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(54) **Modular panel for laying out on a roof**

(57) A modular panel (1) for laying out on a roof to alter the slope of the roof surface has one or more rupture lines (2). The panel (1) can be separated into individual

roof panel modules (W1-W5) along the individual rupture lines (2). The individual roof panel modules (W1-W5) are of varying thickness in order to alter the slope of the roof surface.

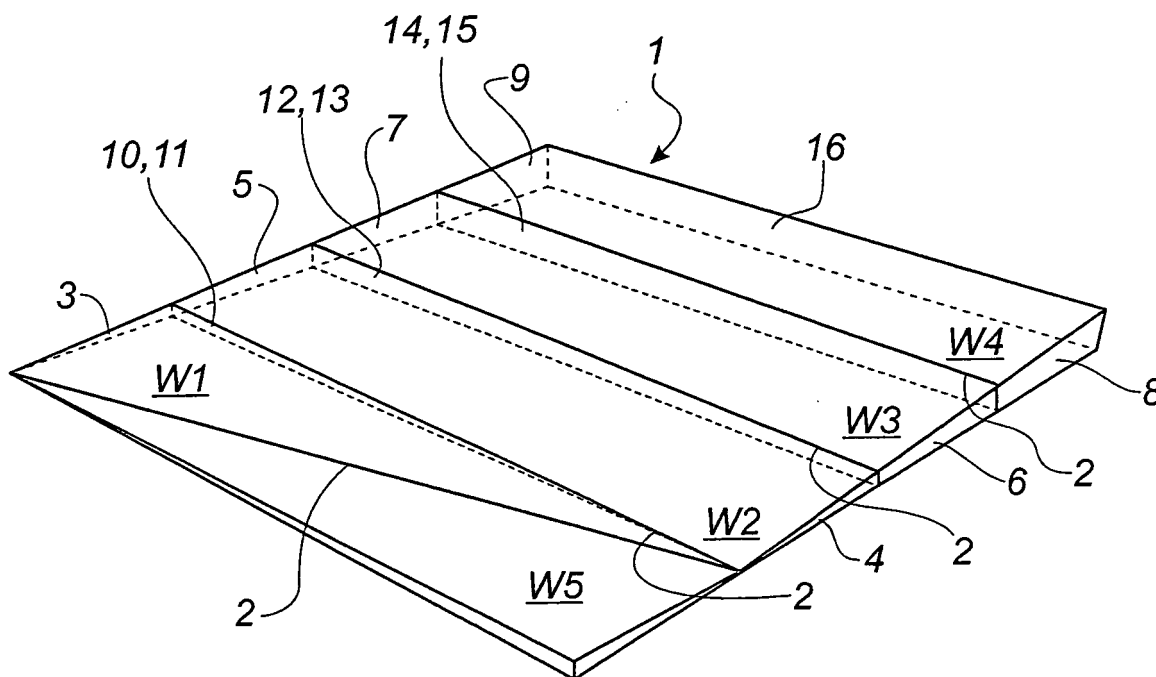


Fig. 1

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Description

Technical Field

[0001] The present invention relates to a modular panel for laying out on a roof to alter the slope of the roof surface.

Background Art

[0002] Buildings with flat roofs have the problem that water can accumulate on the surface of the roof when it rains, if the roof has not been designed with a slope towards a drain. This can be particularly noticeable with, for example, large commercial buildings which may have, for example, concrete roofs or steel plate roofs, as these buildings have a large roof surface area. Therefore, such concrete roofs or steel plate roofs are often covered with panels creating a slope in a predetermined direction when laid out on the flat roof. These panels may be, for example, a roof insulation made of foamed plastics, such as expanded polystyrene, on top of which roof felting or another type of roofing material is laid out. Typically, this is carried out by laying out wedge-cut roof insulation panels, optionally combined with support panels, in such a way as give the roof a sawtooth profile or a triangular profile in the longitudinal or transverse direction of the roof surface.

[0003] However, this creates a slope in only one direction, and when it rains, water continues to accumulate on the roof. Therefore, valley gutter wedges or counter-slope wedges altering the slope of the roof in both longitudinal and transverse directions are placed on top of the wedge-cut roof insulation panels. Thus, valley gutters are formed providing a separate slope towards a drain situated in the middle of the roof.

[0004] The disadvantage of such valley gutter wedges is, for example, that they have to be cut out with the help of a saw or a heated wire to fit the roof in question where they are to be laid out, which is a resource-intensive process. Moreover, the different panels cut to size for valley gutters are often comparatively small in size so that they can be frequently blown off the roof after having been laid out because of the low density and form of polystyrene. As it is time-consuming to pick up the panels having been blown off the roof, a new panel is used instead so that a great number of roof insulation panels having been blown off are frequently wasted when laying out a roof.

Disclosure of Invention

[0005] The object of the present invention is to simplify handling of roof insulation panels, to reduce waste thereof when laying them out as well as to reduce production costs.

[0006] The object of the invention is achieved by a modular panel for laying out on a roof to alter the slope of the roof surface, where the panel has one or more

rupture lines along which the panel can be separated into individual roof panel modules, and where the individual roof panel modules are of varying thickness to alter the inclination of the roof surface. Thus, a modular panel may be manufactured, for example by casting, where the panel includes several roof panel modules for positioning in different places on the flat roof. Moreover, it is possible to wait with separating the individual roof panel modules until immediately prior to laying them out, thereby reducing the risk of them being blown off the roof.

[0007] In a preferred embodiment, the panel has at least one first and one second roof panel module, where the roof panel modules may be either a triangular roof panel module or a rectangular roof panel module. This, for example, allows for three simple rectangular modular panels consisting of either two triangular roof panel modules, one triangular roof panel module and a trapezoidal roof panel module or two rectangular roof panel modules. This also allows for a trapezoidal modular panel consisting of a triangular roof panel module and a rectangular roof panel module.

[0008] In a preferred embodiment of the invention, the first roof panel module is provided with an end face of substantially the same shape as an end face on the second roof panel module. Thus, the two roof panel modules may be separated and laid out in direct extension of one another in such a way that the two end faces fit with each other and that no discontinuity arises between the panels.

[0009] In a particular embodiment of the invention, the panel has at least a first roof panel module in the shape of a right-angle triangle comprising an end face along a comparatively short leg in the transverse direction and a side face along a comparatively long leg in the longitudinal direction, and an abutting rectangular roof panel module comprising two end faces and a side face, said side face having substantially the same shape as and abutting the side face of the triangular roof panel module, and where the end face of the triangular roof panel module has substantially the same shape as one end face of the rectangular roof panel module, preferably the end face facing the opposite direction of the end face of the triangular roof panel module. Thus, the triangular roof panel module and the rectangular roof panel module can be separated and laid out in direct extension of one another in such a way that the two end faces fit with each other and thus do not yield any discontinuity. Alternatively, the two roof panel modules may be laid out without separating them, in which case there again is no discontinuity, since the abutting side faces have substantially the same shape.

[0010] In another embodiment, the panel has two or more, preferably three, consecutive rectangular roof panel modules, where the abutting side faces have substantially the same shape, and where one end face of a first rectangular roof panel module has substantially the same shape as the end face of an abutting rectangular roof panel module facing the opposite direction. In this way, entire panels can be laid out and displaced by the length

and width of one roof panel module without creating a discontinuity between the two panels. Moreover, such a modular panel is inexpensive to manufacture, since a shape with a continuous surface may be used.

[0011] In a preferred embodiment of the invention, the panel additionally has a further triangular roof panel module in the shape of a right-angle triangle, preferably positioned so that its hypotenuse faces the hypotenuse of the first triangular roof panel module, and preferably substantially identical to the first triangular roof panel module. Thus, the second triangular roof panel module can be separated from the modular panel and used as the "acute part" of a valley gutter wedge.

[0012] In a particular embodiment, each roof panel module has a planar bottom side and a planar top side, where the bottom side and the top side are not parallel so that the top sides of the roof panel modules have an even slope, if they are positioned with the bottom side on a horizontal surface. Naturally, the roof panel modules may be positioned with the top sides down, thus providing the bottom sides of the roof panel modules with a corresponding even slope. Preferably, the slope in longitudinal direction of the roof panel modules is between 1:200 and 1:10 or between 1:100 and 1:30, for example around 1:60, and in transverse direction of the roof panel modules between 1:100 and 1:5 or between 1:50 and 1:8, for example around 1:15.

[0013] Preferably, the rupture lines are provided as a perforation of the panel or as a groove or a recess in the panel. Thus, the individual roof panel modules may be separated from each other in a simple manner, for example, by breaking them off from each other along the rupture lines or by cutting the remaining part of the panel with a hobby knife in the groove.

[0014] In a particular embodiment, the panel is made of an insulating material, for example, foamed plastics, such as expanded polystyrene. In this way, the panel may be manufactured in a particularly simple manner, and the roof panel modules may be used as roof insulation.

Brief Description of the Drawings

[0015] The invention is explained in detail below with reference to the drawings, in which

Fig. 1 is a perspective view of a modular panel according to the invention,

Fig. 2 is a perspective view of a valley gutter wedge composed of roof panel modules of modular panels according to the invention,

Fig. 3 is a cross-sectional view of laid-out wedge-cut roof insulation panels and support panels,

Fig. 4 is a cross-sectional view of laid-out wedge-cut roof insulation panels and support panels,

Fig. 5 is a top view of a flat roof with laid-out roof insulation panels, and

Fig. 6 is a perspective view of a section of a roof with wedge-shaped roof insulation panels and valley gutter wedges.

Best Modes for Carrying out the Invention

[0016] Fig. 1 shows a modular panel 1 according to the invention. The modular panel 1 consists of five different roof panel modules W1-W5, preferably made from foamed plastics, such as expanded polystyrene, said modules being separatable along rupture lines 2. The rupture lines 2 may, for example, be perforated lines or a groove marked or cut between the roof panel modules. Thus, each roof panel module can be separated from the panel 1 by either breaking it off the panel 1 or, for example, by guiding a hobby knife through the grooves and cutting each roof panel module off the panel 1.

[0017] The panel 1 has three rectangular roof panel modules W2-W4 and two right-angle triangular roof panel modules W1, W5. The first roof panel module W1 has the shape of a right-angle triangle and comprises a side face 10 along a comparatively long leg and an end face 3 along a comparatively short leg.

[0018] A second roof panel module W2 which is rectangular is positioned adjacent the first roof panel module W1. The second roof panel module W2 has a first side face 11 and a second side face 12 as well as a first end face 4 and a second end face 5. The first roof panel module W1 and the second roof panel module W2 are connected by means of the side face 10 of the first roof panel module W1 and the first side face 11 of the second roof panel module W2 along a rupture line 2. The side faces 10 and 11 have the same shape. The end face 3 of the first roof panel module W1 has the same shape as the first end face 4 of the second roof panel module W2, which means that the two roof panel modules W1, W2 may be separated and positioned in direct extension of one another without there arising any discontinuity between the roof panel modules W1, W2.

[0019] A third roof panel module W3 which is rectangular is positioned adjacent the second roof panel module W2. The third roof panel module W3 has a first side face 13 and a second side face 14 as well as a first end face 6 and a second end face 7. The second roof panel module W2 and the third roof panel module W3 are connected by means of the second side face 12 of the second roof panel module W2 and the first side face 13 of the third roof panel module W3 along a rupture line 2. The side faces 12 and 13 have the same shape. The second end face 5 of the second roof panel module W2 has the same shape as the first end face 6 of the third roof panel module W3, which means that the two roof panel modules W2, W3 may be separated and positioned in direct extension of one another without there arising any discontinuity between the roof panel modules W2, W3.

[0020] A fourth roof panel module W4 which is rectangular is positioned adjacent the third roof panel module W3. The fourth roof panel module W4 has a first side face 15 and a second side face 16 as well as a first end face 8 and a second end face 9. The third roof panel module W3 and the fourth roof panel module W4 are connected by means of the second side face 14 of the third roof panel module W3 and the first side face 15 of the fourth roof panel module W4 along a rupture line 2. The side faces 14 and 15 have the same shape. The second end face 7 of the third roof panel module W3 has the same shape as the first end face 8 of the fourth roof panel module W4, which means that the two roof panel modules W3, W4 may be separated and positioned in direct extension with one another without there arising any discontinuity between the roof panel modules W3, W4.

[0021] A fifth roof panel module W5 having the shape of a right-angle triangle is connected to the first roof panel module W1 by means of their hypotenuses along a rupture line 2.

[0022] The short legs of the triangular roof panel modules W1, W5 and the short sides of the three rectangular roof panel modules W2-W4 have a length of, for example, 300 mm, and the long legs of the triangular roof panel modules W1, W5 and the long sides of the three rectangular roof panel modules W2-W4 have a length of, for example, 1200 mm. Thus, the resulting modular panel 1 is square having a side length of 1200 mm.

[0023] The top sides and the bottom sides of the individual roof panel modules W1-W5 are not parallel and have a slope of 1:15 in the transverse direction (along the short sides of the rectangular roof panel modules) and a slope of 1:60 in the longitudinal direction (along the long sides of the rectangular roof panel modules).

[0024] The modular panels 1 may be used to construct a valley gutter wedge 20 of any length. Fig. 2 shows an example, where the panels 1 have been used to make a valley gutter wedge having the length of six panel lengths (7200 mm). The valley gutter wedge is constructed from six rows of roof panel modules in longitudinal direction, where the first row consists of one roof panel module, the second row of two roof panel modules etc.

[0025] The first row consists of a fifth roof panel module W5 of a first modular panel. The second row consists of a first roof panel module W1 and a second roof panel module W2 of said first modular panel. The third row consists of three first roof panel modules W1-W3 of a second modular panel. The fourth row consists of four first roof panel modules W1-W4 of a third modular panel. Each roof panel module in each row is positioned such that the individual end faces fit with each other so that the resulting valley gutter wedge 20 has an even slope in both longitudinal and transverse direction.

[0026] In continuation of this idea, the fifth row consists of the four first roof panel modules W1-W4 of a fourth modular panel and the fourth roof panel module W4 of the second modular panel. To achieve an even slope

without discontinuity, the fourth roof panel module W4 of the second modular panel is positioned on top of a support panel C having a thickness of, for example, 20 mm.

[0027] In the same manner, the sixth row consists of the four first roof panel modules W1-W4 of a fifth modular panel as well as the third and the fourth roof panel module W3, W4 of the first modular panel. To achieve an even slope without discontinuity, the two roof panel modules W3, W4 of the first modular panel are positioned on top of two support panels C. Naturally, the two support panels C may be replaced by a single support panel having twice the thickness.

[0028] By means of the above-mentioned method a valley gutter wedge of any length may be constructed, thus eliminating the need of making parts cut out by means of sawing or a heated wire.

[0029] When a slope towards a drain is to be created on a flat roof, such as a steel plate roof or a concrete roof, this is carried out, for example, by first laying polystyrene panels having a thickness of 95 mm. Panels of a different thickness may be used, the thickness being selected generally based on the insulation needs of the specific building. The wedge-cut roof insulation panels are laid out on top of these panels. The panels are, for example, square having a side length of 1200 mm and a slope along one of the sides of 1:40. However, this slope may be any size, optionally depending on different required building standards. The wedge-cut roof insulation panels are laid out in such a way that the roof obtains a saw-toothed or triangular profile in the longitudinal direction of the roof. One example of how the saw-toothed profile is constructed is illustrated in Fig. 3 showing a cross-section of a plurality of wedge-cut roof insulation panels W10. They are laid out in the manner shown in Fig. 3, optionally in combination with support panels A1 and A2 having a thickness of 30 mm and 60 mm, respectively.

[0030] The saw-toothed profile may also be constructed in the manner illustrated in Fig. 4, displaying different types of wedge-cut roof insulation panels W20 and W21 fitting with each other such that an even slope is obtained, when two panels are positioned adjacent to each other. These panels shown in cross-section are also preferably square having a side length of 1200 mm and a slope along one of the sides of 1:40. To create the saw-toothed profile, laying out the roof may optionally be combined with support panels B having a thickness of 60 mm and/or 120 mm.

[0031] Fig. 5 shows an example of how the wedge-cut panels are laid out on a flat rectangular roof and how valley gutter wedges are positioned to create a slope towards a drain 22. A section of the roof construction is shown in Fig. 6 in a perspective view.

[0032] The wedge-cut panels W10 are positioned in transverse direction of the roof in such a manner that this creates a slope in the longitudinal direction of the roof (shown with arrows in Fig. 5 and Fig. 6). The first row of wedge-cut panels W10 (seen from the left-hand side in

Fig. 5) is positioned on top of a row of support panels A1 and support panels A2, while the second row of wedge-cut panels W1 is positioned on top of a row of support panels A2. The third row of wedge-cut panels W10 is positioned on top of a row of support panels A1, while the fourth row of wedge-cut panels W10 has been laid out without support panels. The next four rows are positioned as "mirror images" of the first four rows and by alternately laying out the wedge-cut panels W10 in this manner with a slope towards the right-hand side and the left-hand side, respectively, a saw-toothed profile in the longitudinal direction of the roof is obtained.

[0033] Subsequently, the valley gutter wedges 20 are laid out in such a way that they create a counter slope to the saw-toothed profile while simultaneously creating a slope in the transverse direction of the roof. The resulting slope direction of the valley gutter wedges 20 is shown in Fig. 5 and Fig. 6. In this way, a plurality valley gutters 21 are formed having a slope (as shown with arrows) towards a row of drains 22 situated in the middle of the roof. This ensures that the roof does not contain areas where water accumulates when it rains.

[0034] The invention has been described with reference to a preferred embodiment. Many modifications are conceivable without thereby deviating from its scope. From Fig. 2, for example, it is apparent that the first two roof panel modules W1, W2 are always laid out together. Hence, the rupture line between the two roof panel modules W1, W2 is generally not necessary, and the two roof panel modules W1, W2 may instead be provided as a single contiguous roof panel module. It is also conceivable that two different modular panels are used to construct the valley gutter wedge. This may, for example, be a panel consisting of the four first roof panel modules W1-W4, while a second modular panel consists of two triangular roof panel modules W5. In this manner, material waste can be kept at an absolute minimum. Modifications and variations apparent to those skilled in the art are considered to fall within the scope of the present invention.

Claims

1. A modular panel (1) for laying out on a roof to alter the slope of the roof surface, where the panel (1) has one or more rupture lines (2) along which the panel (1) can be separated into individual roof panel modules (W1-W5), and where the individual roof panel modules (W1-W5) are of varying thickness in order to alter the inclination of the roof surface.
2. A modular panel (1) according to claim 1, **characterized in that** the panel (1) has at least one first (W1) and one second (W2) roof panel module, where the roof panel modules (W1, W2) may either be a triangular roof panel module or a rectangular roof panel module.
3. A modular panel (1) according to claim 2, **characterized in that** the first roof panel module (W1) has an end face (3) having substantially the same shape as an end face (4) of the second roof panel module (W2).
4. A modular panel (1) according to claim 3, **characterized in that** the panel (1) has at least a first roof panel module (W1) in the shape of a right-angle triangle comprising an end face (3) along a comparatively short leg in the transverse direction and a side face (10) along a comparatively long leg in the longitudinal direction, and an abutting rectangular roof panel module (W2) comprising two end faces (4, 5) and a side face (11), said side face having substantially the same shape as and abutting the side face (10) of the triangular roof panel module (W1), and where the end face (3) of the triangular roof panel module (W1) has substantially the same shape as one end face (4, 5) of the rectangular roof panel module (W2), preferably the end face (4) facing the opposite direction from the end face (3) of the triangular roof panel module (W1).
5. A modular panel (1) according to claim 5, **characterized in that** the panel (1) has two or more, preferably three consecutive rectangular roof panel modules (W2-W4), where the abutting side faces (12, 13; 14, 15) have substantially the same shape, and where one end face (5) of a first rectangular roof panel module (W2) has substantially the same shape as the end face (6) facing the opposite direction of an abutting rectangular roof panel module (W3).
6. A modular panel (1) according to claim 5, **characterized in that** the panel (1) additionally has a further triangular roof panel module (W5) in the shape of a right-angle triangle, preferably positioned so that its hypotenuse faces the hypotenuse of the first triangular roof panel module (W1), and preferably substantially identical to the first triangular roof panel module (W1).
7. A modular panel (1) according to any one of the preceding claims, **characterized in that** each roof panel module (W1-W5) has a planar bottom side and a planar top side, where the bottom side and the top side are not parallel so that the top sides of the roof panel modules have an even slope, if they are positioned with the bottom side on a horizontal surface.
8. A modular panel (1) according to claim 7, **characterized in that** the top side of each roof panel module (W1-W5) has a slope of between 1:200 and 1:10 or between 1:100 and 1:30, for example around 1:60, when laid out on a horizontal surface in longitudinal direction.

9. A modular panel (1) according to claim 7 or 8, **characterized in that** the top side of each roof panel module (W1-W5) has a slope of between 1:100 and 1:5 or between 1:50 and 1:8, for example around 1:15, when laid out on a horizontal surface in the transverse direction. 5
10. A modular panel (1) according to any one of the preceding claims, **characterized in that** the rupture lines (2) are provided as a perforation of the panel or as a groove or a recess in the panel. 10
11. A modular panel (1) according to any one of the preceding claims, **characterized in that** the panel (1) is made of an insulating material, for example, foamed plastics, such as expanded polystyrene. 15

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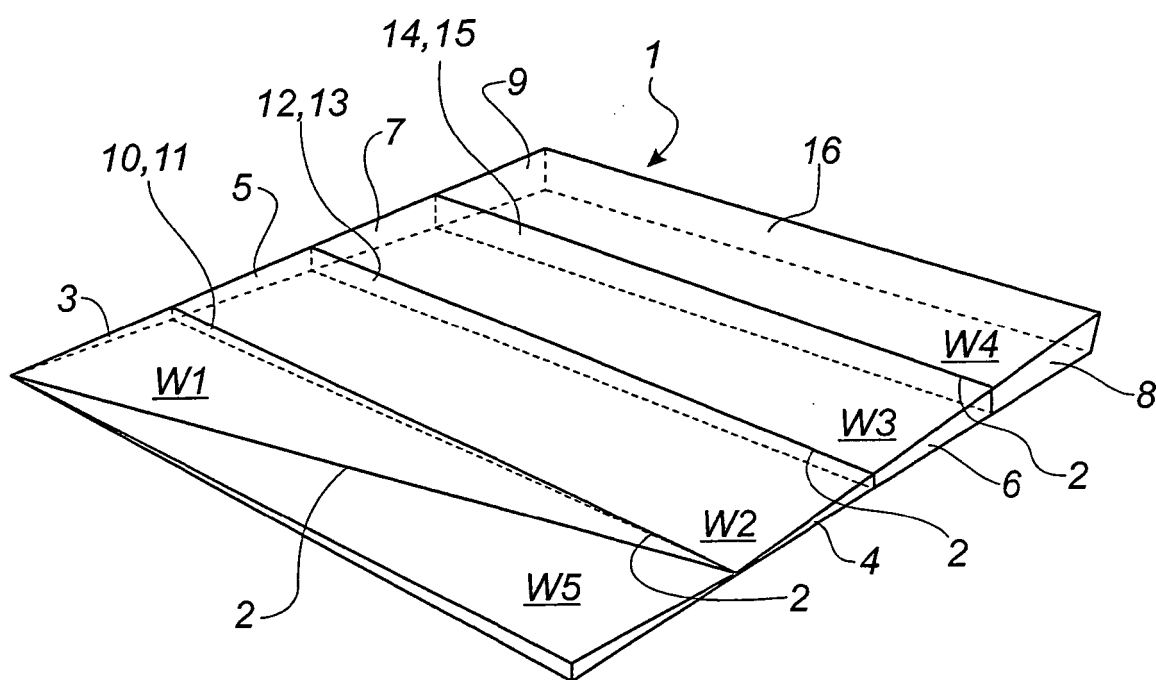


Fig. 1

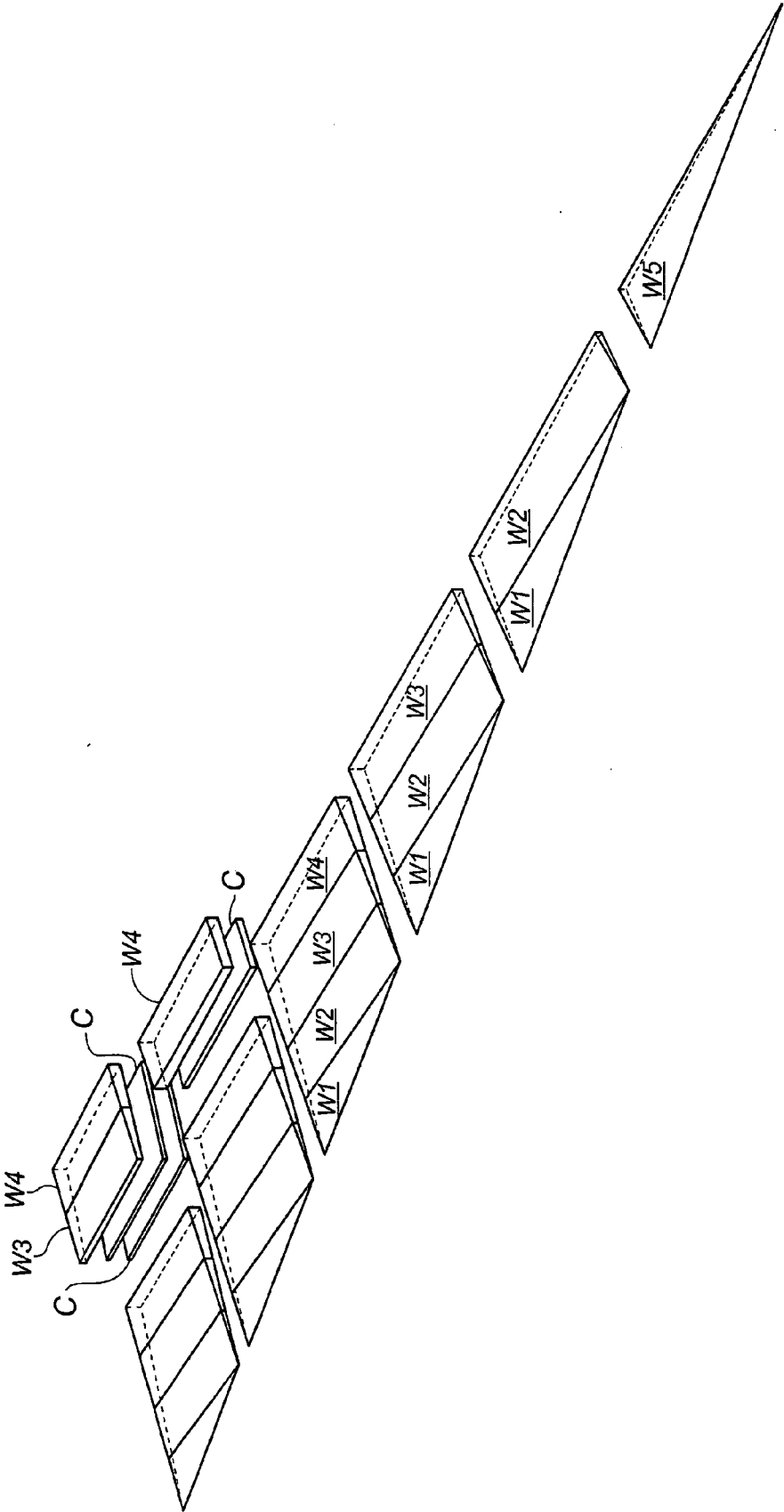


Fig. 2

[illegible]

Fig. 3

$\overline{W20}$	$\overline{W21}$	$\overline{B}$	$\overline{W20}$	$\overline{W21}$	$\overline{B}$
		$\overline{B}$		$\overline{W21}$	$\overline{B}$
			$\overline{W20}$		$\overline{B}$
				$\overline{W21}$	$\overline{B}$
					$\overline{B}$
				$\overline{W20}$	
					$\overline{W21}$

Fig. 4

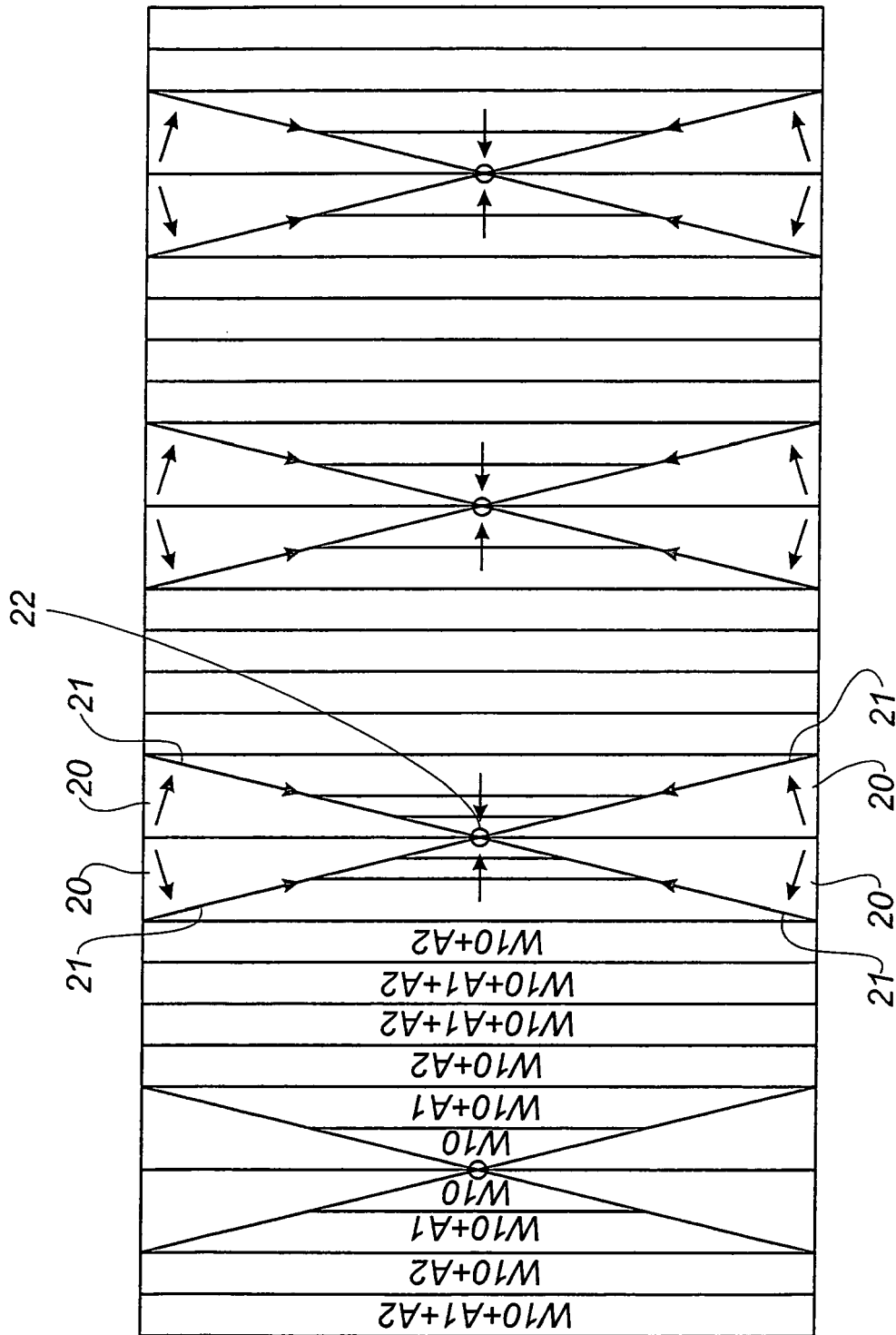


Fig. 5

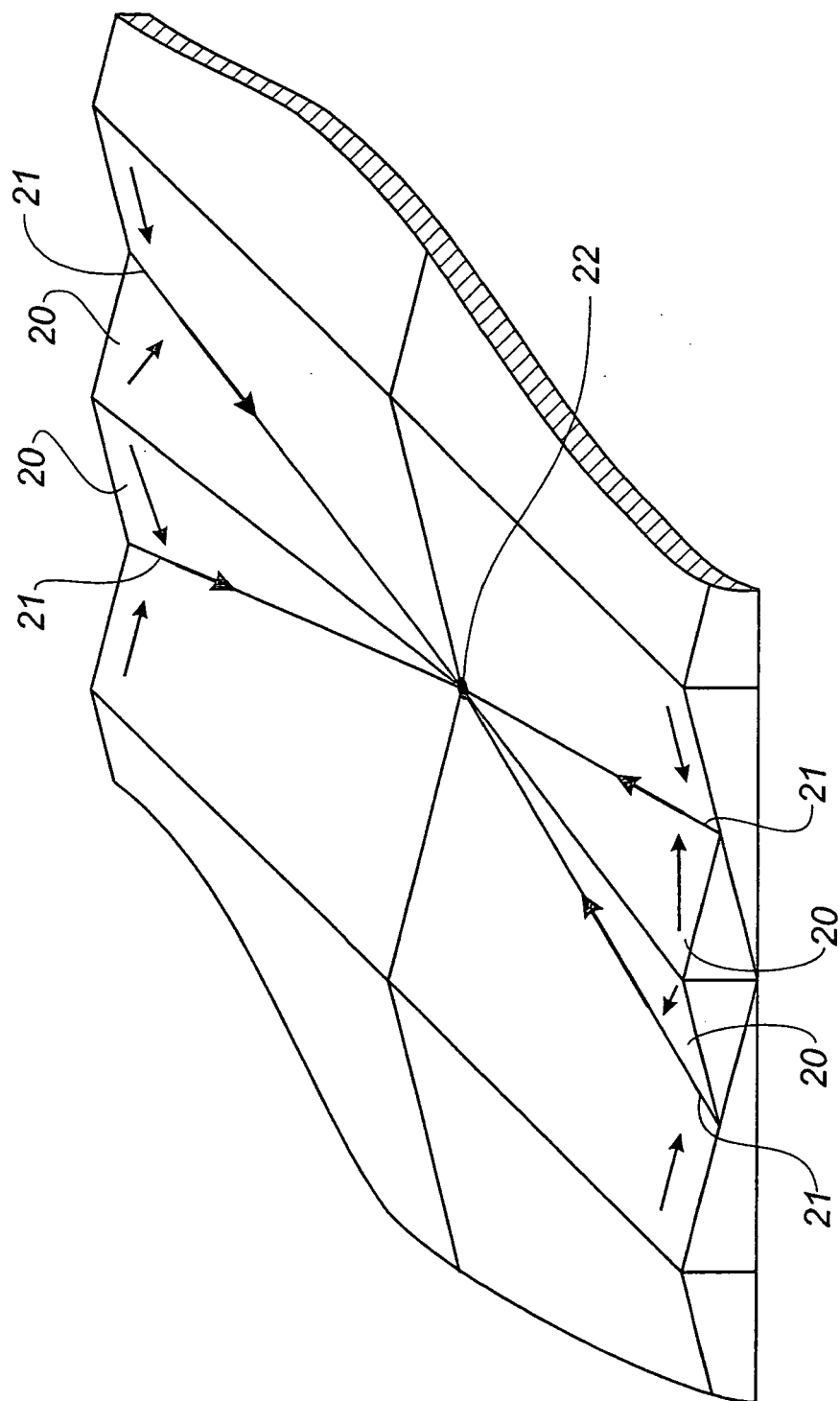


Fig. 6