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(54) Title: A BULKHEAD

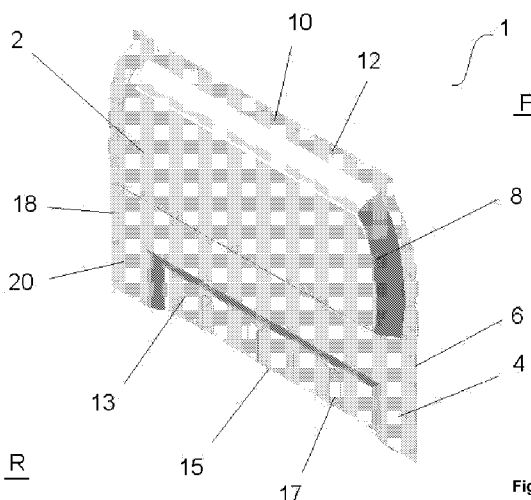


Figure 1

(57) Abstract: A bulkhead for a vehicle (1), comprising at least one panel (2, 4) formed from a polymer material and adapted to engage with the vehicle, reinforcement (6) means to resist the impact of an object moving towards the front of the vehicle and to protect an occupant in front of the bulkhead, and vehicle attachment means for attaching the panel to the vehicle. Advantageously, the bulkhead is lightweight and easy to install whilst being adapted to resist the impact of an object being thrown forward within the cargo space of a vehicle, such as a van, and, importantly, to protect an occupant therein, particularly a driver of the vehicle.

A Bulkhead

The present invention relates generally to bulkheads for vehicles and in particular to bulkheads for disposition in a vehicle, such as a cargo van, immediately behind the occupant seat(s).

Cargo vehicles generally comprise a rear cargo compartment immediately behind the front seat(s) of the vehicle, the cargo compartment being defined by a nearside and offside of the vehicle relative to a kerb and a floor and roof extending therebetween. The cargo compartment is typically accessible through a side door and/or pair of rear doors.

A disadvantage associated with such cargo vehicles is the danger of unsecured cargo impacting the occupant seat(s) or, at worse, an occupant of the vehicle, particularly the driver, when the vehicle is in motion, and particularly when the vehicle stops suddenly, under braking or impact, throwing the cargo forward. The impact on the seat(s) and/or an occupant can be great, particularly when unsecured cargo is thrown forward when an emergency stop is performed or impact occurs. Such impact loads can be fatal to an occupant of the vehicle.

It is desirable to maximize the volume of the cargo compartment to allow for the maximum amount of cargo to be carried by the vehicle. However, an increase in cargo space must be balanced with providing a comfortable environment for the vehicle occupants, in particular the driver, who generally spend considerable periods of time in the vehicle during working hours. Cargo vehicles, such as small vans, are also increasingly being used for personal use outside normal working hours, particularly where the owner uses the vehicle for both commercial and domestic purposes.

An increase in cargo space allows for more cargo to be carried. However, due to increasingly stringent emission regulations being enforced, vehicle weight saving is also particularly desirable.

A first aspect of the present invention provides a bulkhead for a vehicle, comprising:

- at least one panel formed from a polymer material and adapted to engage with the vehicle;
- reinforcement means to resist the impact of an object moving towards the front of the vehicle; and
- vehicle attachment means for attaching the panel to the vehicle.

Advantageously, the bulkhead is adapted to resist the impact of an object being thrown forward within the cargo space of a vehicle, such as a van. Desirably, the bulkhead may also provide protection to an occupant located in front of the bulkhead, particularly a driver of the vehicle, from an object being thrown forward within the cargo space of the vehicle.

Preferably the reinforcement means comprises a reinforcement portion provided in or on the at least one panel. A reinforcement portion may be a reinforcing member disposed on or in the panel. Alternatively, the reinforcement portion may be integrally formed in the panel. Suitably the reinforcement portion provides additional strength and/or stiffness to the bulkhead to resist the impact of an object colliding with the bulkhead, such as loose cargo being thrown forward within a braking vehicle or during a crash.

Suitably the at least one panel comprises at least a first and a second panel.

Advantageously, the bulkhead may be provided with separate first and second panels which may be easily installed inside the vehicle. For example, the first panel may be attached to the roof and sides of the vehicle and the second panel may be attached thereto and to the floor and sides of the vehicle. This provides for simple and quick installation which is particularly desirable where the inside profile of the cargo compartment of the vehicle is relatively complex or where the cargo area is relatively small. Additionally, the first and second panels can be joined together once installed to provide increased strength where they are joined.

Suitably the first panel overlaps the second panel to form an overlapping reinforcement portion. The overlapping reinforcement portion combines and utilises the thickness of each panel to provide additional strength and stiffness to the bulkhead in the region of the overlapping reinforcement portion. The overlapping reinforcement portion may be provided at a height which would benefit from this additional strength and stiffness, such as the area of the bulkhead in the vicinity of a driver's seat. Adequate stiffness of this particular area of the bulkhead is particularly desirable in the event of loose cargo impacting the bulkhead. Providing an overlap at approximately mid-height of the bulkhead is advantageous as it provides reinforcement at the weakest area of the bulkhead, and this also coincides with the height of the upper torso or head of an occupant. Of course, the height of an overlapping reinforcement portion may be suitable for the application, such as the size of the vehicle. Suitably, a number of overlapping reinforcing portions may be provided at different heights.

Preferably the first panel is attached to the second panel at the overlapping portion. Suitably the overlapping portion is a horizontal overlapping portion extending substantially across the extreme width of the first and second panels. The horizontal overlapping portion may be

continuous or intermittent across the width of the bulkhead. A horizontal overlapping portion provides the bulkhead with additional strength and stiffness across the bulkhead between each side of the vehicle. Suitably the panels may be adhered, thermo-welded, riveted or bolted together. Of course, other known joining techniques may be used to attach the panels together.

Suitably the first and second panels are formed from sheet material.

Suitably the reinforcement means comprises one or more recesses. Suitably one or both of the first and second panels may comprise one or more recesses. A recess may be formed in one or both of the first and second panels to provide additional stiffness or flexural rigidity to the bulkhead, for example. One or more recesses may be formed in a panel to control its noise and vibration performance when the vehicle is in use.

Suitably one or both of the first and second panels comprises a recess defining an open side facing the front of the vehicle to allow adjustment of an adjustable seat mounted in front of the bulkhead. A recess formed towards the rear of the vehicle may be formed directly behind the driver's seat, for example. Advantageously, this allows for the bulkhead to be positioned close to the seat(s) of the vehicle thereby increasing the cargo area of the vehicle, whilst allowing for adjustment of an adjustable seat to ensure a comfortable environment is provided to the vehicle occupants. For example, a recess may be formed in the first panel to allow the reclining part of an adjustable seat to recline. Alternatively or additionally, a recess may be formed in the second panel to allow for an adjustable seat slideably mounted to the floor of the vehicle to be adjusted forward and aft relative to the vehicle.

Suitably one or both of the first and second panels comprises a recess to allow adjustment of more than one adjustable seat of the vehicle mounted in front of the bulkhead. A recess may be formed in one or both of the panels to allow a driver's seat and a passenger seat to adjust, as described above. Such a recess may be disposed substantially across the width of the bulkhead. A bulkhead comprising such a recess is conveniently generic for use in right or left hand drive vehicles.

Preferably the recess defines a peripheral flange around the first panel. The flange may be attached to the vehicle and/or the second panel.

Suitably the second panel comprises a recess defining an open side facing the rear of the vehicle. A recess having an open side facing the rear of the vehicle may improve the stiffness of the panel and/or may conveniently provide additional cargo space in the rear of the vehicle. Suitably the recess extends from a lower edge of the second panel towards an upper edge to define an upper flange and side flanges. The upper flange may attach to the peripheral flange of the first panel and side flanges may be attached to the vehicle.

Suitably the peripheral flange of the first panel overlaps with the upper flange of the second panel thereby to define the overlapping reinforcement portion.

Suitably the upper flange of the second panel comprises an upper recess adapted to resist the impact of an object disposed aft of the bulkhead moving towards the front of the vehicle. The upper recess may be one or more recesses in the upper flange. The second panel may be disposed forward of the first panel relative to the vehicle.

Suitably the upper recess may be concave, define a box section or be triangular, for example. Of course, any suitable shape of recess may be provided. Generally a recess in which the number of sharp edges is minimised is preferred, as this will reduce the points of stress and possible failure.

Suitably the peripheral flange of the first panel and side flanges of the second panel define a bulkhead flange. The bulkhead flange may further comprise the lower edge of the second panel. The bulkhead flange may be planar and may be continuous. In other words, the bulkhead flange may comprise intermittent flange portions or may comprise a single continuous flange extending partially or wholly around the bulkhead.

Suitably the vehicle attachment means comprises a plurality of apertures with which fasteners can engage to attach the bulkhead to the vehicle. A plurality of corresponding vehicle apertures may be provided in the vehicle, such as in the 'B'-pillar of the vehicle. Weld nuts, for example, may be provided at the vehicle apertures with which suitable fasteners engage to attach the bulkhead to the vehicle. Alternatively, self-tapping fasteners may engage with the vehicle apertures, for example.

Suitably the plurality of apertures are disposed in the bulkhead flange.

Suitably the vehicle attachment means comprises a reinforcement member disposed at each of the plurality of apertures disposed in the bulkhead flange. The reinforcement member may be disposed in the bulkhead flange. For example, the reinforcement member may be a washer provided in a moulded bulkhead or may be sandwiched between two layers of polymer material forming the bulkhead. Suitably the washer is formed from a metal material.

Suitably one or both of the first and second panels may comprise one or more apertures for a component to be mounted to, or to allow a component to pass through the bulkhead. Advantageously, a component such as a radio or compact disc player may be mounted in the upper recess of the second panel, for example. Wires may be hidden within the upper recess. Speakers, for example, may be mounted to the bulkhead, particularly on the front side of the bulkhead in the vicinity of an occupant. One or more illuminating devices may be mounted in or on the bulkhead, e.g. on the rear side of the bulkhead to illuminate the cargo area. This may be particularly desirable when the cargo area is being loaded or unloaded at night. Interior lights typically supplied with such vehicles are often inadequate for illuminating the whole of the cargo area.

The bulkhead may comprise a window. For example, the first panel may comprise an aperture which forms a window. A window in the bulkhead may be desirable for inspecting cargo in the cargo area or for viewing behind the vehicle where a window is provided in a rear door.

Suitably the bulkhead may be attached to the floor of the vehicle. The bulkhead may be attached to the floor of the vehicle by a bracket. A suitable bracket may include a right-angled bracket having a vertical member and horizontal member, the vertical member being attached to the bulkhead and the horizontal member being attached to the floor of the vehicle. The bracket may be disposed forward and/or rear of the bulkhead relative to the vehicle. Disposing the bracket in front of the bulkhead advantageously provides more space in the cargo area.

The bulkhead is formed from a polymer material. This advantageously provides a lightweight bulkhead when compared to a metal bulkhead.

Suitably the polymer material is a polypropylene composite. This provides the bulkhead with strength and stiffness. Such a composite advantageously has a low density combined with good mechanical properties allowing for significant weight savings relative to metal of comparable strength. This is particularly desirable to achieve lower fuel consumption and emissions. Polypropylene composites offer significant environmental advantages over alternative materials, including the ability to be recycled. These composites can be easily handled and cause no irritation, as undesirably associated with alternative materials containing glass, such as glass reinforced plastic (GRP). The bulkhead may be suitably finished with paint or material, for example. The bulkhead may be used without additional coating. Suitably the bulkhead may be covered in a decorative material. For example, a front surface of the bulkhead may be covered in a material similar to the head lining or door lining supplied in the vehicle cockpit.

Such composites may be easily formed using low pressure, low cost tooling and at relatively modest temperatures.

Advantageously, a bulkhead formed from such a polypropylene composite is highly resistive to impact. In addition, the composite may be chosen to perform better across a broader range of temperatures, such as from around -40 °C to over 60 °C, compared to a different material. The composite may have the additional advantage of becoming stronger in low temperatures whereas alternative materials may tend to become brittle as temperature decreases.

Suitably the bulkhead is non-toxic and resistant to corrosion, fuel and hydraulic fluids, for example. Suitably the bulkhead is resistant to abrasion and can be easily cleaned.

Suitably the polymer material comprises a plurality of fibres. The fibres may be woven or layered. Suitably a first set of fibres may be arranged substantially perpendicularly to a second set of fibres. The first and second set of fibres may be formed from the same polymer or may suitably be different polymers to provide a composite bulkhead. The first and second set of fibres may be fused together to form monolithic or integral fibres, for example by heat and/or pressure.

A second aspect of the invention provides a vehicle comprising a bulkhead as described above.

A further aspect of the invention provides a kit of parts comprising a bulkhead as described above and a plurality of vehicle attachment means. The kit of parts may comprise one or more component mountable to or through the bulkhead, such as a storage compartment, map light, coat hook, cup holder, or audio device, for example.

A method of fitting a bulkhead as described above is also provided, the method comprising the steps of:

- providing a vehicle;
- providing at least one panel formed from a polymer material and adapted to engage with the vehicle;
- providing reinforcement means to resist the impact of an object moving towards the front of the vehicle and to protect an occupant in front of the bulkhead when in use;
- installing the at least one panel in the vehicle; and
- attaching the at least one panel to the vehicle with vehicle attachment means.

The method may comprise one or more of the steps of:

- engaging the at least one panel with the sides and roof of the vehicle;
- engaging the at least one panel with the sides and floor of the vehicle;
- attaching first and second panels together; and
- attaching first and second panels to the vehicle with the vehicle attachment means.

The method may further comprise the step of:

- mounting one or more components on or through the bulkhead.

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

- Figure 1 shows an isometric view of a bulkhead;
- Figure 2 shows a front view of the bulkhead;
- Figure 3 shows a side view of the bulkhead;
- Figure 4 shows the overlapping reinforcement portion of the bulkhead of Figures 1 to 3; and
- Figure 5 shows the bracket attaching the bulkhead to the floor.

As shown in Figures 1 to 3, a bulkhead 1 for a vehicle comprises a first panel 2 and second panel 4. The first panel 2 attaches to the second panel 4 along an overlapping reinforcement portion 6.

The first panel 2 has a large recess 8 defining a peripheral flange 10 around the first panel 2. Apertures 12 are provided around the peripheral flange 10 to attach the first panel 2 to the roof and sides of the vehicle with suitable fasteners such as bolts. The recess 8 has open side facing

forward (indicated by E in Figure 1) relative to the vehicle which allows adjustment of an adjustable seat and also strengthens the first panel 2, in particular to resist impact of an object moving from the rear (indicated by R in Figure 1) of the vehicle. The recess 8 also stiffens the first panel 2 and improves its flexural rigidity. The recess 8 may also control the noise and vibration performance of the first panel 2 when the vehicle is in use. The recess 8 is provided substantially across the entire width of the first panel 2 to allow a driver's and/or a passenger's adjustable seat to be adjusted. This also advantageously provides a generic bulkhead 1 which may be used in right- or left-hand vehicles.

The second panel 4 has a lower recess 14 extending upwards from a lower edge 15 of the second panel 4. The lower recess 13 has an open side facing to the rear of the vehicle. This advantageously provides additional cargo space. The lower recess 14 includes a number of ridges 17 which further strengthen and stiffen the second panel 4. An upper recess 16 is also provided in the second panel 4 which projects forward. The upper recess 16 is substantially triangular in cross section and improves the stiffness of the second panel and overlapping reinforcement portion 6. A component such as a radio or one or more speakers and/or cabling may be mounted on or stored in the upper recess 16. Such components may alternatively or additionally include a storage compartment, a map light, a jacket hook, a cup holder or mobile phone mounting bracket, for example. Of course, such components may be mounted on or pass through any portion of the bulkhead 1. The second panel 4 has apertures 18 along side flanges 20 which allow the second panel 4 to be attached to the sides of the vehicle. A bracket 22 attaches the second panel 4 to the floor of the vehicle. The bracket 22 is provided rear of the bulkhead 1 in the lower recess 13 of the second panel 4.

The bulkhead 1 may include a window (not shown) for viewing the contents in the cargo space of the vehicle or viewing behind the vehicle where the rear of the vehicle is provided with one or more windows.

The first and second panels 2, 4 of the bulkhead 1 is formed from a polymer material. This advantageously provides a lightweight bulkhead 1, which is particularly desirable for reducing fuel consumption, whilst being strong enough to resist the impact of an object being thrown forward into the bulkhead 1, such as when the vehicle is braking. The polymer may have the advantage of becoming stronger in low temperatures whereas alternative materials may tend to become brittle as temperature decreases.

The polymer material may be a polypropylene polymer. Such a polymer advantageously has a low density combined with good mechanical properties allowing for significant weight saving, particularly desirable to achieve lower emissions and increased payload. The weight reduction offered by such a composite can be around 65% when compared with an OEM pressed steel bulkhead. The bulkhead may comprise two or more polymers to be formed from a polymer composite. Such a polymer may be CURV™, for example.

CURV™ offers significant environmental advantages over alternative materials, including the ability to be recycled. Such a polymer can be easily handled and causes no irritation, as undesirably associated with alternative materials containing glass. The bulkhead 1 may be used with or without an additional coating. The bulkhead 1 may be covered in a decorative material. For example, a front surface of the bulkhead 1 may be covered in a material similar to the head lining or door lining supplied in the vehicle.

Such polymers can be easily formed using low pressure, low cost tooling and at relatively modest temperatures.

The bulkhead 1 is non-toxic and resistant to corrosion, e.g. by fuel and hydraulic fluids. The bulkhead 1 is resistant to abrasion and can be easily cleaned.

The polymer material may comprise a plurality of fibres. The fibres may be woven or layered. The fibres may be arranged in a substantially perpendicular manner. A first set of fibres may be arranged substantially perpendicularly to a second set of fibres. The first set of fibres may be formed from the same polymer as the second set or the first and second sets of fibres may be formed from different polymers to provide a polymer composite. The first and second set of fibres may be fused together to form monolithic or integral fibres, for example by heat and/or pressure.

Claims

1. A bulkhead for a vehicle, comprising:
 - at least one panel formed from a polymer material and adapted to engage with the vehicle;
 - reinforcement means to resist the impact of an object moving towards the front of the vehicle; and
 - vehicle attachment means for attaching the panel to the vehicle.
2. A bulkhead according to claim 1, wherein the reinforcement means comprises a reinforcement portion disposed in or on the at least one panel.
3. A bulkhead according to claim 2, wherein the at least one panel comprises at least first and second panels.
4. A bulkhead according to claim 3, wherein the first panel overlaps the second panel to form an overlapping reinforcement portion.
5. A bulkhead according to claim 4, wherein the overlapping reinforcement portion is a horizontal overlapping portion extending substantially across the bulkhead.
6. A bulkhead according to claim 4 or 5, wherein the first panel is attached to the second panel at the overlapping reinforcement portion.
7. A bulkhead according to any preceding claim, wherein the reinforcement means comprises one or more recesses.

8. A bulkhead according to claims 6 and 7, wherein one or both of the first and second panels comprise one or more recesses.
9. A bulkhead according to claim 8, wherein one or both of the first and second panels comprise a recess having an open side facing the front of the vehicle to allow adjustment of an adjustable seat mounted in front of the bulkhead.
10. A bulkhead according to claim 9, wherein the first panel comprises a recess substantially therein to allow adjustment of more than one adjustable seat of the vehicle mounted in front of the bulkhead.
11. A bulkhead according to claim 10, wherein the recess defines a peripheral flange around the first panel.
12. A bulkhead according to any one of claims 8 to 11, wherein the second panel comprises a recess having an open side facing the rear of the vehicle.
13. A bulkhead according to claim 12, wherein the recess extends from a lower edge of the second panel towards an upper edge to define an upper flange and side flanges.
14. A bulkhead according to claims 11 to 13, wherein the peripheral flange of the first panel overlaps with the upper flange of the second panel thereby to define the overlapping reinforcement portion.
15. A bulkhead according to claim 14, wherein the upper flange of the second panel comprises an upper recess adapted to resist the impact of

an object disposed aft of the bulkhead moving towards the front of the vehicle.

16. A bulkhead according to claim 15, wherein the second panel is disposed forward of the first panel relative to the vehicle.

17. A bulkhead according to any one of claims 14 to 16, wherein the peripheral flange of the first panel and side flanges of the second panel define a bulkhead flange.

18. A bulkhead according to any preceding claim, wherein the vehicle attachment means comprises a plurality of apertures with which fasteners engage to attach the bulkhead to the vehicle.

19. A bulkhead according to claims 17 and 18, wherein the plurality of apertures are disposed in and around the bulkhead flange.

20. A bulkhead according to claim 19, wherein the vehicle attachment means comprises a reinforcement member disposed at each of the plurality of apertures disposed in the bulkhead flange.

21. A bulkhead according to claim 20, wherein the reinforcement member is disposed in the bulkhead flange.

22. A bulkhead according to claim 21, wherein the reinforcement member is a washer.

23. A bulkhead according to any preceding claim, wherein the bulkhead comprises one or more apertures for a component to be mounted to or pass through the bulkhead.

24. A bulkhead according to any preceding claim comprising a window.
25. A bulkhead according to any preceding claim, wherein the bulkhead is attached to the floor of the vehicle.
26. A bulkhead according to claim 25, wherein the vehicle attachment means comprises a bracket.
27. A bulkhead according to claim 26, wherein the bracket is a right-angled bracket having a vertical member and horizontal member, the vertical member being attached to the bulkhead and the horizontal member being attached to the floor of the vehicle.
28. A bulkhead according to claim 27, wherein the bracket is disposed forward of the bulkhead relative to the vehicle.
29. A bulkhead according to any preceding claim, wherein the polymer material is a polypropylene composite.
30. A bulkhead according to any preceding claim, wherein the polymer material comprises a plurality of fibres.
31. A bulkhead according to claim 30, wherein the fibres are woven or layered.
32. A bulkhead according to claim 31, wherein a first set of fibres are arranged substantially perpendicular to a second set of fibres.

33. A vehicle comprising a bulkhead according to any one of claims 1 to 32.
34. A kit of parts comprising a bulkhead according to any one of claims 1 to 32 and a plurality of vehicle attachment means.
35. A kit of parts according to claim 34 comprising one or more component mountable to or through the bulkhead.
36. A method of fitting a bulkhead according to any one of claims 1 to 32, comprising the steps of:
- providing a vehicle;
 - providing at least one panel formed from a polymer material and adapted to engage with the vehicle;
 - providing reinforcement means to resist the impact of an object moving towards the front of the vehicle and to protect an occupant in front of the bulkhead when in use;
 - installing the at least one panel in the vehicle; and
 - attaching the at least one panel to the vehicle with vehicle attachment means.
37. A method according to claim 36, comprising the steps of:
- engaging the at least one panel with the sides and roof of the vehicle;
 - engaging the at least one panel with the sides and floor of the vehicle;
 - attaching first and second panels together; and
 - attaching first and second panels to the vehicle with the vehicle attachment means.

38. A method according to claim 36 or 37, comprising the step of:
- mounting one or more components on or through the bulkhead.

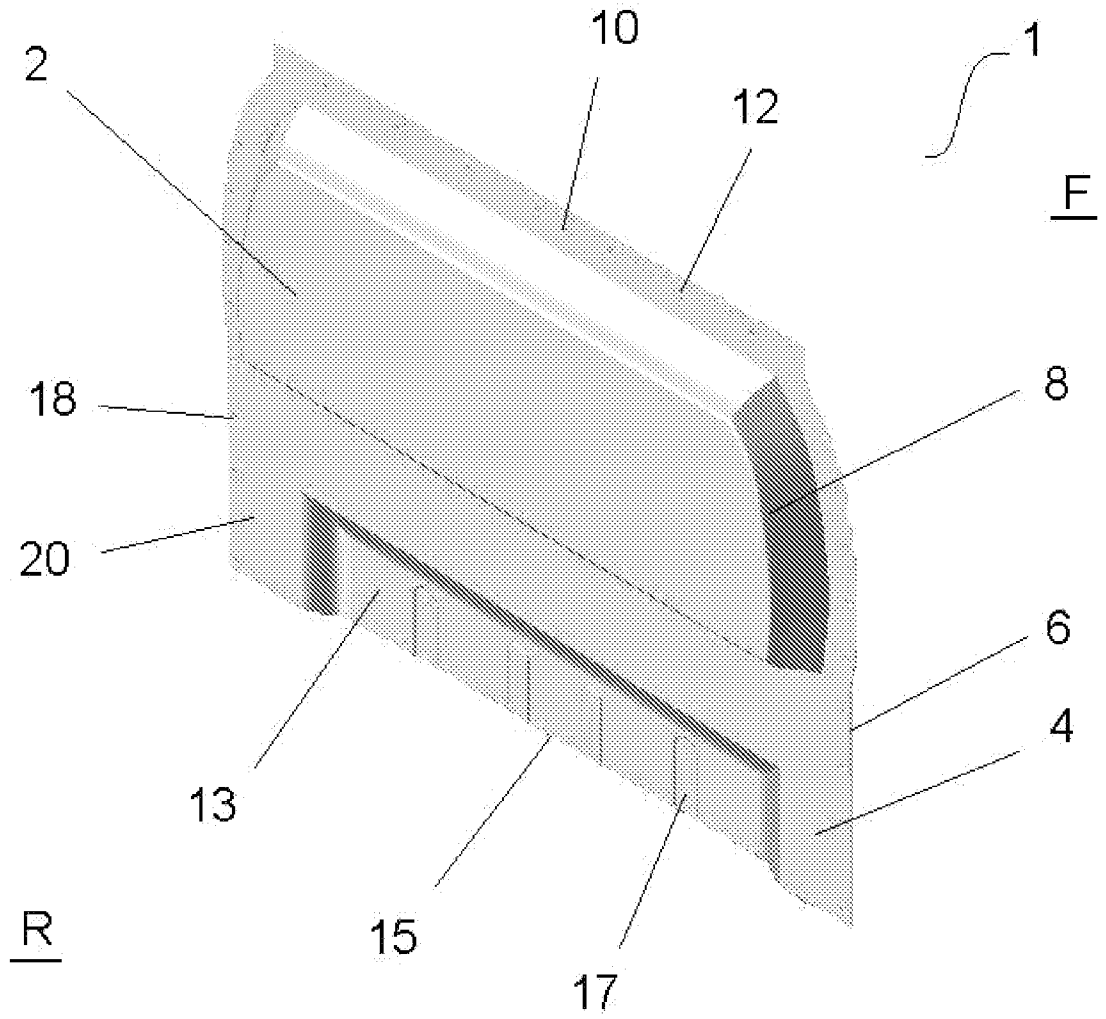


Figure 1

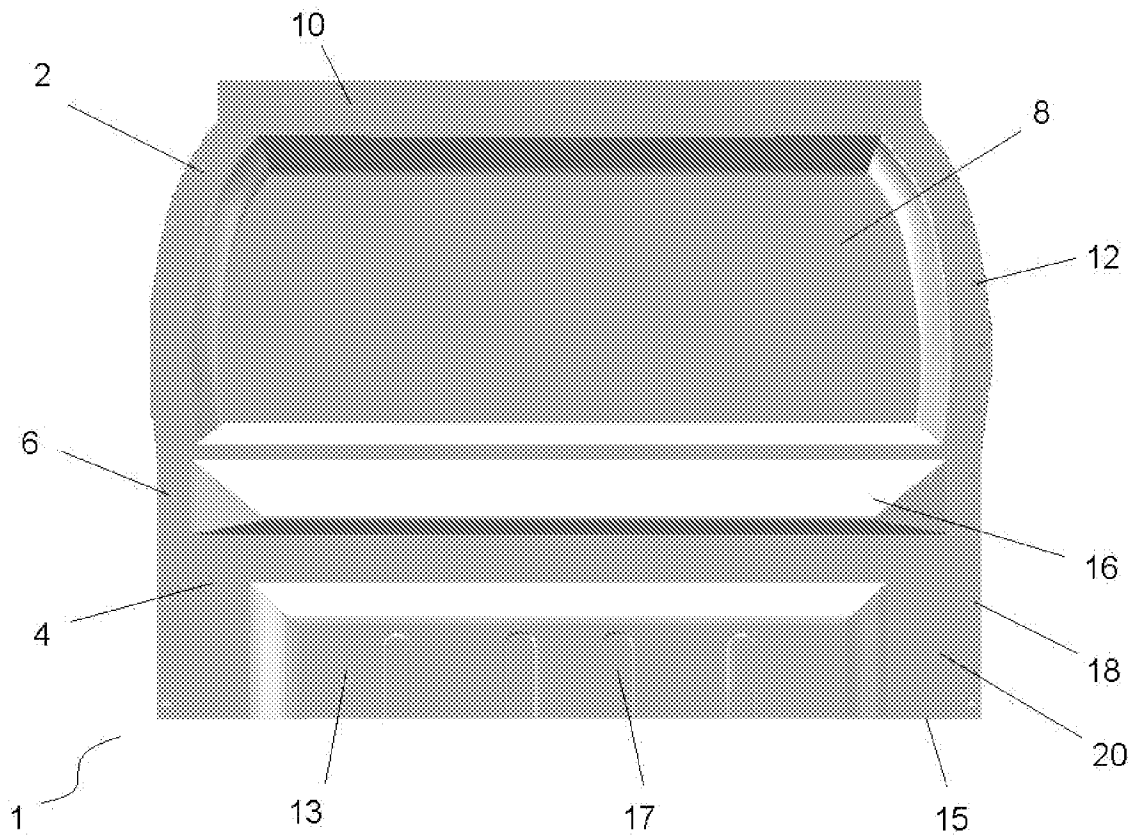


Figure 2

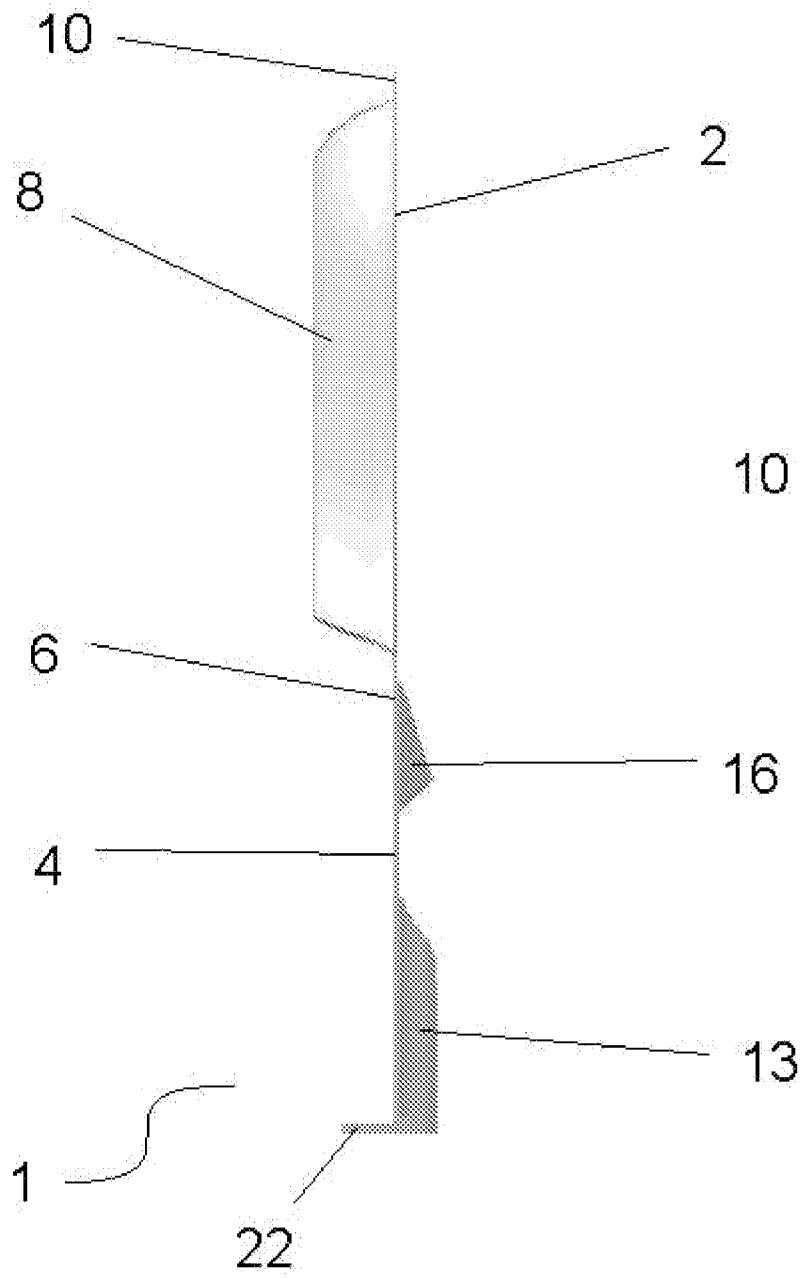


Figure 3

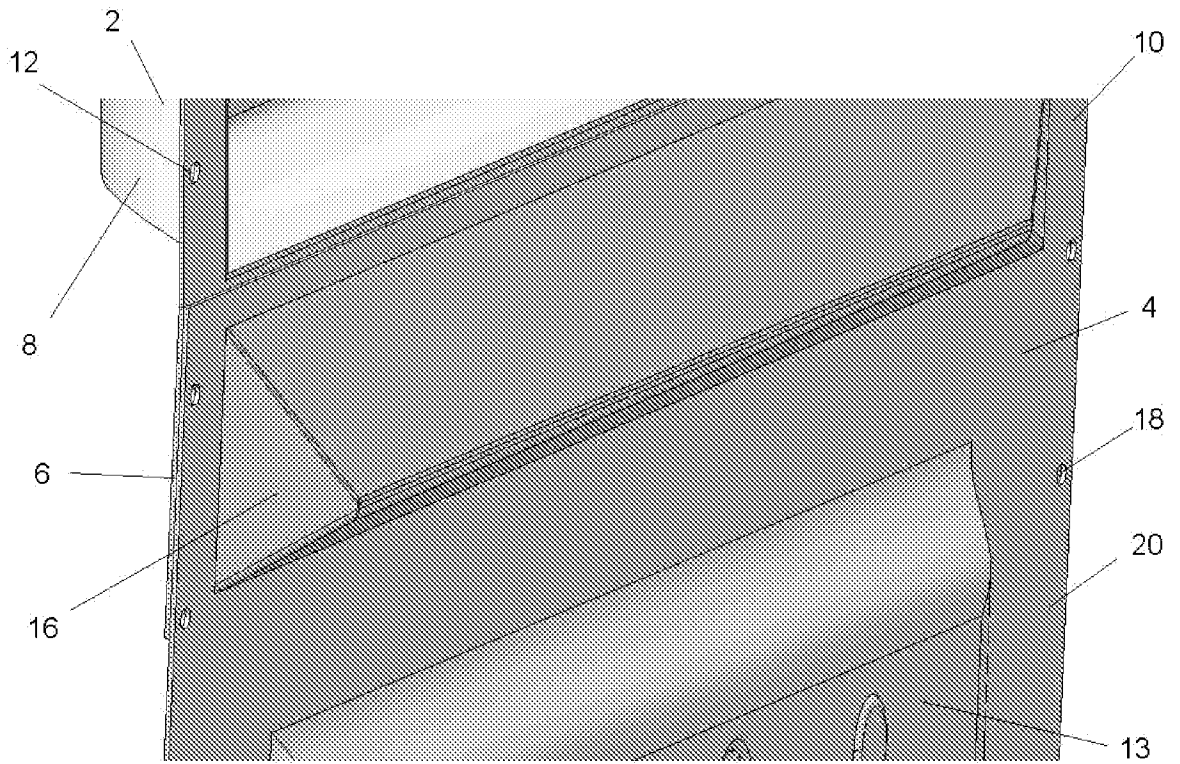


Figure 4

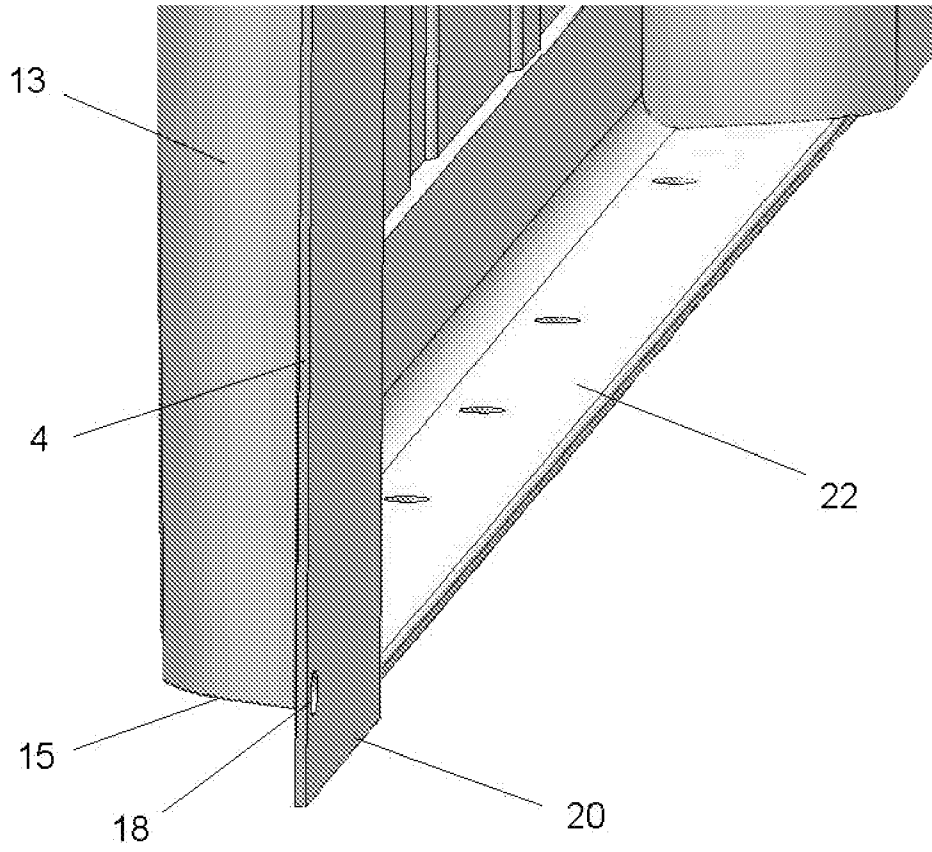


Figure 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2009/051516

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B62D29/04 B62D33/04 B60R21/02

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)
 B62D B60R

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 6 357 979 B1 (MONTAGNA JOHN [US] ET AL) 19 March 2002 (2002-03-19) claims 1-7; figures column 4, line 39 - column 6, line 51	1-26, 29-38
X	US 2007/046071 A1 (STEIGER WILLIAM D [US] ET AL) 1 March 2007 (2007-03-01) claims 1-8; figures paragraph [0005] - paragraph [0008]	1-3, 7-10, 18, 23-32, 35-38
X	GB 2 384 464 A (PRIMERA CONSULTANCY AND DESIGN [GB]) 30 July 2003 (2003-07-30) claims 1,5-10,13,14; figure 5 page 3, line 13 - page 4, line 2 page 12, line 30 - page 13, line 14	1-4,7-8, 12,18, 23-25, 29-38

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search

17 February 2010

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23/02/2010

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/GB2009/051516

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6357979	B1	19-03-2002	NONE	
US 2007046071	A1	01-03-2007	CA 2553094 A1	23-02-2007
GB 2384464	A	30-07-2003	AT 361859 T DE 60313699 T2 EP 1354760 A2 US 2003141731 A1	15-06-2007 24-01-2008 22-10-2003 31-07-2003