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(54) Light-transmitting panel and method for manufacturing the same

(57) The present invention relates to a light-transmitting panel comprising two spaced-apart elongated plates, which are interconnected near long sides, the first plate comprising a main surface and possibly ribs extending transversely to said main surface, away from the

second plate, which first plate comprises hook-shaped ribs extending from said second plate near both long sides. The present invention also relates to a method for manufacturing a plate that forms part of the aforesaid light-transmitting panel.

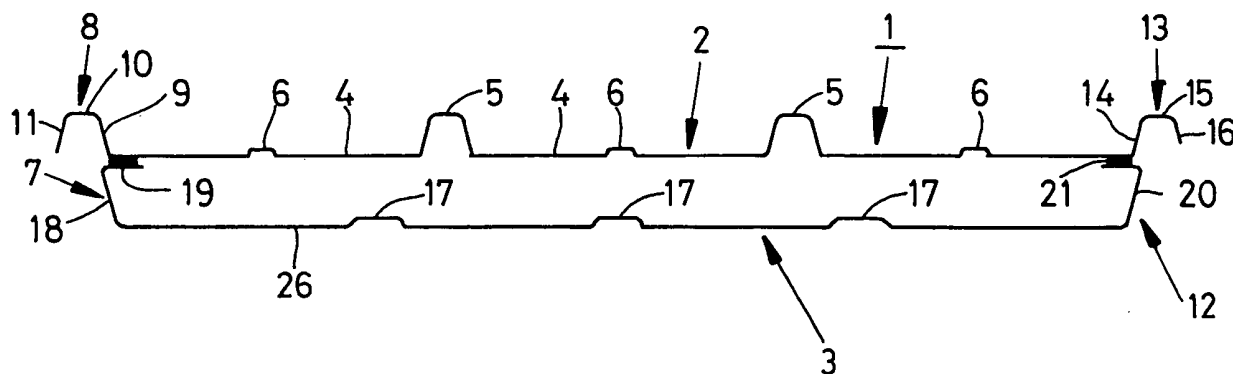


FIG.1

Description

[0001] The present invention relates to a light-transmitting panel comprising two spaced-apart elongated plates, which are interconnected near long sides, the first plate comprising a main surface and possibly ribs extending transversely to said main surface, away from the second plate, which first plate comprises hook-shaped ribs extending from said second plate near both long sides. The present invention also relates to a method for manufacturing a plate that forms part of the aforesaid light-transmitting panel.

[0002] Such a light-transmitting panel is known from Dutch patent No. 1006205 to the present applicant. Said panel comprises two plates, a first plate being provided with a rib on both long sides and a second plate being provided with a flange on one long side and with a U-shaped lip on the other long side. The mould sections for forming said second plate are complex because of the U-shaped lip.

[0003] If a panel according to NL-1006205 is to be used for spanning large distances, the stability is insufficient. In addition, the insulation of such a panel is not optimal, since a thermal bridge may occur between the two plates.

[0004] The object of the present invention is to improve the known light-transmitting panel in such a manner that the panel can be additionally stiffened.

[0005] Another object of the present invention is to provide a light-transmitting panel that has a good insulation value, whilst the occurrence of thermal bridges is minimised.

[0006] The light-transmitting panel as referred to in the introduction is characterized in that the second plate comprises plate portions extending from a main surface of the second plate on both long sides, a lip extending parallel to the main surface, towards the second long side, and a lip extending parallel to the main surface, towards the first long side.

[0007] Since the present panel comprises a second plate, which is on both long sides provided with a lip bent to a U-shape, a stiffening element can be fitted in the panel on both long sides.

[0008] The advantage of the panel according to the present invention is that the presence of two lips makes it possible to fit stiffening elements in the space between the main surface of the second plate and the lips of the second plate. It is also possible to mount an additional stiffening element in the space that is enclosed by the hook-shaped rib of the first plate and the lip of the second plate. The presence of said additional stiffening elements makes it possible to form a light-transmitting panel that has an increased strength, thus making it possible to span large distances.

[0009] Another advantage of the present invention is that such a construction provides a panel having a high insulation value.

[0010] Another embodiment of the panel according to the present invention is characterized in that the

hook-shaped ribs comprise a plate portion, a plate portion extending parallel to the main surface and a plate portion connected thereto, at least one of which plate portions extends at an angle to the main surface as far as a location near the second plate. As a result, the hook-shaped rib can be connected to the hook-shaped rib of an adjacent light-transmitting panel in use. In this way a firm connection between two adjacent panels can be obtained, which makes it possible to build up a large surface of a roof or a wall, or even entire roofs or walls, from the present light-transmitting panels.

[0011] Furthermore, the main surface of the second plate can be lengthened on one or on both long sides, in such a manner that the extending plate portion of the second plate is positioned near or abuts against a plate portion of the hook-shaped rib of the first plate. In this way an optimum insulation value is obtained, as a result of which no thermal bridges will occur in the light-transmitting panel.

[0012] The present invention further relates to a method for manufacturing a second plate comprising a main surface, plate portions extending from said main surface, a lip extending parallel to the main surface towards the second long side, and a lip extending parallel to the main surface towards the first long side.

[0013] According to the present invention, the second plate is thus provided with a U-shaped lip on both long sides. So far it has not been possible to manufacture such a second plate.

[0014] The present inventors have found that parts moulded in particular of plastic material on a mould will shrink after cooling down, so that said moulded parts will become stuck on the mould if they enclose the mould.

[0015] Consequently, it has not been possible so far to form the second plate according to the invention by means of the standard techniques. However, the present inventors have now developed a method that is characterized by the steps of:

- a) forming a preform on a mould in order to obtain a second plate, which second plate comprises a main surface and plate portions extending from said main surface,
- b) removing the preform obtained in step a) from the mould in plasticized condition,
- c) folding over the plate portions extending from the main surface until the lips extend parallel to the main surface of the second plate, and
- d) supporting the lips to obtain a second plate provided with lips extending parallel to the main surface of the second plate.

[0016] Although mention is made in step c) of lips on both long sides, it is possible in practice to use a preform that is already provided with a folded-over lip on one long side.

[0017] Using the present method, it has appeared to be possible to manufacture the intended plates in a con-

tinuous manner without said plates getting stuck on the mould.

[0018] It is in particular preferable to form the second plate of plastic material, especially polyester, because of its good light transmission, durability, weather resistance, strength, workability, water-resistance, resistance to UV-light and glueing capability. It is also possible to reinforce the plastic material with a fibrous material, for example glass fibres. Such a fibrous material can be used in the form of loose fibres or in the form of, for example, a mat or a membrane consisting of fibres.

[0019] In addition to that it is possible when fitting the plates together to mount a spacer in the space that is enclosed by the main surfaces of the two plates. Such a spacer is preferably built up in such a manner that it disperses the incident light, so that the space to be illuminated comprising the present panels is fully lighted without any shades occurring in said space. It is in particular preferable to use a plate-shaped insulation material comprising a multitude of tubular spaces extending perpendicularly to the main surface of the panel, which spaces are internally provided with reflecting surfaces, as a result of which the incident light is optimally spread in said space.

[0020] The first and the second plate can be fixed together by known fixing means, for example screws or glue. Preferably, the plates according to the present invention are fixed together by means of a glue, in particular a water-repellent/waterproof and/or UV-resistant glue, so that the panels can be mounted on the outer side of a space without any problem. Preferably, said glue is a silicone glue, because of the good bond it provides, its excellent water-resistance and its resistance against low temperatures and UV light.

[0021] Further embodiments are defined in the appended claims. The invention will now be explained in more detail with reference to the drawings, in which:

Figure 1 is a cross-sectional view of a panel according to the invention;

Figure 2 shows the panel of figure 1 with spaced-apart plates;

Figure 3 is a larger-scale detail view of the left-hand long side of the panel of figure 1;

Figure 4 is a larger-scale detail view of the right-hand long side of the panel of figure 1;

Figure 5 shows another embodiment of the left-hand long side of the panel that is shown in figure 1;

Figure 6 shows another embodiment of the right-hand long side of the panel that is shown in figure 1;

Figure 7 shows another embodiment of the left-hand long side of the panel of figure 1;

Figure 8 shows another embodiment of the right-hand long side of the panel of figure 1;

Figure 9 shows another embodiment of the left-hand long side of the panel of figure 1;

Figure 10 shows another embodiment of the

right-hand long side of the panel that is shown in figure 1;

Figure 11 shows another embodiment of the left-hand long side of the panel of figure 1.

[0022] In the figures, like parts are indicated by the same numerals.

[0023] Figure 1 shows a panel 1 according to the present invention, which panel 1 comprises two interconnected plates 2,3 extending transversely to the plane of the drawing. The first plate 2 has a main surface 4 and possibly ribs 5,6 extending transversely to the main surface 4, in a direction away from the second plate 3. Near the left-hand long side 7, the first plate 2 is provided with a hook-shaped rib 8 comprising a plate portion 9, a plate portion 10 extending parallel to the main surface 4 and a plate portion 11. Near the right-hand long side 12, the first plate 2 is provided with a hook-shaped rib 13 comprising a plate portion 14, a plate portion 15 extending parallel to the plate portion 10 and a plate portion 16.

[0024] The second plate 3 of the panel 1 comprises a main surface 26 and possibly a number of ribs 17 extending towards the first plate 2, a plate portion 18 located near the left-hand long side 7, which extends from the main surface 26, and a lip 19 extending parallel to the main surface 26, toward the right-hand long side 12. Near the right-hand long side 12, the second plate 3 comprises a plate portion 20 extending from the main surface 26 and a lip 21 extending parallel to the main surface 26, toward the left-hand long side 7.

[0025] After the individual plates 2,3 have been formed, an insulation material (not shown) is if desired locally applied to the plate 3, after which the first plate 2 is positioned opposite the second plate 3 (figure 2), in such a manner that the lip 19 of the second plate 3 is positioned near the hook-shaped rib 8 of the first plate 2 and the lip 21 of the second plate 3 is positioned near the hook-shaped rib 13 of the first plate 2. A glue 22, for example, is applied to the lip 19 and the lip 21 (figures 3 and 4), after which the first plate 2 is moved from the position that is shown in figure 2 toward the second plate 3 as indicated by the arrow P1, until the lip 19 and the lip 21 of the second plate 3 abut against the first plate 2. Any insulation material that may be provided is present in the space that is enclosed by the two main surfaces 4,26 and the plate portions 18,20.

[0026] Figure 5 shows another embodiment both of the first plate 2 and of the second plate 3. The first plate 2 comprises a plate portion 11 that extends at an angle to the main surface 4 to a position near the second plate 3. The plate portion 11 may extend to a position near the main surface 26 of the second plate 3. After the first and the second plate 2 and 3 have been interconnected, the panel 1 can be connected to an adjacent panel 1, with the hook-shaped rib 13 of one panel 1 being fitted over the hook-shaped rib 8 (with the lengthened plate portion 11) of the adjacent panel (not shown). It will be understood that instead of using a lengthened plate portion 11

it is also possible to lengthen the plate portion 16 present on the right-hand long side 12 in a comparable manner.

[0027] The figure also shows another embodiment of the second plate 3, which has been lengthened in the direction of the plate portion 11 of the first plate 2, in such a manner that the plate portion 18 of the second plate 3 abuts against the plate portion 11 of the second plate 2, which two plate portions 11,18 are interconnected by means of a glue 22. Figure 6 shows another embodiment of the second plate 3, in which the main surface 26 of the second plate 3 is shown to have been lengthened on the right-hand long side 12, in such a manner that the plate portion 20 comes near the plate portion 16 of the first plate 2.

[0028] In another embodiment of the second plate 3 (figure 7), the second plate 3 is near the left-hand long side 7 provided with a strip 22 extending towards the first plate 2, with a strip 23 extending from the second long side 14, which is connected thereto, with a plate portion 18 extending towards the main surface 4, and with a lip 19 extending parallel to the main surface 4, towards the second long side 14.

[0029] Figure 8 shows the mirror image of this configuration, in which the second plate 3 is near the right-hand long side 12 provided with a strip 24 extending towards the first plate 2, with a strip 25 extending from the first long side 7, which is connected thereto, with a plate portion 20 extending towards the main surface 4, and with a lip 21 extending parallel to the main surface 4, towards the first long side 7.

[0030] Figures 9 and 10 show yet another embodiment of the present panel 1, in which a stiffening element 27 is mounted in one or in both spaces that are enclosed by the main surface 26 and the lips 19,21 of the second plate 3.

[0031] Figure 11 shows an alternative embodiment of the left-hand side of the panel 1. In this embodiment the main surface 26 of the second plate 3 is lengthened, as is the plate portion 11 of the first plate 2. A stiffening element 27 is mounted in the space that is enclosed by the main surface 26 and the lip 19 of the second plate 3. Furthermore, a stiffening element 28 is mounted in the space that is enclosed by the plate portions 9, 10, 11 of the first plate 2 and the lip 19 of the second plate 3.

[0032] It will be apparent that it is possible to combine the various embodiments of the first plate 2 and the second plate 3 according to figures 1-11 in any desired manner.

Claims

1. A light-transmitting panel (1) comprising two spaced-apart elongated plates (2,3), which are interconnected near long sides (7,12), the first plate (2) comprising a main surface (4) and possibly ribs (5,6) extending transversely to said main surface (4), away from the second plate (3), which first plate (2)

comprises hook-shaped ribs (8,13) extending away from said second plate (3) near both long sides (7,12), **characterized in that** the second plate (3) comprises plate portions (18,20) extending from a main surface (26) of the second plate (3) on both long sides (7,12), a lip (19) extending parallel to the main surface (26), towards the second long side (12), and a lip (21) extending parallel to the main surface (26), towards the first long side (7).

2. A light-transmitting panel (1) according to claim 1, **characterized in that** the hook-shaped ribs (8,13) comprise a plate portion (9,14), a plate portion (10,15) extending parallel to the main surface (4) and a plate portion (11,16) connected thereto, at least one of which plate portions (11,16) extends at an angle to the main surface (4) as far as a location near the second plate (3).
3. A light-transmitting panel (1) according to any one or more of the preceding claims, **characterized in that** the main surface (26) of the second plate (3) can be lengthened on left-hand or the right-hand long side (7,12), in such a manner that the plate portion (18,20) is positioned near the plate portion (11,16) of the first plate (2).
4. A light-transmitting panel (1) according to claim 3, **characterized in that** the plate portion (18,20) of the second plate (3) abuts against the plate portion (11,16) of the first plate (2).
5. A light-transmitting panel (1) according to claim 2, **characterized in that** the hook-shaped ribs (8,13) can be connected to the hook-shaped ribs (13,8) of adjacent light-transmitting panels (1) in use.
6. A light-transmitting panel (1) according to any one or more of the claims 1-5, **characterized in that** an additional stiffening element (27) is mounted in the space that is enclosed by the main surface (26) of the second plate (3) and the lip (19,21) of the second plate (3).
7. A light-transmitting panel (1) according to any one or more of the claims 3-6, **characterized in that** a stiffening element (28) is mounted in the space that is enclosed by the plate portions (9,10,11) of the first plate (2) and the lip (19) of the second plate (3).
8. A method for manufacturing a second plate (3) comprising a main surface (26), plate portions (18) and (20) extending from said main surface (26), a lip (19) extending parallel to the main surface (26) towards the second long side (12), and a lip (21) extending parallel to the main surface (26) towards the first long side (7), which method comprises the steps of:

- a) forming a preform on a mould in order to obtain a second plate (3), which second plate (3) comprises a main surface (26) and plate portions (18,20) extending from said main surface (26),
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b) removing the preform obtained in step a) from the mould in plasticized condition,
c) folding over the plate portions (18,20) extending from the main surface (26) until the lips (19,21) extend parallel to the main surface (26)
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of the second plate (3), and
d) supporting the lips (19,21) to obtain a second plate (3) provided with lips (19,21) extending parallel to the main surface (26) of the second plate (3).
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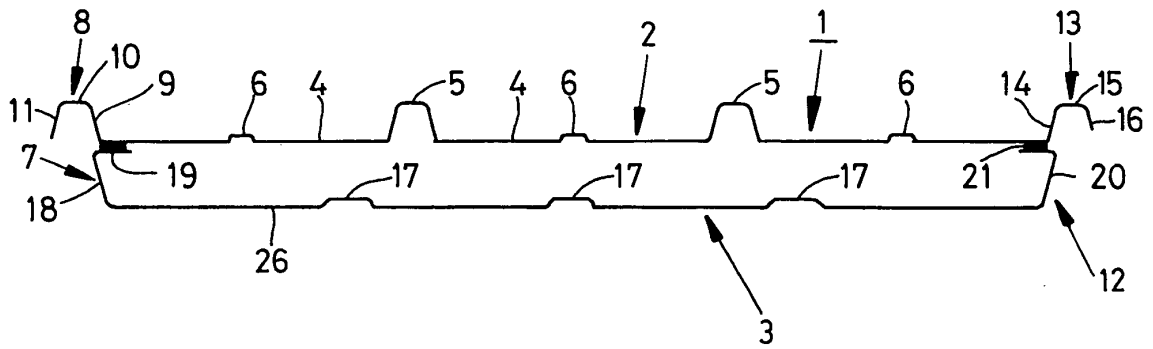


FIG. 1

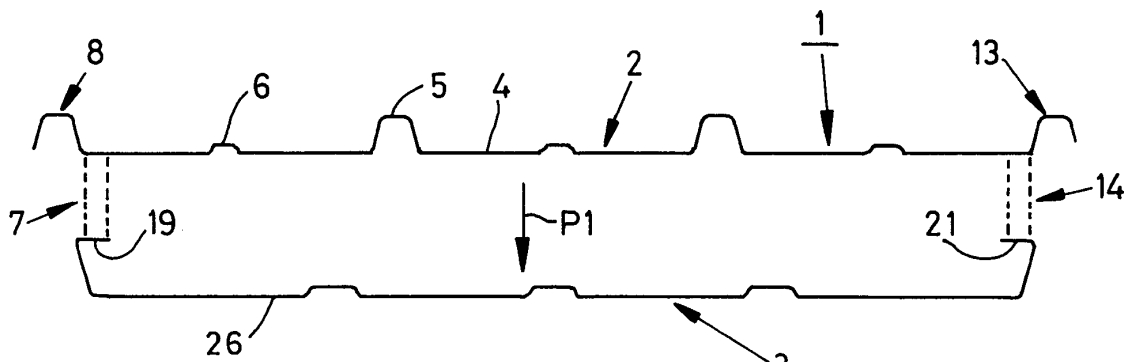


FIG. 2

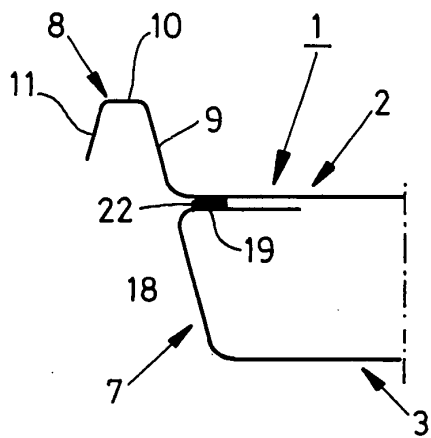


FIG. 3

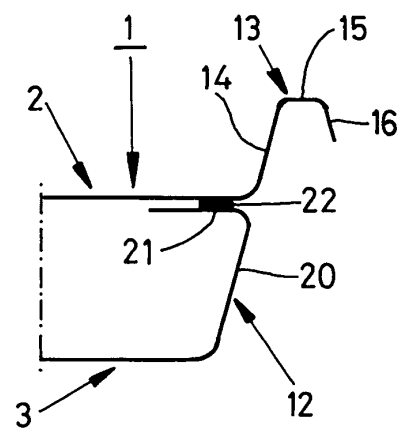


FIG. 4

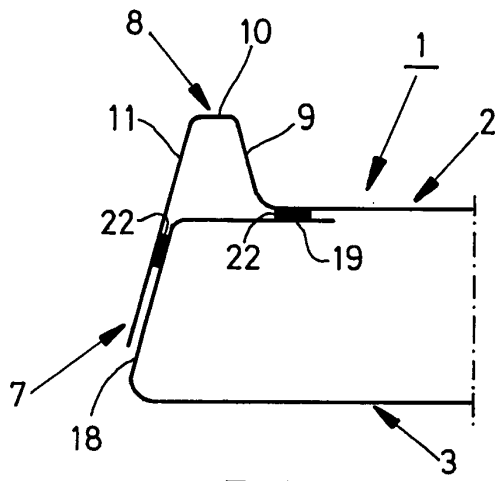


FIG. 5

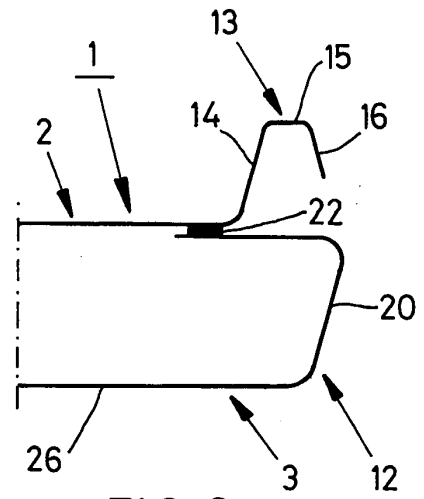


FIG. 6

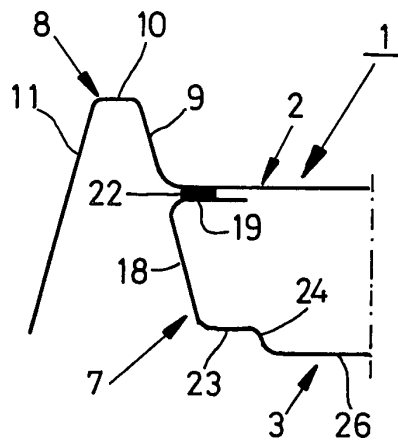


FIG. 7

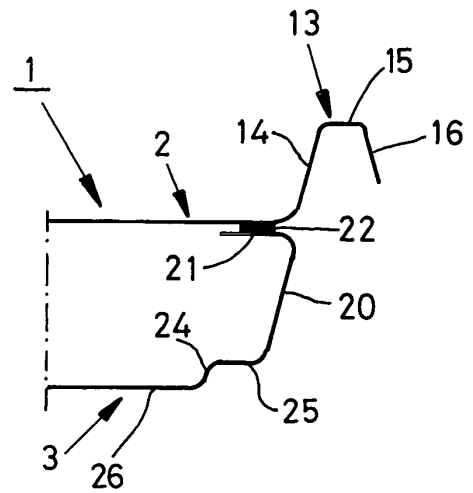


FIG. 8

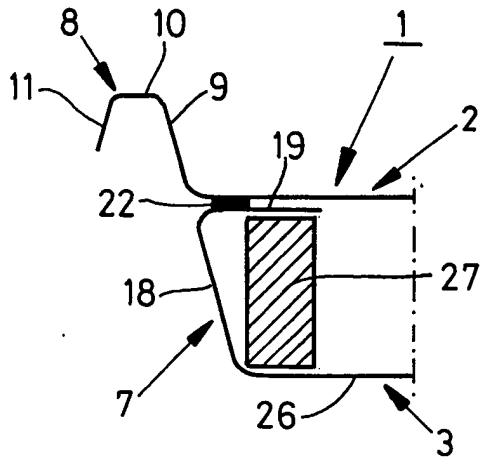


FIG. 9

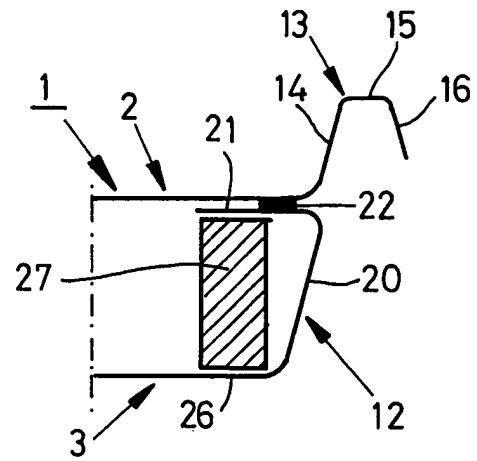


FIG. 10

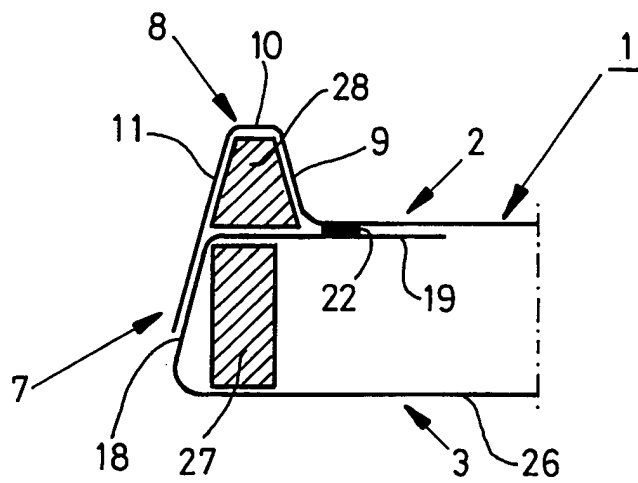


FIG. 11