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(71) Applicant(s)

Eurolyte Limited

(Incorporated in the United Kingdom)

**Unit 14, The Sidings, Whalley, NEAR BLACKBURN,
Lancashire, BB6 9SE, United Kingdom**

(72) Inventor(s)

Paul Pelham

(74) Agent and/or Address for Service

**Wilson, Gunn & Ellis
41-51 Royal Exchange, Cross Street, MANCHESTER,
M2 7BD, United Kingdom**

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EP 0054856 A1 EP 0050462 A1**

(58) Field of Search

**UK CL (Edition L) E1D DCF DLEHW DLEQWCV
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(54) Roof or wall panel

(57) An interlocking member, particularly for a roof, comprises upper and lower regions (12, 17) connected by interconnecting struts (15, 16, 18). Interengaging means e.g. (11) are disposed along lateral edges of the member such that in use an interengaging means of one member interengages with an adjacent member. The interengaging means are integrally formed with the member, which may be extruded and passed through a heated calibrator.

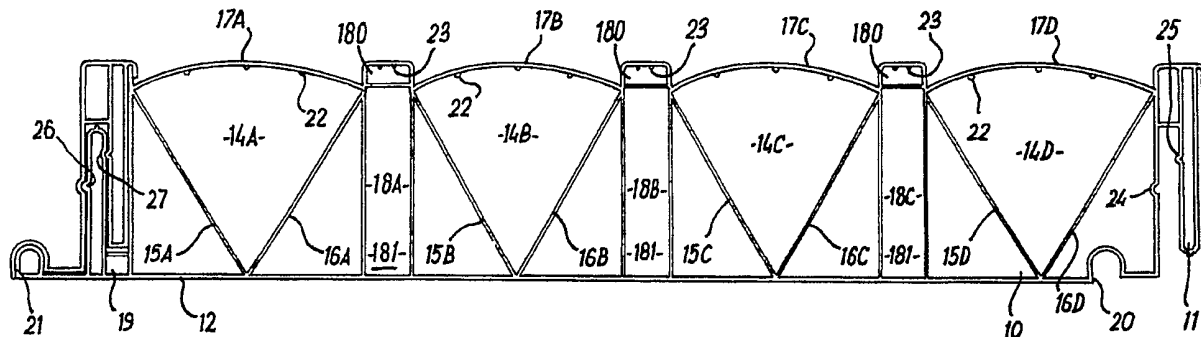


FIG. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

FIG. 1

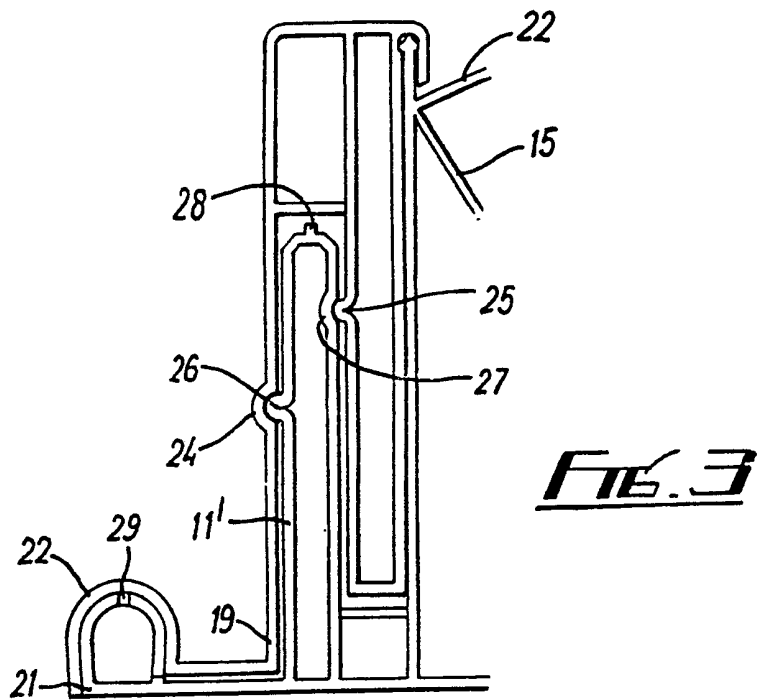
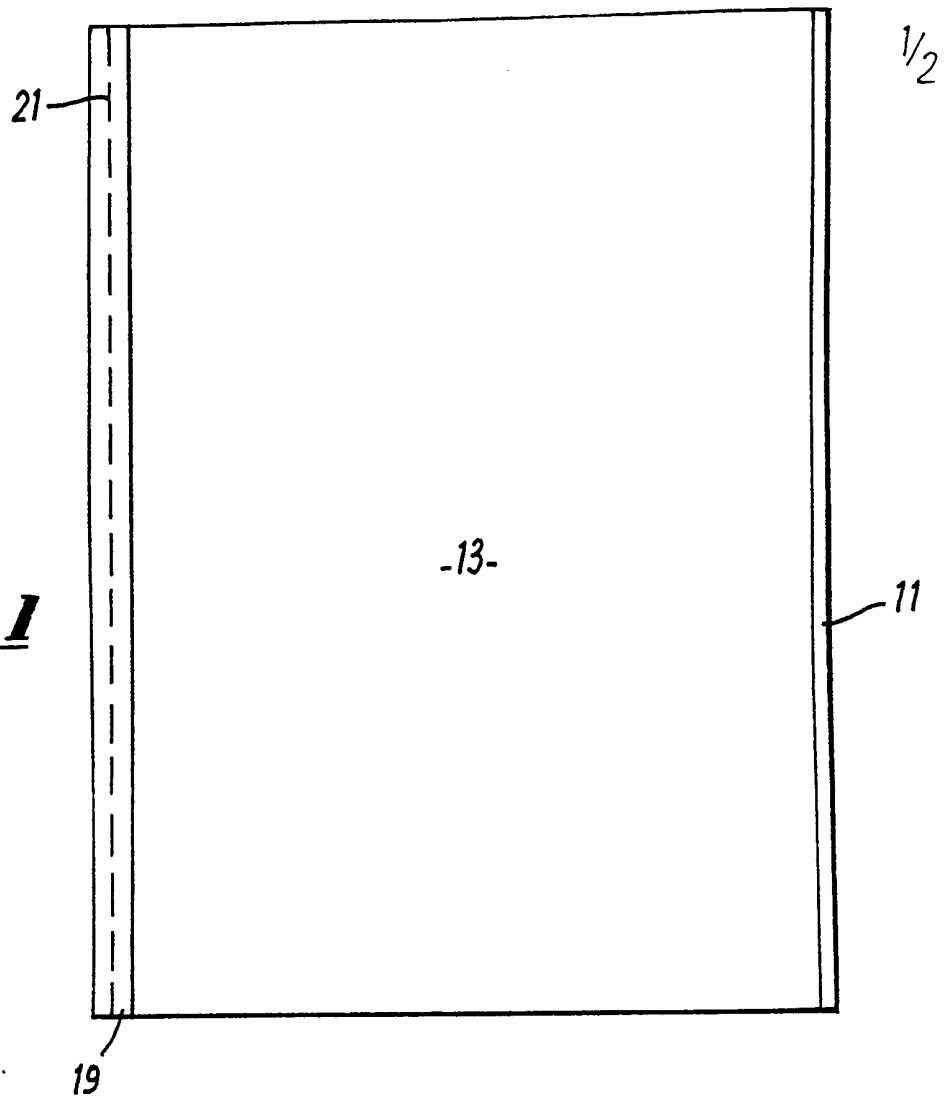


FIG. 3

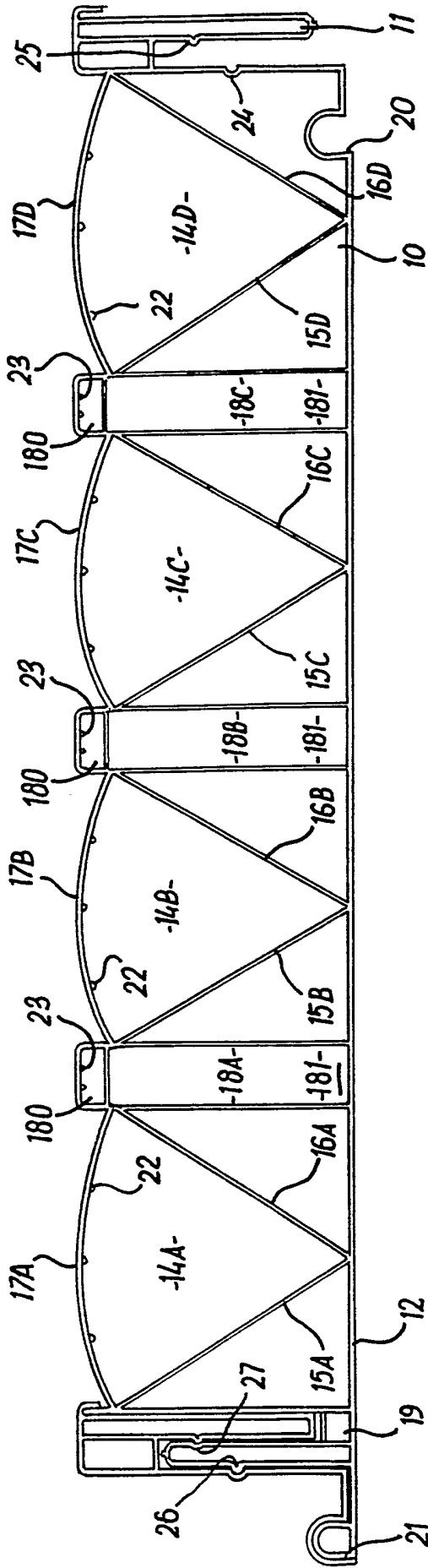


FIG. 2

AN - INTERLOCKING - MEMBER

This invention relates to an interlocking member which in particular may be used as a roof member but may also be used as a wall board. The member may be employed as a roof member when transparent or translucent and as a wall board when opaque; for example when filled with polystyrene.

In general roofs have been formed either from tiles supported on a frame or from corrugated members. The latter have often been formed from synthetic plastics but were also formed from Asbestos. However, this is now less common. The corrugated type of roof member has been used on garden sheds, garages, conservatories, greenhouses, stores, factories and the like.

An example of this latter type of roof member is a polycarbonate sheet usually comprising three sheets lying substantially parallel to one another. The ends of this type of panel were sealed so as to provide upper and lower envelopes of trapped air. These roof panels were not able to be screwed into place but had to be glazed as in effect they had to "float". If they were screwed water could penetrate through the roof panel.

Furthermore, these type of roof panels were limited

in length because of thermal expansion. There was a trade off between the strength of a panel and an inevitable increase in its length in the summer. Thus, although generally successful these roof panels suffered from the limitations imposed by thermal expansion.

They also suffered from other disadvantages which chiefly move as a result of the inadequate method of joining panels together.

Although relatively simple to install and cheap to manufacture the aforementioned roof panel has suffered from a variety of problems.

Firstly, at overlapping edges of adjacent roof panels water was able to seep between touching surfaces by way of capillary action and thereby enter into what otherwise was supposed to be a dry environment;

secondly, screws extending through a roof panel sometimes allowed leakage, even though they were covered with a cap. This is because water was able to enter between adjacent surfaces, for example by capillary action; pass through the lower member, around a threaded portion of the screw and into what should otherwise have been a dry environment. Of course if

there has been damage to an upper member then water was able to seep through this damage to the screw and pass through the lower member around the threaded portion of the screw. As a result of capillary action water damage can occur to an upper portion of a roof which may be lying adjacent a house. This was clearly undesirable; and

thirdly, water seeping between adjacent panels of a roof, for example, because of the inferior method of connecting adjacent panels, could enable algae growth to accumulate. This was not only unsightly but also limited the current amount of sunlight which was able to pass through the transparent roof panel.

Furthermore large sections of roof members have tended to sag under their own weight. This problem has been compounded when for example there has been snow on the roof. The fact that a roof has tended to sag has increased the amount of stress applied to fixing means attaching the roof member to a roof batten or joist and also has tended to stress the roof member.

To some extent this problem has been alleviated by the insertion of strengthening members which were inserted into a cavity in the roof panel. These members

were intended to be load bearing and often consisted of aluminium or steel struts. However, a disadvantage of this technique was that they increased cost; had to be cut to the specific length of a roof panel and were not always inserted when really required. Sometimes the strengthening strut was inserted into a roof panel along a channel which defined part of an engagement mechanism. In this latter respect the strut also helped to lock adjacent panels together. If the strut was forgotten or was removed, there was a risk that adjacent roof panels pulled apart.

According to a first aspect of the present invention there is provided a roof member having an upper region and a lower region, the upper region being connected to the lower region by way of a plurality of interconnecting struts; and interengaging means disposed along lateral edges of said roof member such that in use an interengaging means of one member is arranged to interengage with an adjacent roof member characterised in that the interengaging means was formed integrally with a roof member.

According to a second aspect of the present invention there is provided a roof member having an upper region and a lower region, the upper region being

connected to the lower region by way of a plurality of interconnecting struts; and interengaging means disposed along lateral edges of said roof member such that in use an interengaging means of one member is arranged to interengage with an adjacent roof member characterised in that strengthening struts are formed integrally within the roof member.

Preferably the struts are planar and extend along substantially the whole length of a roof member so as to define separate compartments within the roof member. The struts which are flat sheets are joined along axial region. Selected struts may be angled with respect to a lower portion of the member so as to define a series of prismatic sections. Strengthening ribs may be provided along one or more selected surfaces of a planar strut so as to impart additional strength and to prevent twisting of the strut in use and to promote deflection in a particular strut in a particular direction.

Preferably selected prismatic sections are triangular in cross section. Preferably substantially equilateral triangular prismatic sections are formed between two supporting struts disposed substantially as 60° to one another to the lower portion of the roof member, and a third planar strut defined by a curved

portion of an upper region of the roof member. The supporting struts are preferably relatively planar; whereas the third surface of the equilateral prismatic section, formed by the upper roof region, is gently curved so as to deflect water.

Furthermore the fact that the upper portion, defining one plane of the prismatic section is curved, enables it to expand and contract easier than the associated other two supporting struts and is arranged to deflect when the roof member expands, thus forces generated during expansion are directed to the upper curved surfaces and the roof member per se remains generally unbuckled. This expansion and contraction which occurs during temperature extremes is taken up by the curved portion as it bows up and down increasing and reducing its radius of curvature respectively. The advantage of this feature will be readily appreciated in larger roof members which may have been fitted in, for example, relatively cool weather and which would have buckled in hot weather. Conversely large roof members which were fitted in hot weather have tended to be stretched and torn when they contracted in very cold weather. The present invention limits these drawbacks because it is able to take up any expansion as a result of the unique relationship between its upper and lower

surfaces and the interconnecting support struts.

Between adjacent prismatic members a generally rectangular box structure is disposed. This helps prevent twisting about a longitudinal axis.

According to a third aspect of the present invention there is provided a roof member comprising a plurality of cells, each cell having a contoured section, the cells lying adjacent one another, and interengaging means being provided along at least one edge so as to permit adjacent roof members to be demountably connected together characterised in that the interengaging means is formed integrally with the roof member.

Preferably the interengaging means is formed along the complete length of a roof member and along two separate edges thereof. Individual cell units may comprise triangular support struts sandwiched between interposed cells. Interposed cells are generally box-like rectangular structures.

Preferably the box-like interposed cells define castellations along an upper surface of the roof member. A separate skin is provided between the upper surface

of the castellation and the lower surface of the roof member. These enable screws or nails to be driven through this region of the roof, as will be described below.

Engaging means preferably comprise male and female members. Sympathetic grooves and raised portions may be formed in male and female members respectively, so as to enhance interengagement. The male and female members and grooves and raised portions are preferably formed integrally with the roof member. The roof member is formed by extrusion.

It will be appreciated that in one embodiment of the invention the thickness of the struts is approximately 1 to 2mm; whereas the distance between upper and lower surfaces of the member is of the order of 70mm and the width of a single member or plank is of the order of 400mm. Such an extrusion is extremely difficult to achieve in lengths of several metres whilst maintaining a constant profile and strut thickness.

Considerable experimentation was required to achieve a process whereby consistent cross-sections could be achieved and repeated. Eventually a new process was developed so as to enable the extrusion to

be drawn without the structure collapsing and being deformed during the drawing of the extrusion whilst hot.

According to a fifth aspect of the present invention there is provided a process comprising the steps of extruding a device; passing the device to a calibrator which is heated; imparting a force to specific areas of a surface of the device and then allowing the device to cool at a predetermined temperature. Preferably the force is imparted by subjecting the area to a pressure differential. For example, this may be achieved by drawing a vacuum, or partial vacuum, on one surface of the device. Heating of the calibrator may be achieved by pouring a relatively warm fluid therethrough. The fluid may be water and is preferably maintained at a temperature of between 30°C to 50°C, most preferably the water is 39°C.

According to a sixth aspect of the present invention there is provided a roof member comprising an upper portion and a lower portion so as to define a structure at least a portion of which structure is hollow.

An advantage of this aspect of the invention is that air is trapped in hollow regions of the roof member.

This air, as it is trapped, tends to form an insulating layer. Also because hollow sections pass along the length of roof member it will be appreciated that battens may be placed through the roof member so as to support it. The steps described in the abovementioned process enable this form to be extruded as well as permitting intricate shaped interengaging means to be formed.

According to a further aspect of the present invention there is provided a roof member having a hollow region for receiving a supporting batten and which hollow member is separate from adjacent cavities such that a screw may pass through the hollow region and through the batten.

Thus the advantages of the invention are multifarious. The roof member overcomes many existing problems and in particular because of the male/female interengagement members and adjacent air spaces, no water may pass by capillary action or otherwise, through the roof member. This aspect is enhanced by the fact that individual struts define a plurality of discrete cavities. Each cavity can act as a separate drainage channel.

A cover is provided along one edge of a roof member, adjacent the male interengaging member and formed integrally therewith. The cover is arranged to clip over an associated ridge formed in a female member in an adjacent roof member which (when connected to the male interengaging member of the first mentioned roof member). This cover creates a flap or tag which defines a U-shaped groove for clipping over a raised ridge, which is formed integrally with the respective engaging portion of an adjacent roof member. This provides further protection against the egression of water.

According to a yet further aspect of the present invention there is provided a roof member having means for engaging corresponding means of an adjacent roof member, the means for engaging being dimensioned and arranged to substantially encase an attachment means, which attachment means, in use, attaches the roof member to a support.

The support may be a joist or batten. The attachment means may be a screw or nail.

Preferably the engaging means of a roof member is adapted to engage a corresponding engagement means and encase the attachment means. Upper portions of the

equilateral triangular prismatic section may also have strengthening ribs.

A preferred embodiment of the present invention will now be described, by way of an example only, and with reference to the figures in which:-

Figure 1 is a plan view of a roof member;

Figure 2 is an end view of a roof member; and

Figure 3 is a detailed end view of two interengaging means

A roof member 10 has an elongate male portion 11 formed integrally therewith. The roof member 10 comprises an extruded section having a relatively flat planar lower surface 12 and an undulating upper surface 13. The roof member 10 may be visualised as comprising four individual cells 14A, 14B, 14C and 14D. Each cell 14 comprises a prismatic section which is generally in the form of an equilateral triangle. Each prismatic section comprises two relatively flat planar struts 15 and 16 and a relatively curved strut 17. Interposed between adjacent cells 14 are box-like sections 18. These box-like sections 18 help impart strength to the

member and prevent twisting about its longitudinal axis. The box-like sections 18 have a castellated upper profile and a separate upper box section 180 and a lower box section 181.

Along an opposite edge in which a male engaging member 11 is formed there is a female engaging member 19. These are shown in greater detail in figure 3. A recess 20 is also formed which engages with a corresponding insert 21. Ribs 22 are formed in the upper curved portions 17. These help impart longitudinal strength to the structure and direct the forces caused by thermal expansion so that the upper curved surface deflects. Similarly ribs 23 are formed in the upper portions of the box like structure 18, but because these ribs 23 are formed in relatively short flat sections of the castellations they tend not to give rise to any bending.

Locating portions 24 and 25 are formed in and adjacent the male engagement member 11. Respective engagement portions 26 and 27 are formed along the length of the female engagement member 19, but in the opposite edge of the roof member to that of the male engaging member.

Portion 27 receives portion 25 and portion 24 receives portion 26. Similarly portion 21 is inserted into recess 22 so as to ensure permanent gripping therebetween. A rib 28 passes along male member 11'. This helps to prevent water from seeping over and around the roof member and keeps the roof watertight. A ribbed portion 29 is provided along the length of recess 22.

The friction generated between touching surfaces helps to provide an extremely efficient method of bonding two adjacent roof members together.

It will be appreciated that variation to the exact shape may be made without departing from the scope of the invention. Furthermore it will be appreciated that although reference to a roof member has been made the particular structure described could be used as a wall covering or even as a building material for greenhouses or temporary buildings. When filled with a suitable filler. Also an end adaptor or invert trap may be fitted so as to seal the end regions of the roof member.

CLAIMS

1. A member having an upper region and a lower region, the upper region being connected to the lower region by way of a plurality of interconnecting struts; and interengaging means disposed along lateral edges of said member such that in use an interengaging means of one member is arranged to interengage with an adjacent member characterised in that the interengaging means was formed integrally with a member.

2. A member having an upper region and a lower region, the upper region being connected to the lower region by way of a plurality of interconnecting struts; and interengaging means disposed along lateral edges of said member such that in use an interengaging means of one member is arranged to interengage with an adjacent member characterised in that strengthening struts are formed integrally within the member.

3. A member according to claim 2 wherein the struts are planar and extend along substantially the whole length of a member so as to define separate compartments within the member.

4. A member according to claim 2 or claim 3 wherein one

or more of said struts is angled with respect to a lower portion of the member so as to define one or more prismatic sections.

5. A member according to any of claims 2, 3 or 4 wherein strengthening ribs are provided along one or more selected surfaces of a planar strut.

6. A member according to claim 4 wherein one or more of said prismatic section is triangular in cross section.

7. A member according to any preceding claim wherein substantially equilateral triangular prismatic sections are formed between two supporting struts disposed substantially at 60° to one another to the lower portion of the member, and a third planar strut defined by a curved portion of an upper region of the member.

8. A member as claimed in claim 7 wherein the supporting struts are relatively planar and the third surface of the equilateral prismatic section formed by the upper region is gently curved.

9. A member as claimed in any of claims 4 to 8 wherein a generally rectangular box structure is disposed between

adjacent prismatic sections.

10. A member comprising a plurality of cells, each cell having a contoured section, the cells lying adjacent one another, and interengaging means being provided along at least one edge so as to permit adjacent members to be demountably connected together characterised in that the interengaging means is formed integrally with the member.

11. A member as claimed in claim 10 wherein the interengaging means is formed along the complete length of member and along two separate edges thereof.

12. A member as claimed in claim 10 or 11 wherein individual cell units comprise triangular support struts sandwiched between interposed cells.

13. A member as claimed in claim 12 wherein the interposed cells are generally box-like rectangular structures.

14. A member as claimed in claim 12 or 13 wherein the interposed cells define castellations along an upper surface of the member.

15. A member as claimed in claim 14 wherein a separate skin is provided between the upper surface of the castellation and the lower surface of the member.

16. A member as claimed in any preceding claim wherein said interengaging means comprise male and female members.

17. A member as claimed in any preceding claim wherein said member is formed by extrusion.

18. A member according to any preceding claim wherein said member is a roof member.

19. A process comprising the steps of extruding a device; passing the device to a calibrator which is heated; imparting a force to specific areas of a surface of the device and then allowing the device to cool at a predetermined temperature.

20. A process as claimed in claim 19 wherein the force is imparted by subjecting the area to a pressure differential.

21. A process as claimed in claim 20 wherein the pressure differential is achieved by drawing a vacuum or

partial vacuum on one surface of the device.

22. A process according to any preceding claim wherein heating of the calibrator is achieved by pouring a relatively warm fluid therethrough.

23. A process as claimed in claim 22 wherein the fluid is water and is maintained at a temperature between 30°C and 50°C.

24. A roof member comprising an upper portion and a lower portion so as to define a structure at least a portion of which structure is hollow.

25. A roof member having a hollow region for receiving a supporting batten and which hollow member is separate from adjacent cavities such that a screw may pass through the hollow region and through the batten.

26. A member as claimed in any preceding claim wherein a cover is provided along one edge of the member adjacent a male interengaging member and formed integrally therewith.

27. A member as claimed in claim 25 wherein the cover is arranged in use to clip over an associated ridge formed

in a female member in an adjacent member.

28. A roof member having means for engaging corresponding means of an adjacent roof member, the means for engaging being dimensioned and arranged to substantially encase an attachment means, which attachment means, in use, attaches the roof member to a support.

29. A roof member according to claim 27 wherein the engaging means is adapted to engage a corresponding engagement means and encase the attachment means.

30. A member substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

31. A process substantially as hereinbefore described.

Patents Act 1977
 Examiner's report to the Comptroller under
 Section 17 (The Search Report)

Application number

GB 9217784.9

Relevant Technical fields

- (i) UK CI (Edition L) E1D (DCF, DLEQWCV, DLEQWDV,
 DLEQWNV, DLEQWSV, DLEHW)
- (ii) Int CI (Edition 5) E04D

Search Examiner

D J LOVELL

Databases (see over)

- (i) UK Patent Office
- (ii)

Date of Search

20 September 1993

Documents considered relevant following a search in respect of claims

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2243170 A (ULTRAFRAME LTD)	1
X	GB 2155527 A (ROLKAN NV)	1
A	EP 0054856 A1 (BAYER AG)	
X	GB 1528874 (EVERLITE)	1
X	EP 0050462 A1 (DAN-PAL)	1

Categories of documents

X: Document indicating lack of novelty or of inventive step. *

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P: Document published on or after the declared priority date but before the filing date of the present application.

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