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71 Applicant: KELSEY BUILDING PRODUCTS LIMITED
Kelsey House Wood Lane End
Hemel Hempstead Hertfordshire HP2 4RQ(GB)

72 Inventor: Rundle, Dennis Arthur
Old Mill Cottage Woodford
Near Berkeley Gloucestershire GL13 9JU(GB)

74 Representative: Cheyne, John Robert Alexander
Mackenzie European Patent Attorney et al,
Haseltine Lake & Co. Hazlitt House 28 Southampton
Buildings Chancery Lane
London WC2A 1AT(GB)

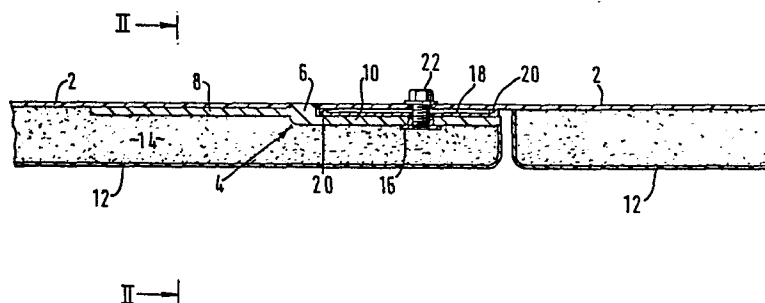
54 Gutters.

57 A connection between two gutter components is made between a connecting element (4) bonded to one of the components and a projecting portion of the other component. A self-supporting gasket (18) is disposed between the projecting portion and the connecting element (4) and the connection is made by bolts (22) which enter tapped bores in inserts (16) in the connecting element (4).

Each gutter component may comprise upper and lower

skins (2, 12) which provide a cavity (14) filled with thermally insulating material. The component is formed by applying foamable material to the lower skin (12) and then placing the upper skin (2) on the lower skin (12) so that the edge regions of the skins (2, 12) are in contact. The foamable material then expands to fill the cavity (14). The upper skin (2) is made from GRP by a pultrusion process.

FIG. 1.



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GUTTERS

This invention relates to a gutter assembled by interconnecting gutter components. Such gutters may be used, for example in the valleys between
5 inclined roofs of industrial buildings.

According to the present invention, the connection between two gutter components is made between a connecting element, including a tapped bore, which is bonded to one end of one of the gutter components and a
10 connecting portion at the adjacent end of the other gutter component, the connecting portion overlying the connecting element, and a self-supporting gasket being disposed between the connecting portion and the connecting element, a bolt extending through an
15 opening in the connecting portion into the tapped bore to secure the gutter components together.

The connecting element may be made from glass reinforced plastics (GRP) in which case the tapped bore may be provided in a threaded metal insert.

20 It is becoming increasingly common for the roofs of industrial buildings to be insulated. In order to extend the insulation to areas of the roof which are provided with gutters, the gutters themselves have also been insulated. Hitherto, this has been
25 done by securing sections of insulating board to the underside of the gutter after installation of the gutter. This is a labour-intensive operation and

is not always effective. In addition, it creates difficulties in replacing damaged gutter sections.

According to an embodiment in accordance with the present invention the gutter component comprises
5 an upper skin, of water-impervious material providing a trough for carrying rainwater, a lower skin, the edge regions of which engage the edge regions of the upper skin and the central region of which is spaced from the central region of the upper skin to provide
10 a cavity between the upper and lower skins, and a body of thermally insulating material disposed within the cavity.

The upper and lower skins may comprise glass reinforced plastics material (GRP), and the insulating
15 material may comprise foamed plastics material, such as polyisocyanurate foam.

A convenient method of manufacturing a gutter component in accordance with the present invention begins with laying up the lower skin in a mould by
20 applying a gel coat of a suitable resin to the surface of the mould. Glass fibre rovings are then sprayed onto the gel coat. The lower skin thus formed can be removed from the mould for storage if required. The upper skin may be formed by the so-called
25 "pultrusion" process, in which the material is pulled through a suitably shaped die under tension.

When the complete gutter component is to be assembled, the lower skin is fitted into a mould which is capable of holding the lower skin rigid under
30 pressure. A dosed quantity of foamable plastics material is deposited on the lower skin, and the upper skin is then clamped firmly, in sealing engagement, with the lower skin. Within a very short time, the foamable material begins to foam and expands to fill
35 the cavity provided between the upper and lower skins. The foamed material bonds together the upper and lower skins, so that no further bonding is required at the

adjoining edges of the upper and lower skins.

For a better understanding of the present invention, and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying
5 drawings in which:

Figure 1 shows, in longitudinal cross-section, two interconnected gutter components; and

Figure 2 is a sectional view taken on the line II-II of Figure 1.

10 Each gutter component comprises an upper skin 2 which is made from GRP by means of the "pultrusion" process. Each upper skin 2 incorporates woven glass fibre matting, and to provide the necessary rigidity and strength there may be, for example, five layers
15 of this matting.

To one end of each upper skin 2 is bonded a connecting element 4. This element 4 is shown bonded to the left-hand upper skin 2, but it will be appreciated that a similar connecting element 4 will
20 be bonded to the right-hand upper skin at the end which is not visible in Figure 1. The connecting element 4 comprises a rib 6 from which extend two flanges 8 and 10, the flange 8 being bonded to the upper skin 2.

25 A lower skin 12 adjoins the upper skin 2 at its lateral edges. At one end, the lower skin 12 adjoins the flange 10 of the connecting element 4, and at the other end the lower skin 12 adjoins the upper skin 2 at a position spaced from the end of the upper
30 skin 2, so that a portion of the upper skin 2 projects beyond the lower skin 12. The upper skin (including the connecting element 4) and the lower skin provide a cavity 14 which is filled with a polyisocyanurate foam. The thickness of this cavity (i.e. the distance
35 between the upper skin 2 and the lower skin 12) is selected to provide the desired degree of thermal insulation as governed by current building practice

and/or regulations. At present, it is thought that a thickness of approximately 25 mm is sufficient for most purposes.

The lower skin is made from GRP by laying up
5 in the conventional manner in a suitably shaped mould. A gel coat is applied to the surface of the mould, and glass fibre rovings are sprayed on to the gel coat.

The connecting element 4 is made from GRP in
10 a hot press moulding process. A row of holes is provided across the width of the flange 10, and a threaded insert 16 is force-fitted into each hole. Each insert 16 may have a serrated cylindrical surface in order to retain it against rotation in its hole.
15 Between the upper skin 2 of the right-hand gutter section and the flange 10 there is a self-supporting gasket 18 which is bonded to the flange 10. This gasket 18 can, for example, be made from paper or board, as is commonly used for gaskets in automobile
20 engines, or it may be made from hard rubber or other resilient materials. In the preferred construction, the upper skin 2 and the connecting element 4 can be formed with great accuracy, and so the gasket 18 does not have to be excessively resilient. In
25 particular, the use of flowable sealants such as mastic can be avoided. The gasket 18 has, at each end, an upturned lip 20 which increases the pressure between the upper skin 2 and the flange 10 to improve the seal between these parts.

30 The two gutter components are secured together by bolts 22 which pass through holes drilled in the upper skin 2, through pre-punched holes in the gasket 18, and into the inserts 16. A rigid and water tight joint can thus be obtained, and it will be noted that
35 the upper surfaces of the upper skins 2 and of the rib 6 are flush with one another.

The Figures and the description given above relate

to gutter components which are both thermally insulated and interconnected by the connecting element 4. However, it will be appreciated that the connecting element 4 can be used to interconnect gutter components which are not thermally insulated and which comprise, for example, only the upper skin 2. Similarly, thermally insulated gutter components can be interconnected by means other than the connecting element 4.

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CLAIMS

1. In a gutter, a connection between two gutter components, characterized in that the connection is made between a connecting element (4), including a tapped bore, which is bonded to one end of one of the gutter components and a connecting portion at the adjacent end of the other gutter component, the connecting portion overlying the connecting element (4), and a self supporting gasket (18) being disposed between the connecting portion and the connecting element (4), a bolt (22) extending through an opening in the connecting portion into the tapped bore to secure the gutter components together.

2. A connection in a gutter as claimed in claim 1, characterized in that the connecting element (4) is made from glass reinforced plastics material.

3. A connection in a gutter as claimed in claim 1 or 2, characterized in that the tapped bore is provided by a threaded metal insert (16) in the connecting element (4).

4. A connection in a gutter as claimed in any one of the preceding claims, characterized in that the connecting element (4) has a rib (6) which extends between the adjacent end edges of the gutter components, or of the upper skins (2) of the gutter components, the upper surface of the rib (6) being flush with the upper surface of each of the gutter components.

5. A connection in a gutter as claimed in claim 4, characterized in that two flanges (8, 10) extend from the rib (6), one of the flanges (8) being bonded to the said one component and the other of the flanges (10) having the tapped bore.

6. A connection in a gutter as claimed in any one of the preceding claims, characterized in that the tapped bore is one of a plurality of tapped bores disposed in a row extending across the width of the gutter, each tapped bore receiving a respective bolt

(22) extending through a respective opening in the connecting portion.

7. A connection in a gutter as claimed in any one of the preceding claims, characterized in that
5 the gasket (18) comprises a pair of ribs (20) which engage the connecting portion and extend across the width of the gutter, the tapped bore being disposed between the ribs (20).

8. A connection in a gutter as claimed in any
10 one of the preceding claims, characterized in that the gasket (18) is made from a hard resilient material.

9. A connection in a gutter as claimed in any one of the preceding claims, characterized in that each gutter component comprises an upper skin (2)
15 of water impervious material providing a trough for carrying rain water, a lower skin (12), the edge regions of which engage the edge regions of the upper skin (2) and the central region of which is spaced from the central region of the upper skin (2) to provide
20 a cavity (14) between the upper skin (2) and the lower skin (12), and a body of thermally insulating material disposed within the cavity (14), the connecting element (4) being bonded to the upper skin (2) of the said one gutter component and the connecting portion compris-
25 ing a portion of the upper skin (2) of the other gutter component which projects beyond the lower skin (12) of that other gutter component.

10. A connection in a gutter as claimed in claim 9, characterized in that the thermally insulating
30 material substantially fills the cavity (14).

11. A connection in a gutter as claimed in claim 9 or 10, characterized in that the thermally insulating material comprises foamed plastics material.

12. A connection in a gutter as claimed in claim
35 11, characterized in that the foamed plastics material serves to bond the upper and lower skins (2, 12) together.

13. A connection in a gutter as claimed in any one of the claims 9 to 12, characterized in that the upper skin (2) comprises glass reinforced plastics material.

5 14. A connection in a gutter as claimed in claim 13, characterized in that the upper skin (2) is formed by a pultrusion process.

10 15. A connection in a gutter component as claimed in any one of the claims 9 to 14, characterized in that the lower skin comprises glass reinforced plastics material.

16. A method of making a gutter component, characterized in that the method comprises:

- 15 (i) manufacturing an upper skin (2);
- (ii) manufacturing a lower skin (12);
- (iii) applying a foamable material to the upper or lower skin;
- (iv) bringing the edge regions of the upper and lower skins into contact to provide a cavity
- 20 (14) between the upper and lower skins, which cavity (14) encloses the foamable material;
- (v) allowing to causing the foamable material to foam thereby to fill the cavity (14); and
- (vi) allowing or causing the foamable material
- 25 to set or cure.

17. A method as claimed in claim 16, characterized in that the upper skin (2) is manufactured from glass reinforced plastics material by a pultrusion process.

30 18. A method as claimed in claim 16 or 17, characterized in that steps (iii) to (vi) are performed with the lower skin (14) supported in a mould.

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FIG. 1.

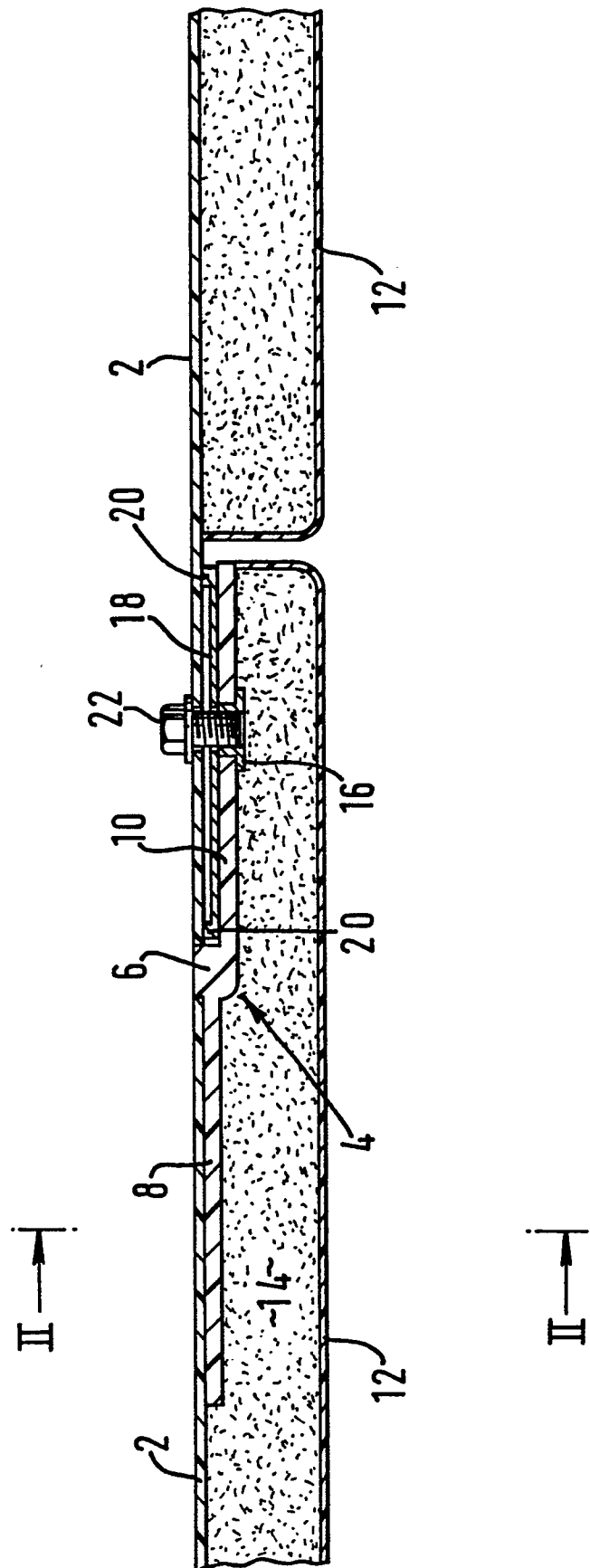
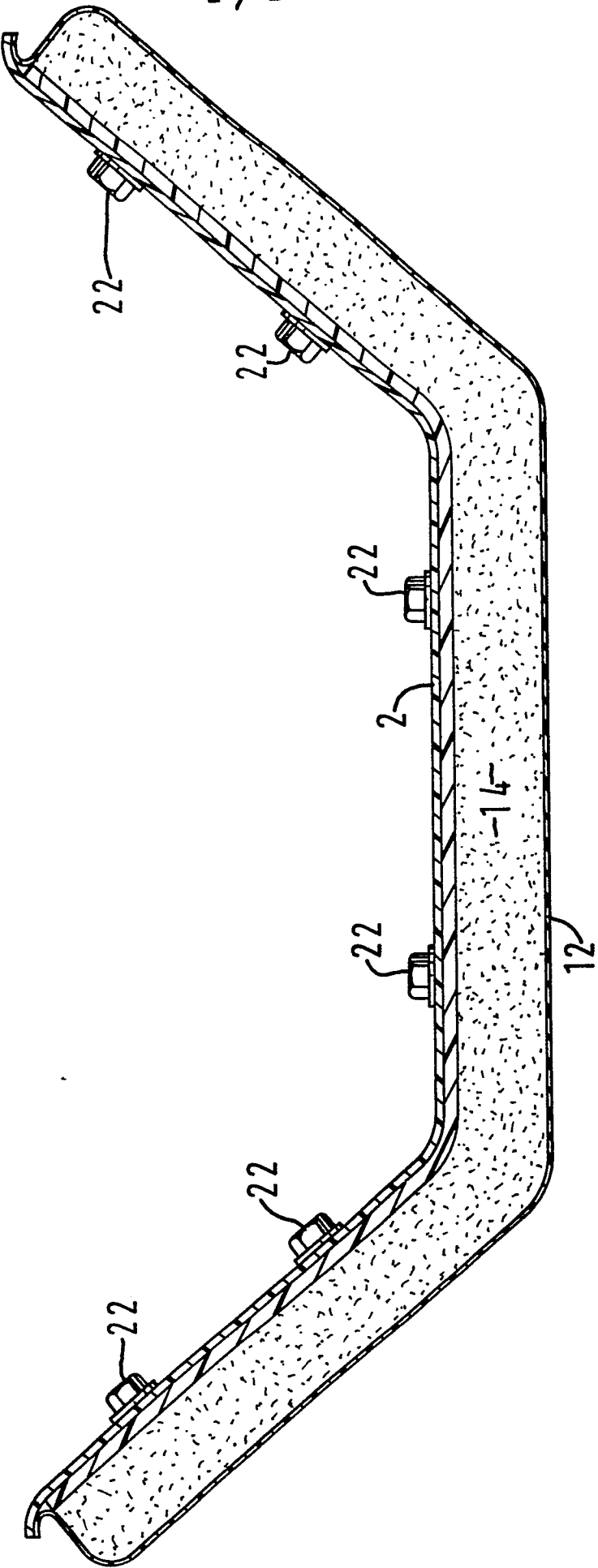


FIG. 2.





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. ³)
A	--- BE-A- 871 747 (PRE-FORMED COMPONENTS LTD.) *Page 5, line 4 - page 7, lines 26; page 11, lines 14-27; page 15, lines 6-32; figures 7,10*	1-3, 8 13, 14	E 04 D 13/06
A	--- GB-A-2 026 058 (PRE-FORMED COMPONENTS LTD.) *Page 3, lines 12-74; figure 6*	1, 18	
A	--- GB-A-1 130 844 (ROBERTSON) *Page 1, lines 64-72; page 1, line 81 - page 2, line 2; figures*	9-12, 16	
A	--- GB-A-2 051 907 (OLYMPIAD EPOXY SURFACE COATINGS LTD.) -----		TECHNICAL FIELDS SEARCHED (Int. Cl. ³) E 04 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28-01-1983	Examiner SPIEGEL R.P.
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			