 22a, 22b. Clip means 20, 30 are provided by which the panels are secured to the support structure and to one another respectively.

FIG 1**EP 0 421 727 A1**

SHEET CLADDING SYSTEM

This invention relates to a sheet cladding system for a building, and more particularly, but not exclusively, to a sheet cladding system for roofing a building.

Such a sheet cladding system is described in 68 Patent 1350518 in which each cladding panel of the system has a male edge formation along one edge, and a female edge formation along an opposite edge, with ribs which extend generally parallel to the edges between the edges.

The male edge formation of one panel overlaps with a female edge formation on the next panel and clips are provided secured to a support structure such as one or more rafters or other structural members beneath the panels which co-operate with the ribs, or with the overlapped edge formations as appropriate, to secure the cladding panels to the support structure.

On site it is awkward to install panels with overlapping edges in this way and if any of the panels becomes damaged in use and needs to be replaced, it is difficult to disengage the damaged panel from the panels either side with which its edges are lapped.

A similar arrangement having the same disadvantages is disclosed in GB application 2184751.

According to one aspect of the invention we provide a sheet cladding system for a building comprising at least two cladding panels and a support structure, the cladding panels each comprising opposite edges between which there is provided at least one recess, and at least one edge of each of the panels, in use, lying in side-by-side relationship with an edge of another panel, a first clip means which co-operates with the recesses of the panels, a second clip means which co-operates with the side-by-side edges of the panels and the first and second clip means securing the panels to the support structure.

It has been found that such an arrangement provides distinct advantages compared with the prior art arrangements mentioned above. First, because the edges of the cladding panels lie side-by-side rather than in overlapping engagement, installation is considerably facilitated and replacement of any single panel is made easier.

Also, on installation an arrangement in accordance with the invention enables roof lights and other roof devices such as soakers and upstands to be incorporated into the roof with more ease than with the lapping arrangements described.

Further, the panels can be installed in either direction from a start position since the panels are not handed. This can be particularly advantageous where the system must be installed from a start

position between the ends of the finished system.

Because the second clip means engage with each of the adjacent edges, both of the adjacent edges are held securely and efficiently.

With lapping arrangements it is common for clips along the lapped edges to engage only one of the edge formations of the panels, with the other edge being retained solely by its lapping engagement with the held edge.

The recesses of the cladding panels of the present invention may each extend towards the support structure but preferably each extend away from the support structure so that intermediate parts of the panels between the recesses lie adjacent or in engagement with the support structure.

Preferably, the or each recess of each panel is provided with an upstanding rib which extends generally longitudinally of the panel for example in a direction generally parallel to the edges of the panel, although the recess of the panel may comprise a plurality of discrete recesses provided in the panels if desired, with which the first clip means engage.

The support structure may comprise a plurality of support members which underlie the panels, each support member having first and second clip means secured thereto.

The or each recess of each panel may comprise a re-entrant formation with which the first clip means engage, preferably as the cladding panel is moved relatively towards the support structure.

The first clip means may comprise at least one clip, which comprises a pair of limbs which are resiliently biased outwardly away from one another and snap inter-engage into a respective re-entrant formation of a recess.

The edges of the cladding panels which lie adjacent one another may each comprise an edge formation which extends generally away from the support member. Preferably each of the opposite edges of the panels have similar, but oppositely handed edge formations, so that the panels themselves are not handed.

The second clip means may comprise at least one clip which comprises a pair of hooks which extend in opposite directions, one of the hooks engaging over the edge formation of one of the panels to retain the edge formation relative to the support structure to which the clip is secured, and the other of the hooks engaging over the adjacent edge formation of the other panel to retain the other edge formation relative to the support structure to which the clip is secured.

The or each clip of the second clip means may include abutments to engage with the edge forma-

tions of each of the adjacent panels to maintain the hooks in engagement over the edge formations.

To provide weather protection, a capping strip may be provided which clips over and engages with the edge formations of the adjacent cladding panels or the hooks of the or each clip of the second clip means.

The re-entrant formations of the recesses, where the recesses are provided by ribs, may be provided by rolled formations at the crown of the rib and the re-entrant formations thus may extend for the entire length of the rib, or only part of the way therealong as desired.

The or each of the support members may extend transversely, generally perpendicularly to the edges of the panels, although other arrangements are possible.

Where the rib or ribs of each of the panels extend longitudinally, the first clip means may comprise a plurality of clips, engaged with the support structure, to engage in the recesses provided by the rib or ribs at spaced positions along the lengths thereof.

Additionally, the second clip means may comprise a plurality of clips, engaged with the support structure, to engage with the edges of the panels at spaced positions along the panels.

The support structure may comprise a plurality of spaced support members which extend transversely to the edges of the panels.

According to a second aspect of the invention we provide a method of affixing a cladding panel of a sheet cladding system to an underlying support structure wherein the cladding panel has between opposite edges thereof, a recess and the support structure has a clip of a first clip means secured thereto and a pair of clips of a second clip means secured thereto spaced apart along the structure with the clip of the first clip means therebetween, the method comprising engaging one of the edges of the panel with one of the clips of the second clip means so that the one edge is retained by the clip, moving the remainder of the cladding panel towards the structural member so that the clip of the first clip means is engaged in the recess, and engaging a second edge of the panel with the second clip of the second clip means so that the second edge of the panel is retained.

The cladding panel may comprise a panel of a sheet cladding system of the first aspect of the invention.

Hence the clip or clips of the first clip means may be snap interengaged with a re-entrant formation of the recess.

The invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a fragmentary cross-sectional view through three panels of a sheet cladding system

in accordance with the invention.

FIGURE 1a is an enlarged view of part of the system of Figure 1.

FIGURES 2a, 2b are enlarged end and side views respectively of a clip of a first clip means for use in the system of Figure 1.

FIGURES 3a and 3b are enlarged end and side views respectively of a clip of a second clip means for use in the system of Figure 1.

FIGURE 4 is an end illustrative view showing how a panel is installed.

FIGURES 5a and 5b are end and side views respectively of an alternative clip of a first clip means.

Referring to figures 1 to 4 of the drawings, a sheet cladding system for a roof comprises a plurality of cladding panels, three of which are indicated at 9, 10, and 11, which are supported by an underlying support structure comprising a plurality of support members, one of which is indicated at 12, such as rafters which may in one example comprise part of a frame structure of a building.

The rafters 12 may lie generally parallel to one another as in this example, and may be supported on purlins but any other suitable supporting structural arrangement could alternatively be employed.

The cladding panels 9, 10, 11, each comprise a plurality of recesses across their width, which, in this example, are provided by two continuous up-standing ribs 15 which extend generally parallel to opposite edges 16, 17, of the panels 9, 10, and 11 throughout the lengths of the panels. For illustrative purposes, in figure 1, only one rib 15 of panel 10 is shown, but in figure 4, the two troughs 15 of panel 10 are shown.

It will be appreciated that if desired, each panel 9, 10, 11, may have any number of such ribs 15 extending throughout the length thereof as dictated by the width of the panel, and the number of sites or recesses required for anchoring the cladding panels relative to the underlying support structure.

Each rib 15 extends upwardly away from the support member 12, and has a re-entrant formation 18 at a crown 19 of the rib 15, which re-entrant formation 15 receives clips 20 of a first clip means, at spaced positions along the length of the rib 15 and secured to the support members 12.

The clips 20 are secured to their respective support members 12 by a pair of bolts 21 for example, which pass through openings 21a in the clips 20, although the clips 20 could be riveted or otherwise secured as desired.

Each clip 20 is fabricated from a single piece of metal such as steel and has a pair of slits 23 extending downwardly from an upper edge thereof, with the metal between the slits 23 being bent in one direction out of a central plane P1 of the clip 20, to provide a first limb 24, and the metal to

either side of the slits 23 being bent in an opposite direction out of the plane P1 to provide a pair of second limbs 25, each of the limbs 24,25, having an upper edge bent over at about 45° to the limbs 24,25, to provide tails 26 which extend generally away from the plane P1 and the ends of the tails 26 provide abutments 26a. In this example, the included angle between the limbs 24,25, is preferably also about 45°.

The clips 20 also each have a further bend to provide a base flange 27 which extends at about 90° to plane P1, the base flange 27 having the openings 21a for the bolts 21 or other fasteners which secure the clips 20 to the support members 12.

In use, the abutments 26a engage within the re-entrant formations 18 of the ribs 15 to retain the cladding panels 9,10,11 relative to the support member 12. By providing at least some of the support members 12 with a clip for each rib 15 across the widths of the panels 9,10,11, the entire length of the cladding panels 9,10,11 is retained by the clips 20.

Any alternative suitable clip configuration may be used for the clips of the first clip means. For example, an alternative configuration clip is shown in figures 5a and 5b at 20'.

The clip 20' is again made from sheet metal e.g. steel bent to shape, but is generally of channel shape. A base 27' of the channel is provided with a pair of apertures 21a' for fasteners, whereby the clip 20' can be secured to a support member beneath.

Side limbs 24',25' of the channel, each have downwardly folded tails 26' which at their ends, provide abutments 26a' which in use engage within the re-entrant formations 18 of the ribs 15.

The limbs 24',25' of the clips 20', like the limbs 24,25, of the clips 20, exhibit resilience to permit the abutment 26a' to snap interengage in the re-entrant formations 18.

To improve resilience, the side limbs 24',25' may each be slotted as indicated in figure 5b at 23', to provide a plurality, in this example six individual fingers.

Still further alternative clip configurations are possible for the clips of the first clip means. For example, instead of such clips being made of metal, they may be formed in a suitable plastics material such as nylon, in which case the clips may have the form indicated by the dotted lines in figure 5a. In each case, means are provided to secure the clip to a support member, and abutments are provided to interengage within the re-entrant formations 18 of the ribs of the panels.

Referring again to figures 1 to 4, at each of the opposite edges 16,17 of the panels 9,10,11, respective edge formations 22a, 22b are provided,

with the edge formation 22a for edge 16 being identical to edge formation 22b for edge 17 but oppositely handed.

It will be appreciated from figure 1 that the edges 16,17, of adjacent panels 9,10,11 do not overlap but lie alongside and adjacent one another.

The edge formations 22a, 22b each comprise half of a further rib formation 15a, a crown part 19a of which has an upstand 19b which terminates in a hook 19c. The hooks 19c of adjacent edge formations 22a, 22b, extend away from each other.

The edges 16,17, are retained by further clips 30 of a second clip means which are again secured to the support members 12 by bolts 31 or by any other suitable means.

The clips 30 are made from a single piece of metal which is provided with a pair of downwardly extending slits 32, the metal between the slits 32 being bent in one direction out of a central plane P2 of the clip 30 to provide a first hook formation 34, and the metal to either side of the slits 32 being bent out of plane P2 in an opposite direction to provide a pair of second hook formations 33.

At the lower end of the clip 30, there is a further bend to provide a base flange 36 which has openings 31a to receive the bolts 31 or is provided with other securing means.

Also two further pairs of pressed out tongues 37,38, are provided, the tongues of each pair 37,38, being pressed out of plane P2 in opposite directions. The tongues are each formed to a generally triangular shape as can be appreciated from figure 3a. In use, the hooks 34,33, engage over the hooks 19c of the respective edge formations 22a, 22b so that the edges 16,17, of adjacent cladding panels 9,10,11, are retained.

The pressed out tongues 37,38, each provide abutments 39 which engage the underside of the respective crown part 19a of the respective edge formation 22a, 22b, to add rigidity to the connection.

Thus the panels 9,10,11 are each retained by the clips 20 intermediate their edges 16,17, and by the clips 30 at their edges.

A batten cap 40 of generally inverted channel configuration is clipped over the adjacent hooks 19c to provide a joint therebetween and suitable sealant such as a non-setting butyl or other suitable sealant, not shown, is provided within the batten cap to weatherproof the joint.

The batten cap 40 has downwardly and outwardly extending limbs 41 at the lower free ends of which are provided inwardly extending flanges 42 which provide an abutment part for engagement with the hooks 19c to retain the batten cap in position.

To install the panels 9,10,11, the following method is adopted which will be described with

reference to the illustration of figure 4.

First, the various clips 20,30, are secured to the support members 12 of the support structure. With the panel 10 orientated as shown in figure 4, the edge 16 of panel 10 is then secured to the support member 12 by a plurality of the clips 30 which are spaced long the length of the panel 10, by engaging the hook 25 of the edge formation 16 under the hooks 34, of the clips 30. The clips 30 may at this stage also be retaining the edge 17 of adjacent panel 9, although this is not shown in figure 4.

The panel 10 is then moved from the condition in which the panel is spaced from the support member 12 as seen in figure 4, towards the support member 12 so that the clips 20 engage in the troughs 15. It will be appreciated that the limbs 24,25, of each of the clips 20 will exhibit some resilience thus enabling the abutments 26a of the tails 26 to snap interengage into the receiving formations 18 of the troughs 15.

This method may conveniently be achieved by rolling the panel 10 into position i.e. by deforming the panel to a slightly convex shape as indicated in figure 4, and engaging the clips 20 within the troughs 15 across the width of the panels in turn.

Finally, the edge 17 of the panel 11 is retained by clips 30 by engaging the hook 19c of the edge formation 22b under the hook 33 of the clip 30.

The same method could be employed, using the clips 20' of figures 5a and 5b instead of clips 20.

Various modifications may be made without departing from the scope of the invention.

Any desired form of support structure underlying the cladding panels 9,10,11, may be provided, provided that clips 20, (or 20') 30 can be secured thereto.

The cladding panels 9,10,11 shown in the drawings are only examples of configurations of cladding panels which may incorporate the invention. In the example shown, the cladding panels 9,10,11 include intermediate ribs 40 smaller than ribs 18 which each extend parallel to the edges 16,17, and ribs 15 to add rigidity to the panels 9,10,11. These need not be required in an alternative construction, or ribs of different configurations may be provided as desired.

The ribs 15 need not be of the configuration shown, although preferably the ribs 15 each have a re-entrant formation 18 to engage with the clips 20. Instead of extending away from the support member 12, suitably configured ribs may provide recesses which extend towards the member 12 if desired.

Instead of the recesses with which the clips 20 or 20' engage being provided by continuous ribs 15, if desired, a plurality of discrete recesses may

be provided over the areas of the panels 9,10,11, with which the clips 20 or 20' engage. However, it will be appreciated that by providing such recesses by ribs 15, the cladding panels 9,10,11 are more conveniently made, and installation is considerably simplified as alignment of clips with the ribs 15 is simpler.

The clips 20 or 20' which engage in the recesses of the ribs 15 or other recesses may be of alternative configurations provided that the clips 20,20' can co-operate with the respective troughs/other recesses.

The clips 30 may be of alternative configurations to co-operate with the edge formations of the panels 9,10,11, which could also be of alternative configurations.

The clips 20,30, need not each be made from a single piece of metal as described, but could be otherwise fabricated as desired.

Because the edges of the panels 9,10,11 do not overlap, any one panel may be removed in the event of that panel becoming damaged or otherwise requiring replacement more easily than if the edges of the panels were overlapped as with conventional arrangements.

Furthermore, installation of the panels 9,10,11 is considerably simplified using the clips 20,30, as described, and that no perforation of the panels 9,10,11 is required to enable the panels to be securely fixed to the supporting structure beneath.

Also, by clipping the panels at the adjacent side-by-side edges the panels are held very securely by the second clip means whilst between the edges of the panels the engagement of the first clip means with the recesses provides an adequate grip.

The features disclosed in the foregoing description or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, or a class or group of substances or compositions, as appropriate, may, separately or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A sheet cladding system for a building comprising at least two cladding panels and a support structure, the cladding panels each comprising opposite edges between which there is provided at least one recess, and at least one edge of each of the panels, in use, lying in side by side relationship with an edge of another panel, a first clip means which cooperates with the recesses of the panels, a second clip means which cooperates with the

side by side edges of the panels and the first and second clip means securing the panels to the support structure.

2. A sheet cladding system according to Claim 1 in which the recesses of the cladding panels each extend away from the support structure so that intermediate parts of the panels between the recesses lie adjacent or in engagement with the support structure.

3. A sheet cladding system according to Claim 1 or Claim 2 in which the or each recess of each panel is provided with an upstanding rib which extends generally longitudinally of the panel.

4. A sheet cladding system according to any one of the preceding claims in which the support structure comprises a plurality of support members which underlie the panels, each support member having the first and second clip means secured thereto.

5. A sheet cladding system according to any one of the preceding claims in which the or each recess of each panel comprises a re-entrant formation with which the first clip means engage.

6. A sheet cladding system according to Claim 5 in which the first clip means engages with the re-entrant formation as the cladding panel is moved relatively towards the support structure.

7. A sheet cladding system according to any one of the preceding claims in which the first clip means comprises at least one clip, which comprises a pair of limbs which are resiliently biased outwardly away from one another and snap inter-engage into a respective re-entrant formation of a recess.

8. A sheet cladding system according to any one of the preceding claims in which the edges of the cladding panels which lie adjacent one another each comprise an edge formation and each of the opposite edges of the panel have similar, but oppositely handed edge formations, so that the panels themselves are not handed.

9. A sheet cladding system according to Claim 8 in which the second clip means comprises at least one clip which comprises a pair of hooks which extend in opposite directions, one of the hooks engaging over an edge formation of one of the panels to retain the edge formation relative to the support structure to which the clip is secured, and the other of the hooks engaging over the adjacent edge formation of the other panel to retain the other edge formation relative to the support structure to which the clip is secured.

10. A sheet cladding system according to Claim 9 in which the or each clip of the second clip means includes abutments to engage with the edge formations of each of the adjacent panels to maintain the hooks in engagement over the edge formations.

11. A sheet cladding system according to any one

of claims 8 to 10 in which a capping strip is provided which clips over and engages with the edge formations of the adjacent cladding panels or the hooks of the or each clip of the second clip means.

12. A method of affixing a cladding panel of a sheet cladding system to an underlying support structure wherein the cladding panel has between opposite edges thereof a recess and the support structure has a clip of a first clip means secured thereto and a pair of clips of a second clip means secured thereto spaced apart along the structure with the clip of the first clip means therebetween, the method comprising engaging one of the edges of the panel with one of the clips of the second clip means so that the one edge is retained by the clip, moving the remainder of the cladding panel towards the structural member so that the clip of the first clip means is engaged in the recess, and engaging a second edge of the panel with the second clip of the second clip means so that the second edge of the panel is retained.

FIG 1

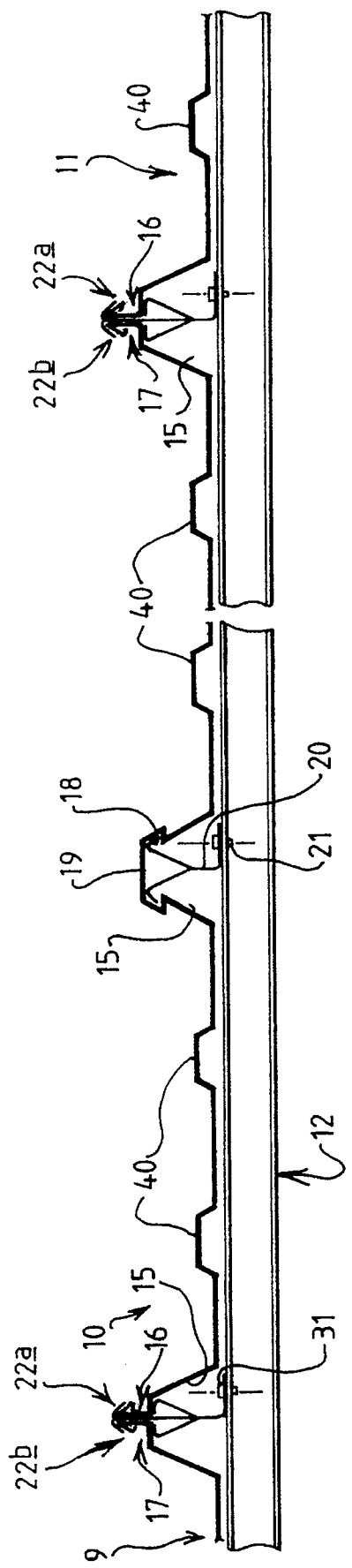


FIG 1a

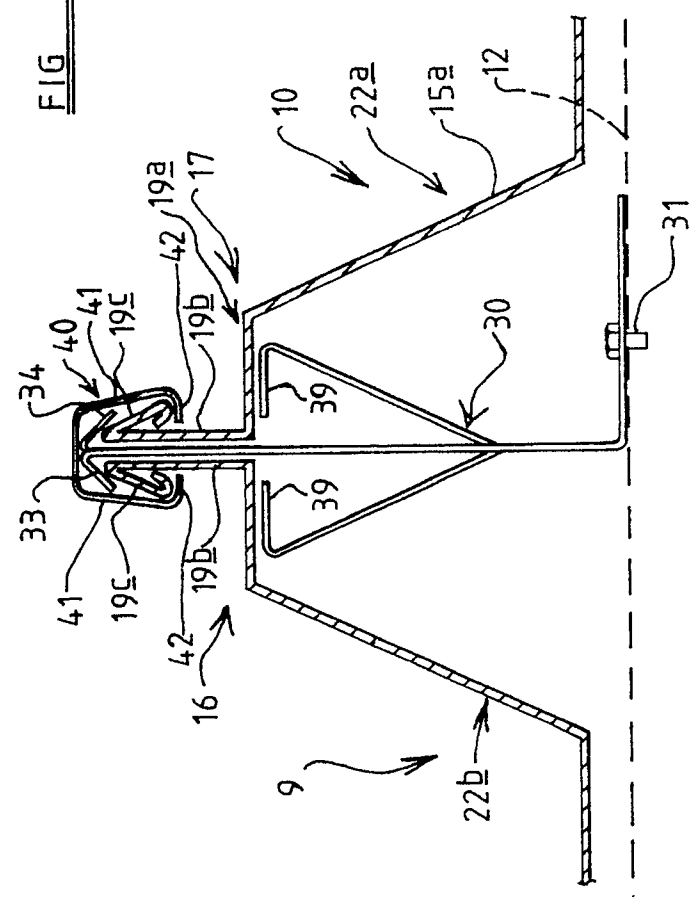


FIG 2a

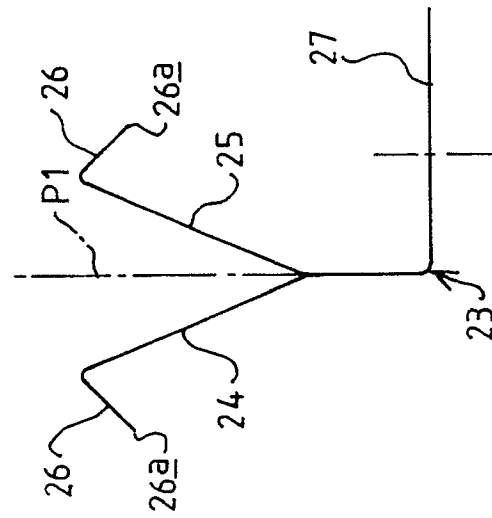


FIG 2b

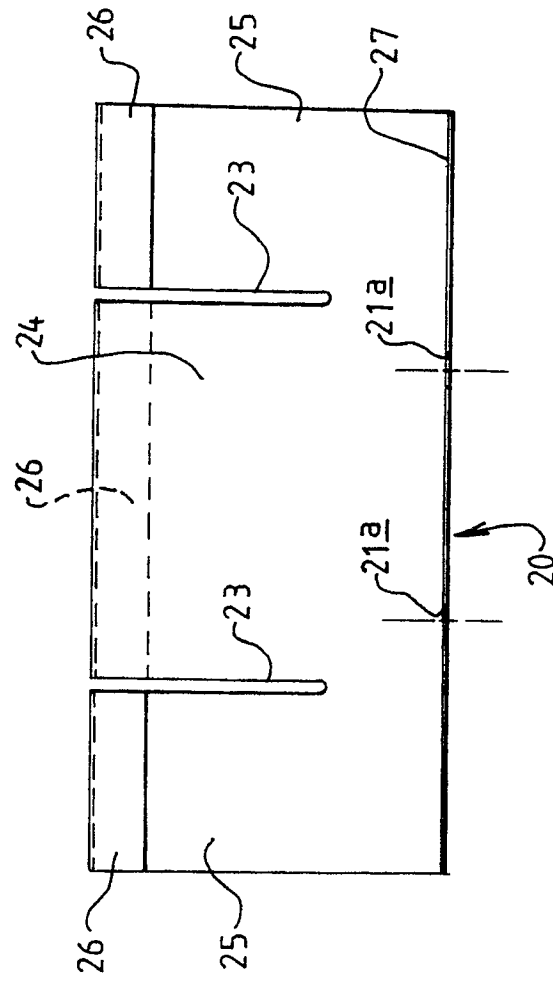


FIG 3b

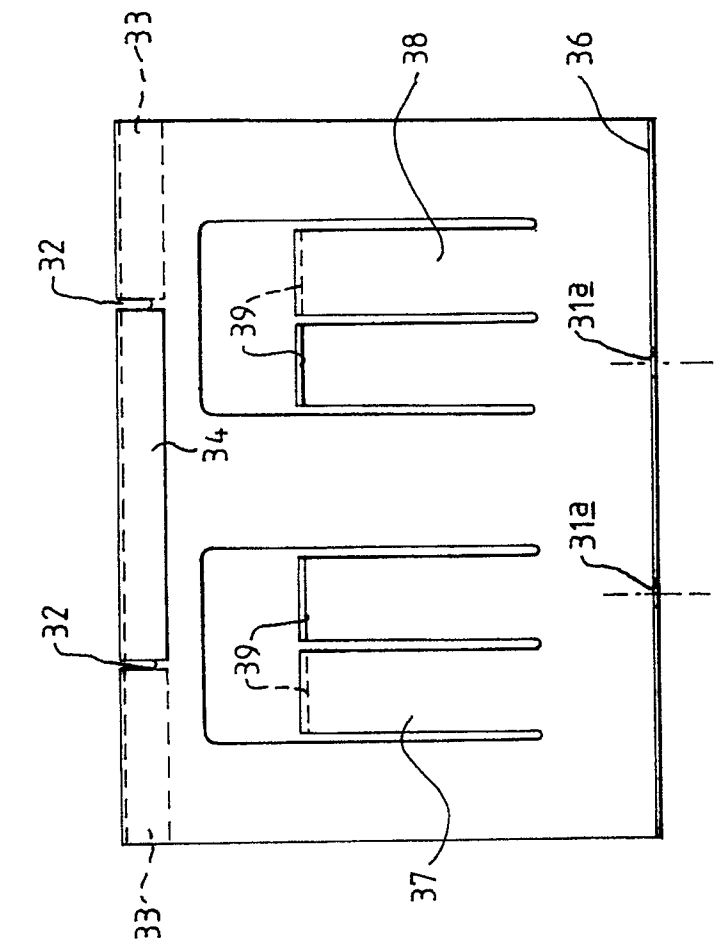
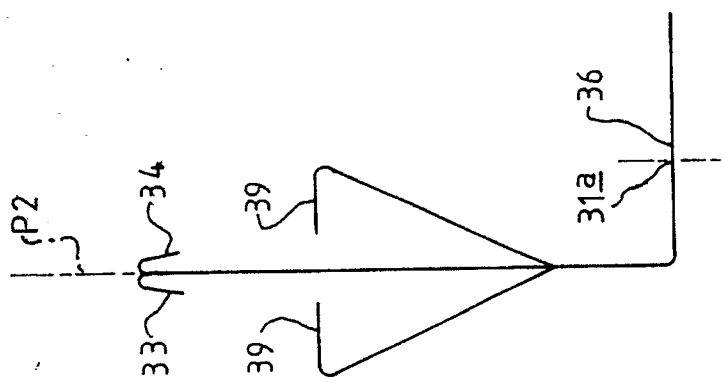


FIG 3a



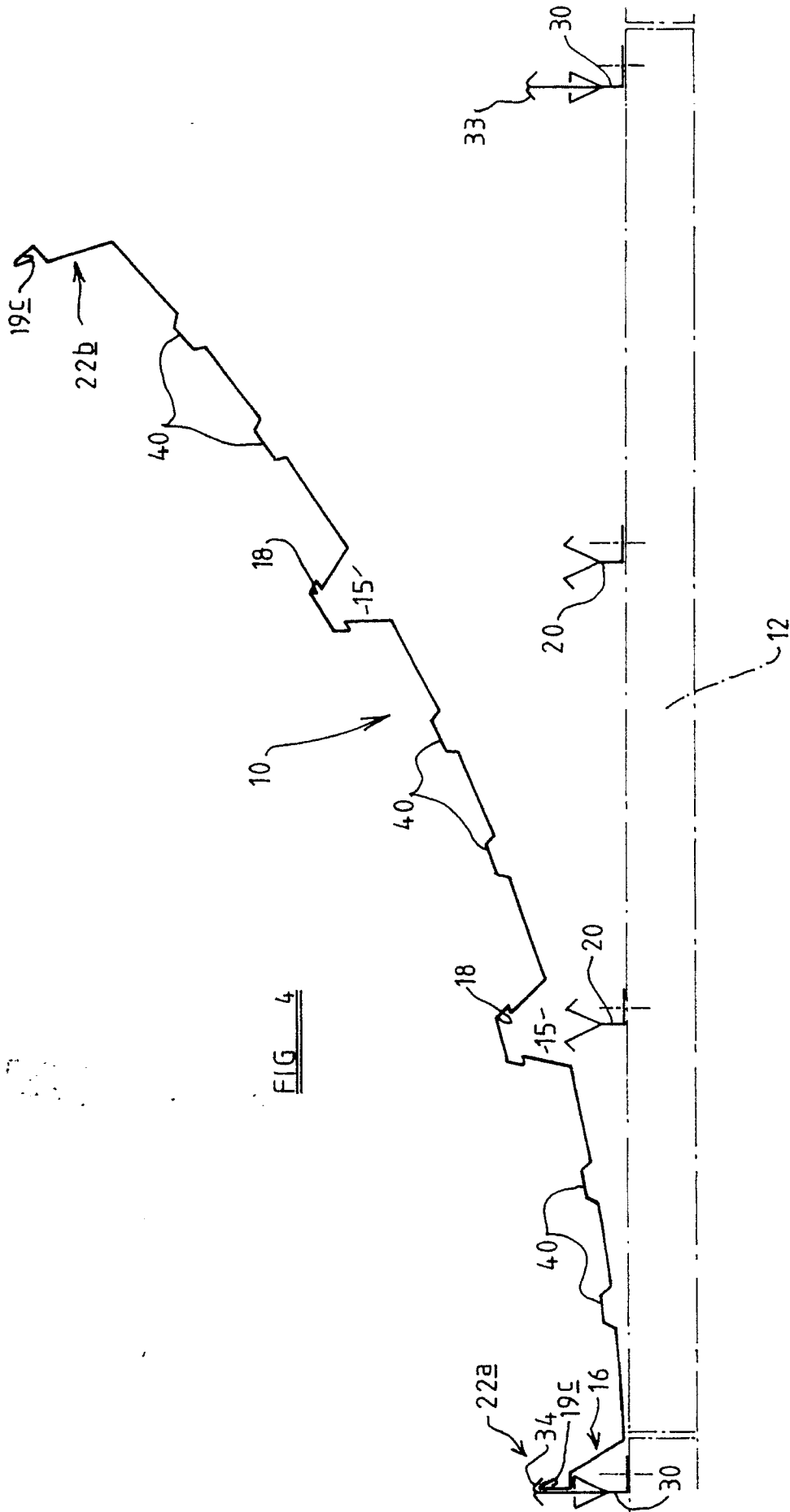
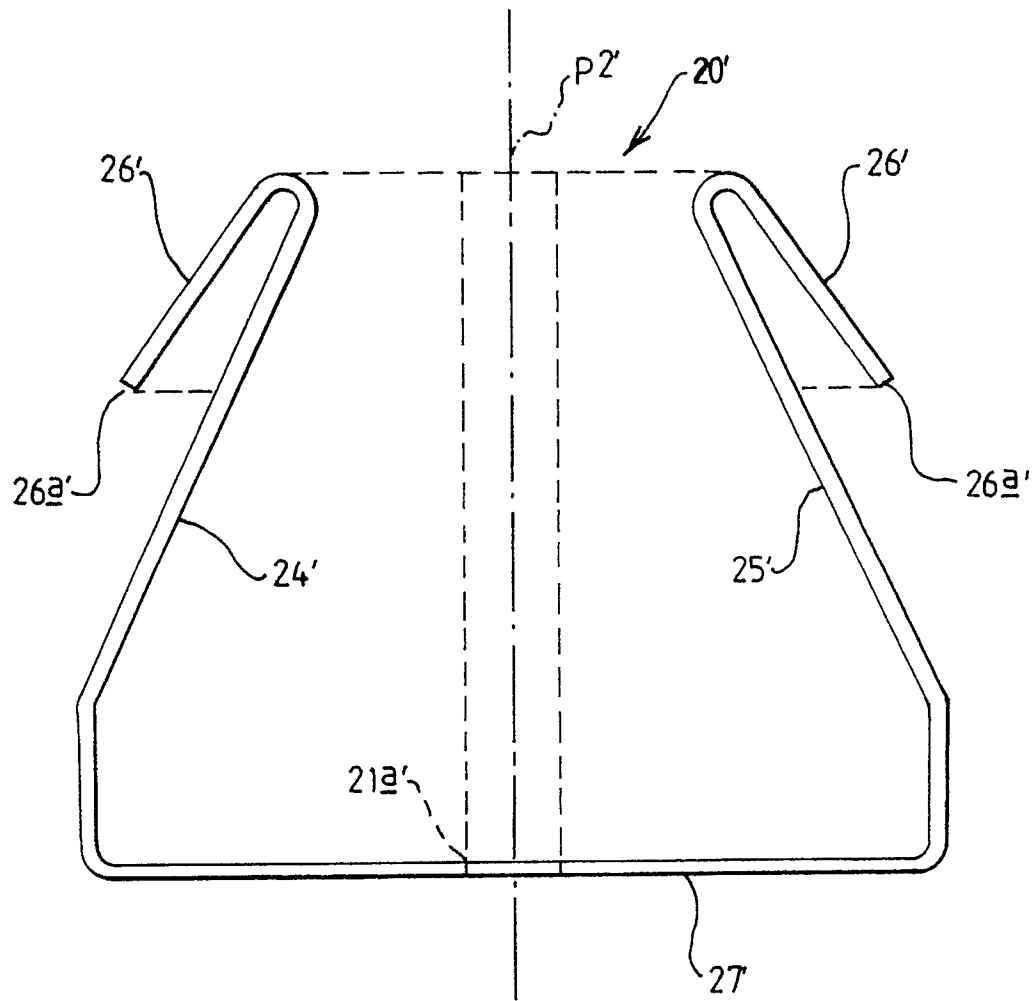


FIG 5a



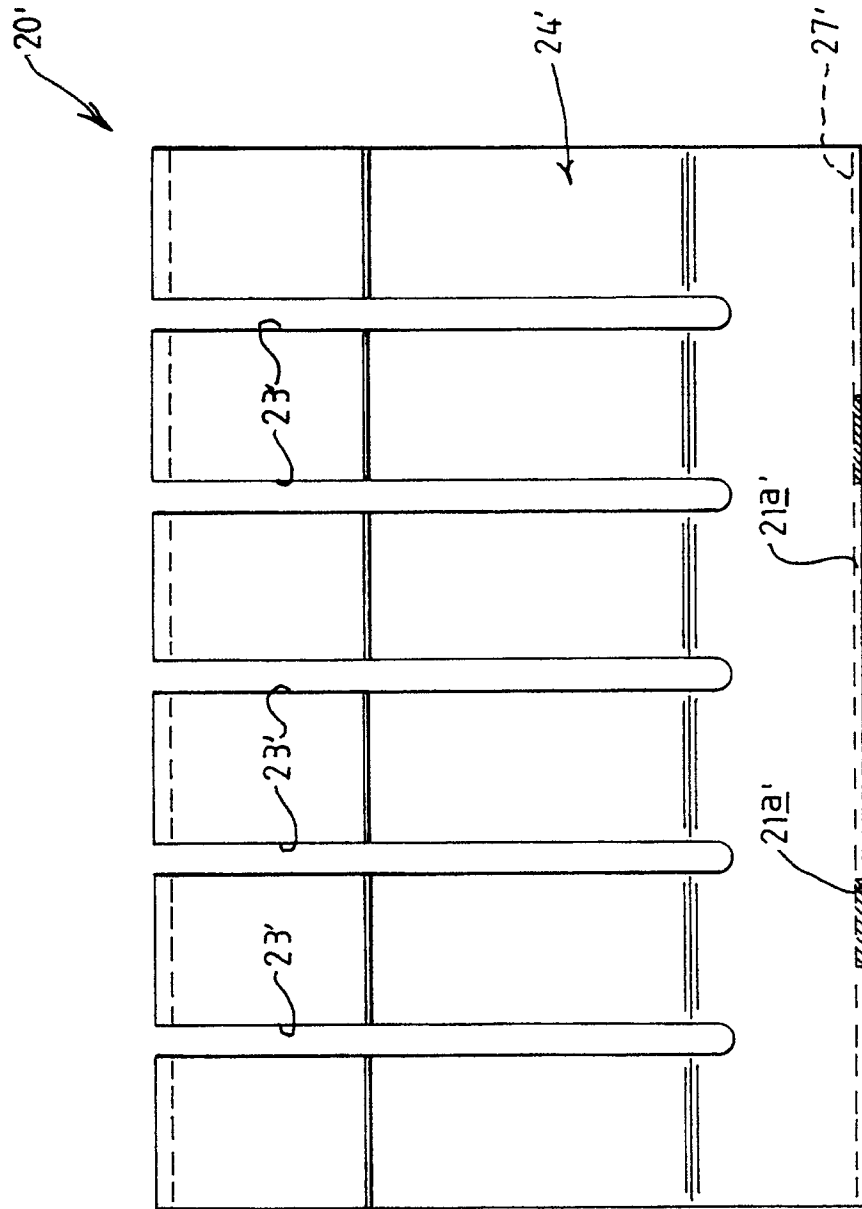


FIG 5b



EUROPEAN SEARCH
REPORT

EP 90 31 0769

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	US-A-3 708 943 (THOMAS et al.) * Column 4, lines 1-49; column 5, lines 19-52; figures 4-7,14,15 * - - - -	1-12	E 04 D 3/30 E 04 D 3/36
Y	EP-A-0 271 246 (S.J. SEEFF) * Claims 1-4; figure * - - - -	1-12	
A	FR-A-2 220 645 (G.E. PROST) * Claim 1; figures 1,2 * - - - -	1,2	
A	US-A-4 406 106 (K.N. DINGES) * Abstract; figure 3 * - - - -	1,7	
A	US-A-2 585 760 (J. FURRER) * Figure 1 * - - - -	1,6	
A	US-A-4 446 665 (BERGER) * Abstract; figure 1 * - - - -	1,8,9,12	
A	US-A-4 366 656 (SIMPSON) * Figures 1,2,6 * - - - - -	1,9,12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5) E 04 D E 04 F F 16 B
Place of search The Hague		Date of completion of search 04 December 90	Examiner RIGHETTI R.
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document			