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(54) Title of the Invention: **Structural component**
 Abstract Title: **Structural component suitable for use as a mullion or transom of a curtain walling system**

(57) A structural component comprising an elongate structural box section 32 with a plastics material mount 40 secured to it. The structural section 32 defines a pair of limbs 38 including retaining features 38a engaging with the mount 40, and the structural section 32 and mount 40 together define a void 52, with a foamed material 54 substantially filling the void 52. The mount 40 may be of a material incorporating reinforcing glass fibres, and may be manufactured by pultrusion. The mount 40 may further be shaped to receive a securing bolt onto which a pressure plate 60 can be secured. There may also be seal receiving channels 58 present on the component, so that it can be sealed to a wall panel or glazing unit 62. Suitable architectural uses for the structural component include a mullion or transom for a curtain walling system.

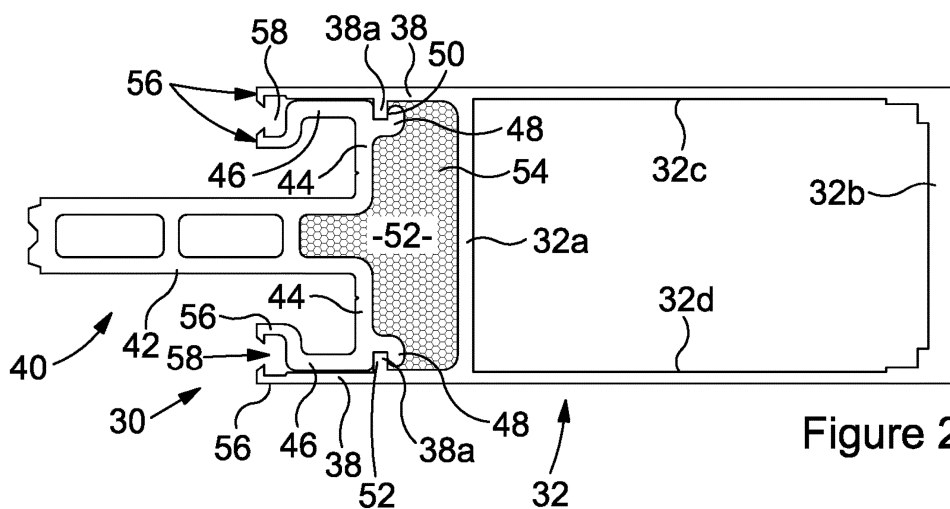


Figure 2

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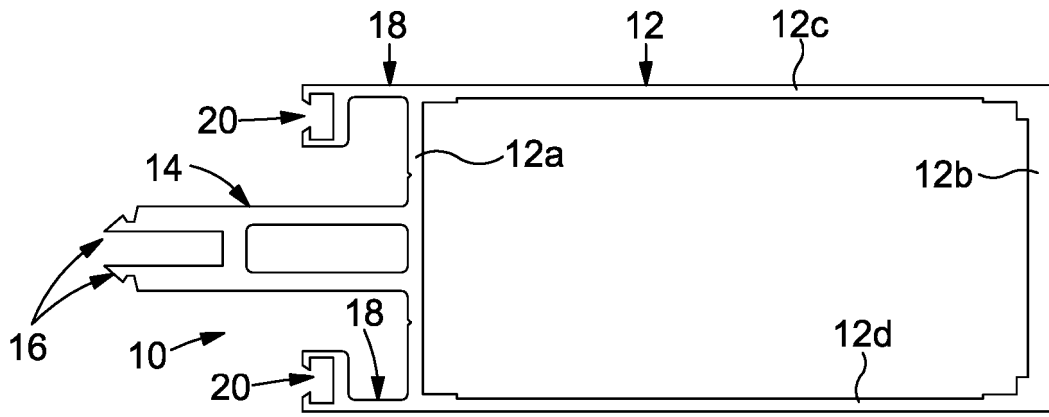


Figure 1

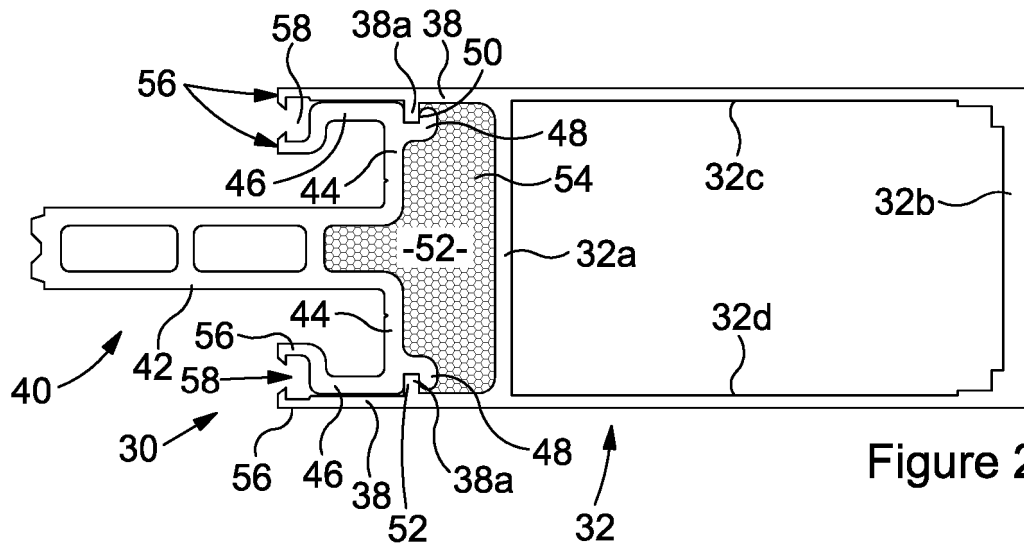


Figure 2

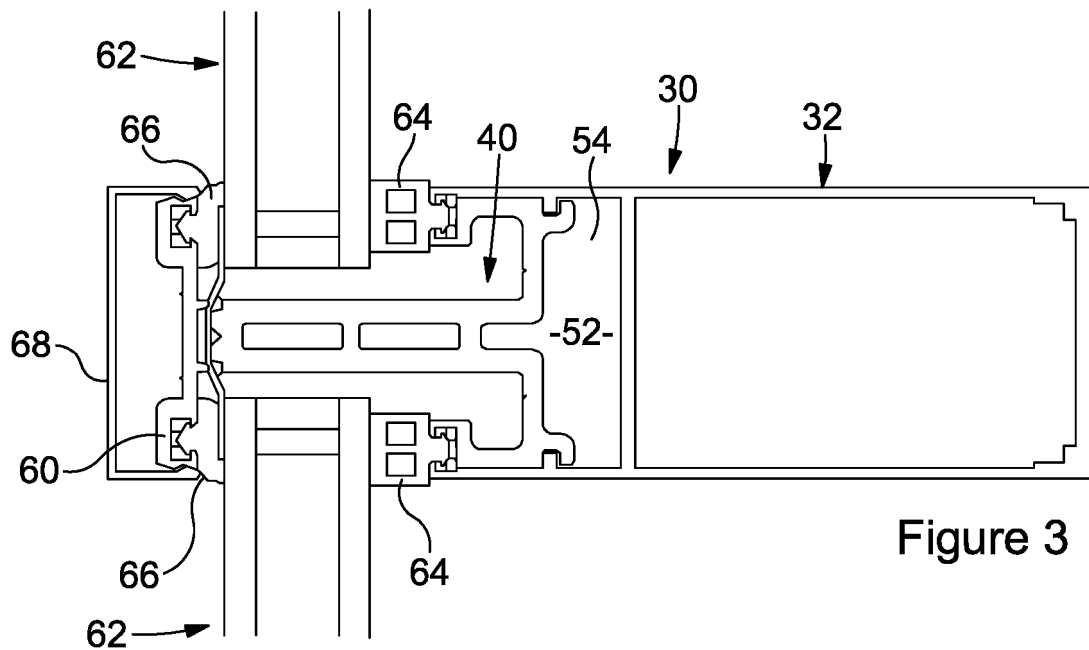


Figure 3

02 09 14

Structural Component

This invention relates to a structural component, and in particular to a structural component suitable for use as a mullion or transom of a curtain walling system.

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Curtain walling systems are in widespread use, for example to provide the outer skin to large buildings such as office buildings, industrial units and the like. A typical curtain walling system comprises a series of structural components in the form of upstanding mullions interconnected by generally horizontally extending transoms. The mullions and transoms support a series of wall panels and/or glazing units. By way of example, each wall panel or glazing unit may be clamped to the adjacent mullions and transoms by the use of pressure plates which are bolted or otherwise secured to the mullions and transoms. A cover may be provided over each pressure plate to enhance the appearance of the wall so constructed. Each mullion and transom, and each pressure plate, conveniently carries seals which bear against the adjacent wall panels and glazing units to form a substantially weather tight seal therebetween.

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It will be appreciated that the mullions and transoms bear significant loadings, in use, as they carry the weight of the wall panels and/or glazing units, and they may also bear externally applied loads, for example the loads experienced as wind impinges upon the outer surface of the wall. Typically, the mullions and transoms take the form of extruded aluminium components of generally box like form, such arrangements providing good strength whilst being of relatively low weight. Whilst bearing the weight of the glazing units and/or wall panels, the structural components do not carry significant building loads which, rather, are carried by supporting walls and/or pillars or columns thereof.

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It is increasingly desirable to enhance the thermal insulating properties of buildings, to reduce heating costs and the carbon footprint of the building. One problem with curtain walling systems is that, where the structural components are of metallic form, such as aluminium, and where aluminium or other metals are used in the construction of the pressure plates, significant thermal losses are experienced. In order to improve the thermal insulating properties of such a system, it is known to incorporate a thermal break in the form of a plastics material component fitted to the structural components to reduce the conduction or transfer of heat between the structural components and the

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pressure plates. However, the space available to incorporate such components is limited, resulting in the thermal break components used having only a limited effect. Furthermore, in order to ensure that the pressure plates are properly secured in position, the bolts used to mount the pressure plates to the structural components typically pass completely through the thermal break and into the structural components, thereby providing a thermal conduction path between the pressure plates and the structural components.

If the thermal insulating properties of the structural components can be enhanced then, to achieve a desired overall level of thermal insulation, it may be possible to use smaller or less insulating wall panels and/or glazing units which may allow significant cost savings to be made.

It is therefore an object of the invention to provide a structural component suitable for use in such applications and of enhanced thermal insulating properties.

According to a first aspect of the invention there is provided a structural component comprising an elongate box section structural section, and a plastics material mount secured to the structural section, wherein the structural section defines a pair of limbs including retaining features engaging with the mount, the structural section and mount together defining a void, a foamed material substantially filling the void.

The structural section provides the required level of strength whilst the mount and foamed material provide a thermal break between the structural section and an associated pressure plate, in use.

The mount is conveniently of a material incorporating reinforcing fibres, for example it may incorporate glass fibres or the like, and it may be manufactured by the use of, for example, a pultrusion process. However, depending upon the size and shape of the mount and the material used, other manufacturing techniques may be used.

Conveniently, the mount is shaped to receive a securing bolt whereby a pressure plate can be secured thereto, in use.

Preferably, the structural component is shaped to define seal receiving channels whereby, in use, the structural component can be sealed to an associated wall panel or glazing unit. The seal receiving channels are conveniently defined in part by the limbs of the structural section and in part by features of the mount.

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The invention further relates to a curtain walling system comprising at least one structural component of the type defined hereinbefore. By way of example, the structural component may serve as a mullion and/or transom of the curtain walling system.

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According to another aspect of the invention there is provided a method of manufacture of a structural component comprising the steps of assembling a mount to a structural section by engagement of retaining features of the structural section with the mount to define a void, and foaming a foamable material in situ within the void to substantially fill the void.

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

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Figure 1 is a sectional view illustrating part of a typical structural component design;

Figure 2 is a sectional view illustrating a structural component in accordance with one embodiment of the invention; and

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Figure 3 is a sectional view of the structural component of Figure 2, in use.

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Referring firstly to Figure 1, a typical structural component 10 is illustrated. The component 10 is intended for use as a mullion and/or transom of a curtain walling system. The component 10 comprises a section 12 of box like extruded aluminium form. It includes a pair of relatively short walls 12a, 12b interconnecting longer walls 12c, 12d. Upstanding from the wall 12a, and integral therewith, is a mounting flange 14 of hollow form. The free end of the flange 14 is shaped to define snap fit projections 16 whereby a plastics material thermal break element (not shown) can be secured thereto. The walls 12c, 12d each include extensions or limbs 18 which protrude beyond the wall

12a, parallel to the flange 14, and terminate in channels 20 shaped to receive respective seal members.

5 In use, a series of upstanding mullions is provided, interconnected by generally horizontally extending transoms, each taking the form of the structural component 10 shown in Figure 1. Glazing units and/or wall panels are secured to the structural components 10 by pressure plates (not shown) which are bolted to the flanges 14, the bolts extending through the thermal break elements. Seal members located within the channels 20, and within similar channels of the pressure plates, bear against the wall
10 panels and/or glazing units, forming a substantially weather tight seal between the wall panels and/or glazing units and the structural components 10.

It will be appreciated that, in such an arrangement, the structural components 10 support the glazing units and/or wall panels, bearing the weight thereof and any
15 externally applied loads. Thermal conduction or heat transfer between the inside of the building (and the structural components) and the exterior of the building (and the pressure plates) is limited by the presence of the thermal break elements. However, as these elements are of relatively small dimensions, a significant level of heat loss will still occur.

20 As shown in Figures 2 and 3, in accordance with an embodiment of the invention a structural component 30 is shown which comprises a generally box-section structural section 32. Like the section 12 of the arrangement shown in Figure 1, the section 32 comprises a pair of relatively short walls 32a, 32b which interconnect longer walls 32c,
25 32d. Extensions or limbs 38 extend from the walls 32c, 32d, extending generally parallel to one another and so defining, with the wall 32a, a generally U-shaped channel. Each limb 38 is provided, part way along its length, with a rib 38a, protruding into the channel.

30 The structural component 30 further comprises a mount 40 of plastics material form. Conveniently, the material of the mount 40 includes reinforcing fibres, for example it may incorporate reinforcing glass fibres. However, other materials may be used if desired. By way of example, it may be manufactured by the use of a pultrusion process. However, depending upon the shape and size of the mount and the materials
35 used, it may be possible to use other manufacturing techniques.

The mount 40 includes a central flange 42 of hollow form, the flange 42 having a pair of arms 44 extending therefrom. The arms 44 extend generally perpendicularly away from the flange 42. At the outer end of each arm 44 is formed a wall 46 extending generally parallel to the flange 42. At the intersection between each arm 44 and the associated wall 46 is provided a lip 48 which defines a channel 50.

In use, during assembly of the structural component, the mount 40 is secured to the structural section 32 by introducing the ribs 38a into the channels 50 and sliding the mount 40 longitudinally relative to the structural section 32. It will be appreciated that once so assembled, the mount 40 and structural section 32 will together define an elongate closed void 52. A foam material 54 is introduced into the void 52, the material 54 expanding, in situ, to fill or substantially fill the void 52, rigidly securing and locking the mount 40 and structural section 32 to one another to form a rigid structural component 30.

As illustrated, the free ends of the limbs 38 and the ends of the walls 46 each include features 56 which together serve to define seal receiving channels 58.

In use, as shown in Figure 3, a pressure plate 60 is bolted or otherwise secured to the flange 42 of the mount 40 (the bolts are not shown in Figure 3), clamping wall panels and/or glazing units 62 between the pressure plate 60 and the structural component 30 such that the wall panels and/or glazing units 62 are secured to and supported by the structural components 30. Seal members 64 are secured to the channels 58, and seal members 66 are carried by the pressure plate 60. The seal members 64, 66 bear against the wall panels and/or glazing units 62 to form a substantially weather tight seal therewith.

A cover cap 68 is snap fitted to the pressure plate 60 to enhance the appearance of the wall.

It will be appreciated that the mount 40 and foam material 54 serve to provide a relatively large thermal break between the pressure plate 60 and the metallic part of the structural component 30, reducing heat transfer therebetween and so enhancing the thermal insulating properties of the walling system. The use of parts of the mount 40 in

the formation of the channels 58 assists in increasing the spacing of metallic parts of the structural component 30 from the pressure plate, in the heat transfer path, and so further enhances the thermal insulating properties of the product. As the outer sides of the channels 58 are defined by the limbs 38, the appearance of the structural component 30, when installed, matches that of the component 10 of Figure 1.

Compared to the arrangement of Figure 1, the use of the structural component 30 of Figures 2 and 3 allows significant enhancements in the thermal insulating properties of a curtain walling system to be made. As a result, a building of enhanced thermal efficiency may be constructed using a curtain walling system incorporating the structural component of the invention. Alternatively, the use of the structural component of the invention may allow smaller, lighter or less thermally efficient wall panels and/or glazing units to be used in achieving a desired overall thermal efficiency, which may allow cost savings to be made.

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Whilst the description hereinbefore is of one embodiment of a structural component in accordance with the invention, it will be appreciated that a wide range of modifications and alterations may be made to the arrangement described hereinbefore without departing from the scope of the invention as defined by the appended claims.

CLAIMS:

1. A structural component comprising an elongate box section structural section, and a plastics material mount secured to the structural section, wherein the structural section defines a pair of limbs including retaining features engaging with the mount, the structural section and mount together defining a void, a foamed material substantially filling the void.
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2. A component according to Claim 1, wherein the mount is of a material incorporating reinforcing fibres.
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3. A component according to Claim 2, wherein the fibres are glass fibres.
4. A component according to Claim 2 or Claim 3, wherein the mount is manufactured by pultrusion.
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5. A component according to any of the preceding claims, wherein the mount is shaped to receive a securing bolt whereby a pressure plate can be secured thereto, in use.
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6. A component according to any of the preceding claims, wherein the structural component is shaped to define seal receiving channels whereby, in use, the structural component can be sealed to an associated wall panel or glazing unit.
7. A component according to Claim 6, wherein the seal receiving channels are defined in part by the limbs of the structural section and in part by features of the mount.
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8. A curtain walling system comprising at least one structural component according to any of the preceding claims.
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9. A method of manufacture of a structural component according to any of Claims 1 to 7, comprising the steps of assembling a mount to a structural section by engagement of retaining features of the structural section with the mount to define a void, and foaming a foam material in situ within the void to substantially fill the void.
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Examiner: Mr Tanay Dutt

Claims searched: 1-9

Date of search: 5 December 2013

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6, 8 & 9	DE4235687 A1 (SCHLACHTER) See figure 1
X	1-6, 8 & 9	DE29618365 U1 (METALLBAU) See figure
X	1-4 & 9	GB2082234 A (BROKELMANN) See figure 1
A	-	EP2348164 A2 (RALCO) See figure 2
A	-	DE10144820 A1 (GUTTER) See figure 3
A	-	EP1936096 A1 (STEINDL) See figures 3 & 4

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

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Worldwide search of patent documents classified in the following areas of the IPC

E04B; E06B

The following online and other databases have been used in the preparation of this search report

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**International Classification:**

Subclass	Subgroup	Valid From
E04B	0002/96	01/01/2006
E04B	0002/88	01/01/2006
E06B	0003/267	01/01/2006
E06B	0003/54	01/01/2006