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### (54) **Roofwindow frame structure and roofwindow**

(57) The present invention relates to a roof window structure and a roof window installed therewith, comprising at least one horizontal part, the top edge of the front surface of the horizontal part extends forward and then gradually downward to the front bottom edge of the horizontal part. Between the top edge and bottom edge of the horizontal part there forms at least one operative surface that cooperates with a flashing part connected

to the window. The operative surface can be a curved concave surface; it well protects the flashing part. The operative surface also has at least one front top edge extending outward then exceeding the covering connected with the sash, thus well protects the covering. The exterior surface of the frame is configured a sloped surface along the basic edge facing outwards and along the glass of the window. This configuration saves the material for the frame and lowers the production cost.

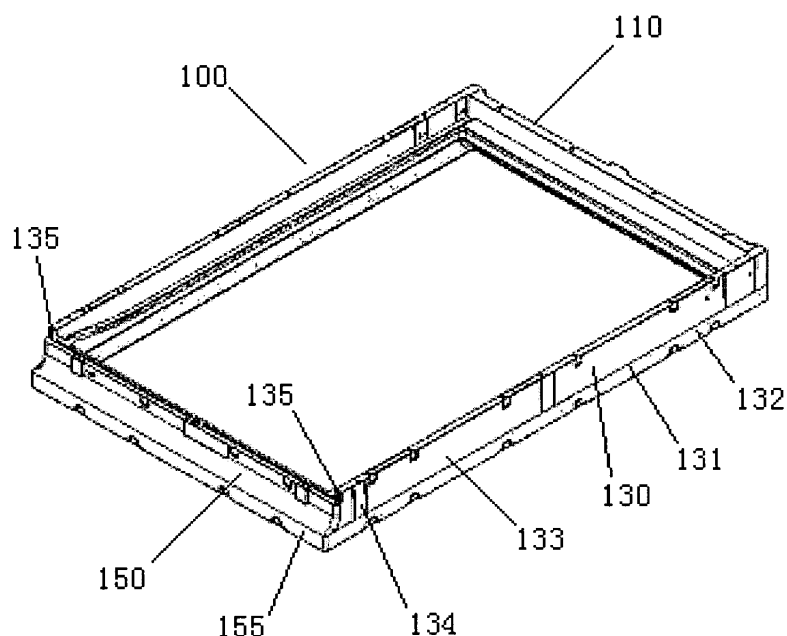


Fig. 1

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## Description

### FIELD OF THE INVENTION

**[0001]** The invention relates to a window frame used to install a window; in particular it relates to a frame structure and a roof window constructed in a sloped roof.

### BACKGROUND OF THE INVENTION

**[0002]** To construct a window in a sloped roof, first need to install the frame in the roof by means of supporters, then fit the sash with glass on the frame, with the frame and the sash covered with a covering and a flashing part and some other necessary parts.

**[0003]** The combination of the frame, the sash with other means or parts and the combination of the frame with the sash satisfies people's normal use of the window constructed in the sloped roof.

**[0004]** Apparently, all the parts of the window, especially the frame is very important, the structure of the frame and other parts determine for the entire window the production process, production cost, installation, connection, seal, waterproof, flashing part, usage and maintenance and so on.

**[0005]** Generally, the frame and the top, bottom and outward facing side part of the sash is covered to protect the wood material of the frame and the sash, so that the weather for example the rain, the sun, or the blizzard erodes the wood or other material of the frame or sash. Wherein, the sash covering comprises top covering, side covering and bottom covering, the sash bottom covering covers the outward facing side of the bottom part thereof. Therefore, in order to cover the bottom part of the sash, the bottom covering is exposed in the air, particularly after the installation of the exterior vertical side of the bottom covering on the sash, it will be easily scratched by other sharp and hard material during transportation, installation, utilization and maintenance, or damaged by the friction with the floor or the wall, severely will cause the failure of the bottom covering and reduces its life. Meanwhile it brings the inconvenience to the utilization and maintenance, increase the production costs and consume costs. For example, the application WO99/51830 "AN OPENABLE WINDOW WITH MAIN FRAME AND SASH COVERING MEMBERS", the covering member in its published specification is the like.

**[0006]** In the application WO99/51831 "A ROOF WINDOW WITH MAIN FRAME AND SASH COVERING MEMBERS", the exterior side of the bottom frame is covered by the frame bottom covering, the exterior side of the bottom sash is covered by the sash bottom covering, which covers at the same time the frame bottom covering, then the exterior cavity formed in between may produce a vertex which prevent the frame and the sash from the interior erosion by the weather. Although this bottom covering structure is well windproof and waterproof, its frame bottom outward facing front surface

is a complete vertical surface, refer to this vertical surface, the sash bottom covering is being outward away from the frame bottom, also it will produce the same damage problem of the sash bottom covering.

**[0007]** Besides, for the flashing part, which connects to the frame bottom covering, is entirely constructed in the air at the outward front side of the frame bottom. With a slight collision by the parts, it may cause the unsteadiness of the flashing part. Plus the flashing part is usually made of light metal or complex material, the collision between parts or heavier force tends to deform the flashing parts, thus jeopardize the usage thereof.

**[0008]** Under certain circumstance, it is necessary to configure vertically several windows in the sloped roof, this needs to connect the two vertically adjacent windows, and then waterproof and drain the lower combination part of the upper window and the upper combination part of the lower window. Due to the limitation of the aforesaid frame structure, it will cause the same unreasonable waterproof and drainage in the combination part.

**[0009]** Nowadays, with the development of the material technology, some high intensity, water resistant, erosion resistant material is used on the frame and the sash, it may lead to an increase of the material costs; the consumption needs in different areas will vary with the weather and the environment. The change of the production will lead to change of the window parts, increase of the production costs. To lower the costs, improve the performance, make it more competitive, make the production of the window frame simpler and more convenience, cut down the material cost to its maximum extent without decreasing the technical performance, all are the real problems people longing for solutions.

### SUMMARY OF THE INVENTION

**[0010]** In order to overcome the disadvantage of the prior art, the purpose of the present invention is to provide a frame structure which can well cooperate with the window parts.

**[0011]** Another purpose of the present invention is to provide a frame structure, which effectively protect the sash bottom covering.

**[0012]** Another purpose of the present invention is to provide a frame structure, which easily connects the adjacent vertically lined windows.

**[0013]** Another purpose of the present invention is to provide a frame structure, which is low cost, convenient made.

**[0014]** Another purpose of the present invention is to provide a sloped roofwindow, which comprises a window frame according to the invention.

**[0015]** Therefore, the present invention provides A window frame, comprising at least one horizontal part, which has a top surface edge going downwards on the exterior side, extending to the bottom edge of the horizontal part, and where the top surface edge and the bot-

tom surface edge between them creates a operative surface, adapted to working together with a flashing part, which is connected to the frame.

**[0016]** Preferably, the operative surface is placed within the upper part of the front of the horizontal part, and creates a first front surface of the horizontal frame, and a second front surface between the bottom edge of the operative surface and the bottom edge of the bottom surface edge.

**[0017]** Preferably, the operative surface is convex and/or sloped or concave.

**[0018]** Preferably, the crosssection of the convex, concave or sloped surface is profiled by straight lines.

**[0019]** Preferably, the crosssection of the convex, concave or sloped surface is profiled by straight and curved lines.

**[0020]** Preferably, the crosssection of the convex, concave or sloped surface is profiled by curved lines.

**[0021]** Preferably, the operative surface of the horizontal frame extends forward to exceed the bottom covering of the sash, so that it protects the covering well.

**[0022]** Preferably, the front face edge is the bottom edge of the operative surface.

**[0023]** Preferably, the operative surface is placed at the bottom part of the frame.

**[0024]** Preferably, the operative surface is placed at the bottom part of the frame.

**[0025]** Preferably, the operative surface is placed at the top part of the frame.

**[0026]** Preferably, the operative surface is placed at the top part of the frame.

**[0027]** Preferably, the exterior of the frame has a perimeter basic edge along which a sloped exterior surface is configured.

**[0028]** Preferably, the sloped exterior surface is placed at the horizontal or vertical parts of the frame.

**[0029]** Preferably, the sloped exterior surface is placed at the top part and side parts.

**[0030]** Preferably, the frame supporters are configured on the sloped exterior surface protruding therefrom (in order to keep it standing upright).

**[0031]** Preferably, the supporter surfaces can be point-shaped or line-shaped or combinations thereof.

**[0032]** Preferably, the members of supporters are apart from each other.

**[0033]** Preferably, the supporters are placed at the top, bottom or side parts or combinations thereof.

**[0034]** Preferably, the supporters at least are placed at two ends of the lengths of the top part or side parts of the frame.

**[0035]** Preferably, the crosssection of the horizontal parts or side parts of the frame are consists of exterior layer and interior layer and the exterior layer is coating and the interior layer is wood.

**[0036]** Preferably, the coating consists of two layers, one is PUR, and the other is paint.

**[0037]** Preferably, the thickness of the PUR layer is variable/various along the wood perimeter in certain ar-

eas from thick to thin to save the material for making the frame.

**[0038]** The present invention also provides a sloped-roof window, comprising a frame, a sash and a covering, in which the frame and the sash are constitutive of horizontal and side parts, the horizontal parts comprising top part and bottom part, characterized having a top surface edge going downwards on the exterior side, extending to the bottom edge of the horizontal part, and where the top surface edge and the bottom surface edge between them creates a operative surface, adapted to working together with a flashing part, which is connected to the frame.

**[0039]** Preferably, the operative surface is placed within the upper part of the front of the horizontal frame, and creates a first front surface of the horizontal frame, and a second front surface between the bottom edge of the operative surface and the bottom edge of the bottom surface edge.

**[0040]** Preferably, the operative surface is convex and/or sloped or concave.

**[0041]** Preferably, the crosssection of the convex, concave or sloped surface is profiled by straight and /or curved lines.

**[0042]** Preferably, the operative surface of the horizontal frame extends forward to exceed the bottom covering of the sash, so that it protects the covering well.

**[0043]** Preferably, the front face edge is the bottom edge of the operative surface.

**[0044]** Preferably, the operative surface is placed at the bottom part and/or the top part of the frame.

**[0045]** Preferably, the exterior of the frame has a perimeter basic edge along which a sloped exterior surface is configured.

**[0046]** Preferably, the sloped exterior surface is placed at the top part and side parts.

**[0047]** Preferably, the frame supporters are configured on the sloped exterior surface protruding therefrom (in order to keep it standing upright).

**[0048]** Preferably, the supporter surfaces can be point-shaped or line-shaped or combinations thereof.

**[0049]** Preferably, the members of supporters are apart from each other.

**[0050]** Preferably, the supporters are placed at the top, bottom or side or combinations thereof. Preferably, the crosssection of the horizontal parts or side parts of the frame consists of exterior layer and interior layer and the exterior layer is coating and the interior layer is wood.

**[0051]** Preferably, the coating consists of two layers, one is PUR, and the other is paint.

**[0052]** Preferably, the thickness of the PUR layer is variable/various along the wood perimeter in certain areas from thick to thin to save the material for making the frame.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0053]**

Fig. 1 is a perspective view of an embodiment of a window frame according to the invention;  
 Fig. 2a is a cross section of the bottom part in Fig. 1;  
 Figs. 2b - 2e are a cross section of the bottom part according to other embodiments of the invention;  
 Fig. 3 is a cross section of the side part in Fig. 1;  
 Fig. 4 is the cross section of the top part in Fig. 1;  
 Fig. 5 is the cross section of the entire assembly including the frame bottom part, sash bottom part and the covering;  
 Fig. 6 is a partial cross section view of the frame interior structure according to the invention;  
 Fig. 7 is a perspective view of the window according to the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0054]** The invention will now be explained in detail in the following with reference to the drawings and embodiment:

**[0055]** Referring to Fig. 1, the window frame 100 of the utility model comprises a top part 110, a bottom part 150 and two side parts 130. The frame may be formed into a single piece or be assembled by separate parts, which are made from various materials. For example, the top part, bottom part and side parts are mould from aluminum alloy or plastic, or other metal or nonmetal composite materials.

**[0056]** As shown in Fig. 2a, an operative surface 153 is extended from the top edge 151 of the front surface (the outward facing exterior surface) of bottom part 150 gradually downward to the bottom edge 152. It cooperates with a flashing part (not shown) that is connected to the frame. The operative surface 153 can cooperate well with the window members; in particular with the flashing part (not shown) having a curved surface, it also provides good support and protection of the flashing part, and improves the drainage of the window.

**[0057]** Figs. 2a - 2e show a part of the window frame incorporated respectively with operative surfaces which are concave and sloped. Certainly, the operative surface may be convex according to another embodiment. The front surface of the bottom part 150 (the exterior surface of the bottom 150 facing outward) in Figs. 2a-2e extends forward and gradually downward from the top edge 151 to the front bottom edge 152 of the bottom part. Between the top edge 151 and the bottom edge 152 of the bottom part is at least one operative surface 153 provided for cooperating with a flashing part (not shown) connected with the frame. The operative surface 153 can well cooperate with the corresponding window members, especially with the flashing part to provide a good support and protection of the flashing part, and

hence an improved waterproof and drainage with the window.

**[0058]** This thickness determines the position of the perimeter basic edge of the frame exterior surface.

**[0059]** The operative surface 153 may be concave in Figs. 2a and 2b or sloped in Fig. 2c, depending on actual requirements. The preferable operative surface is such a concave one as shown in Fig. 2a, so that it can be easily installed and cooperate with other members.

**[0060]** Fig. 2b shows that a cross section of the concave surface is profiled by straight lines.

**[0061]** As shown in Fig. 2a, the operative surface 153 is extended from the top edge 151 of the front surface (the outward facing exterior surface) of bottom part 150 gradually downward to the bottom edge 152. It cooperates with the flashing part (not shown) having a curved surface, it also provides good support and protection of the flashing part, and improves the drainage of the window.

**[0062]** Fig. 2d shows that the cross section of the concave surface is curved.

**[0063]** The operative surface 153 of the bottom part 150 extends from the front edge 154 outwards beyond the bottom covering 450 connected with the sash 200, as shown in Fig. 5. Thus, the operative surface 153 extends from the top edge 151 to the front surface edge 154 and outwards exceeds the exterior surface of the bottom covering 450. This extended surface well protects the bottom covering 450, provides an expanded supporting area for the flashing part, and facilitates the rain drainage. In Fig. 3, the sash bottom covering 450 also covers the frame bottom covering 350.

**[0064]** The front surface edge 154 may be the bottom edge of the operative surface 153, or it may be the top edge 154 of the second front surface 155 of the horizontal part. When the second front surface is removed, the front surface edge 154 is the bottom edge of the operative surface 153, or the front bottom edge 152 of the bottom part 150. Fig 2 shows such an embodiment.

**[0065]** The operative surface 153 shown in Fig. 2 is located at the top part of the window frame or it may also be located at the top part of the frame, or both at the top part and at the bottom part.

**[0066]** When the frame 100 is integrated by molding, there is perimeter basic edge 131 at the exterior surface of the frame 100, as shown in Fig. 1. The position of the basic edge 131 can be determined by the position of the top edge 151 of the operative surface 153 at the exterior surface. There configured a slope along the basic edge 131 facing inwards at the exterior surface of the frame, as the slope 155 shown in Fig. 1, 2a, the slope 132 shown in Fig. 1, 3 and the slope 112 shown in Fig. 4, it facilitates the demolding production of the frame.

**[0067]** In Fig. 1, the exterior of the frame 100 has a perimeter basic edge 131 along which a sloped exterior surface is configured. As the exterior sloped surface 133 shown in Fig. 1, 3, the exterior sloped surface 113 in Fig. 4. The exterior sloped surface is at the top part 110 and

the two side parts 130 of the frame at the same time in this embodiment of the invention.

**[0068]** On the side part 130 in Fig. 3 and the exterior sloped surface 133, 113 of top part 110 in Fig. 4, there are formed supporters 134, 114 protruding from the slopes and allow the frame remain erect. The supporters 134, 114 allow the finished frame to stand upright on the floor steadily.

**[0069]** The supporting area of the supporters 134, 114 may be plane or line-shaped. It may be a plane for a bigger supporting area. There are a plurality of supporters 134, 114 lined apart from each other; which facilitates the stability of the frame.

**[0070]** The supporters may comprise a plurality of dot-shaped, point-shaped surfaces and/or line-shaped surfaces, as shown in Figs. 4a and 4b.

**[0071]** The supporters 134, 114 are at the side part 130, top part 110 respectively. In the case of the operative surface configured at the bottom part of the frame, the preferred way is to arrange an upright supporting pillar (not shown) at the bottom end 135 of the two side parts, while the bottom plane of the pillar is at the level of the bottom surface of the bottom part 150.

**[0072]** The interior structure of the horizontal part (including the top part and bottom part) and side parts of the frame 100 in Fig. 6 consists of the exterior layer and the interior layer 3, the exterior layer is the coating, and the interior layer is wooded. The coating can give the wood a good protection. The coating consists of two layers, one layer is PUR 1 and the other is paint 2. The paint layer 2 strengthens and protects the coating. The thickness of the PUR is variable/various about the interior layer 3 from thick to thin or from thin to thick.

**[0073]** The sloped roofwindow in Fig. 7 consists of a window frame 100 and a sash 200 according to the present invention.

## Claims

1. A window frame, comprising at least one horizontal part, which has a top surface edge going downwards on the exterior side, extending to the bottom edge of the horizontal part, and where the top surface edge and the bottom surface edge between them creates a operative surface, adapted to working together with a flashing part, which is connected to the frame.
2. A window frame according to claim 1, wherein the operative surface is placed within the upper part of the front of the horizontal part, and creates a first front surface of the horizontal frame, and a second front surface between the bottom edge of the operative surface and the bottom edge of the bottom surface edge, wherein the operative surface can be convex and/or sloped or concave, wherein the crosssection of the convex, concave or sloped surface can be profiled by straight lines, wherein the crosssection of the convex, concave or sloped surface can be profiled by straight and curved lines, wherein the crosssection of the convex, concave or sloped surface can be profiled by curved lines.
3. A window frame according to any of the preceding claims, wherein the operative surface of the horizontal frame extends forward to exceed the bottom covering of the sash, so that it protects the covering well.
4. A window frame according to any of the preceding claims, wherein the front face edge is the bottom edge of the operative surface, wherein the operative surface can be placed at the bottom part of the frame, wherein the operative surface can be placed at the bottom part of the frame, wherein the operative surface can be placed at the top part of the frame, wherein the operative surface can be placed at the top part of the frame, wherein the exterior of the frame has a perimeter basic edge along which a sloped exterior surface can be configured, wherein the sloped exterior surface can be placed at the horizontal or vertical parts of the frame, wherein the sloped exterior surface can be placed at the top part and side parts.
5. A window frame according to any of the preceding claims, wherein the frame supporters are configured on the sloped exterior surface protruding therefrom (in order to keep it standing upright), wherein the supporter surfaces can be dot-shaped, point-shaped or line-shaped or combinations thereof, wherein the members of supporters can be apart from each other, wherein the supporters can be placed at the top, bottom or side parts or combinations thereof, wherein the supporters at least can be placed at two ends of the lengths of the top part or side parts of the frame.
6. A window frame according to any of the preceding claims, wherein the crosssection of the horizontal parts or side parts of the frame comprises a shell with an exterior layer and an interior layer where the exterior layer can be a coating and the interior layer can be wood, wherein the coating consists of two layers, one can be PUR, and the other can be paint, wherein the thickness of the PUR layer can be variable/various along the wood perimeter in certain areas from thick to thin to save the material for making the frame.
7. A sloped-roof window, comprising a frame, a sash and a covering, in which the frame and the sash constitute horizontal and side parts, the horizontal parts comprising top part and bottom part, **characterized** having a top surface edge going down-

wards on the exterior side, extending to the bottom edge of the horizontal part, and where the top surface edge and the bottom surface edge between them creates a operative surface, adapted to working together with a flashing part, which is connected to the frame. 5

8. A sloped-roof window according to claim 7, wherein the operative surface is placed within the upper part of the front of the horizontal frame, and creates a first front surface of the horizontal frame, and a second front surface between the bottom edge of the operative surface and the bottom edge of the bottom surface edge, wherein the operative surface can be convex and/or sloped or concave, wherein the crosssection of the convex, concave or sloped surface can be profiled by straight and /or curved lines. 10 15

9. A sloped-roof window according to any of the preceding claims, wherein the operative surface of the horizontal frame extends forward to exceed the bottom covering of the sash, so that it protects the covering in a good way, wherein the front face edge can be the bottom edge of the operative surface, wherein the operative surface can be placed at the bottom part and/or the top part of the frame, wherein the exterior of the frame has perimeter basic edge along which a sloped exterior surface can be configured, wherein the sloped exterior surface can be placed at the top part and side parts, wherein the frame supporters can be configured on the sloped exterior surface protruding therefrom (in order to keep it standing upright), wherein the supporter surfaces can be point-shaped or line-shaped or combinations thereof, wherein the members of supporters can be apart from each other, wherein the supporters can be placed at the top, bottom or side or combinations thereof. 20 25 30 35

10. A sloped-roof window according to any of the preceding claims, wherein the crosssection of the horizontal parts or side parts of the frame consists of exterior layer and interior layer and the exterior layer can be a coating and the interior layer can be wood, wherein the coating consists of two layers, one can be PUR, and the other can be paint, wherein the thickness of the PUR layer can be variable/ various along the wood perimeter in certain areas from thick to thin to save the material for making the frame. 40 45 50

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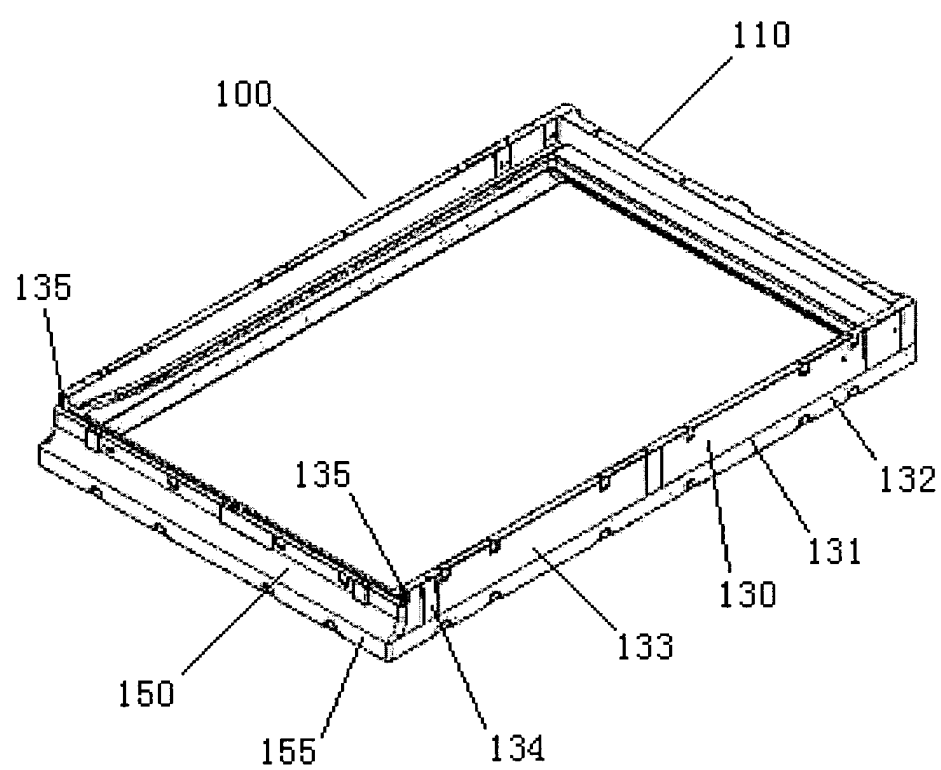


Fig. 1

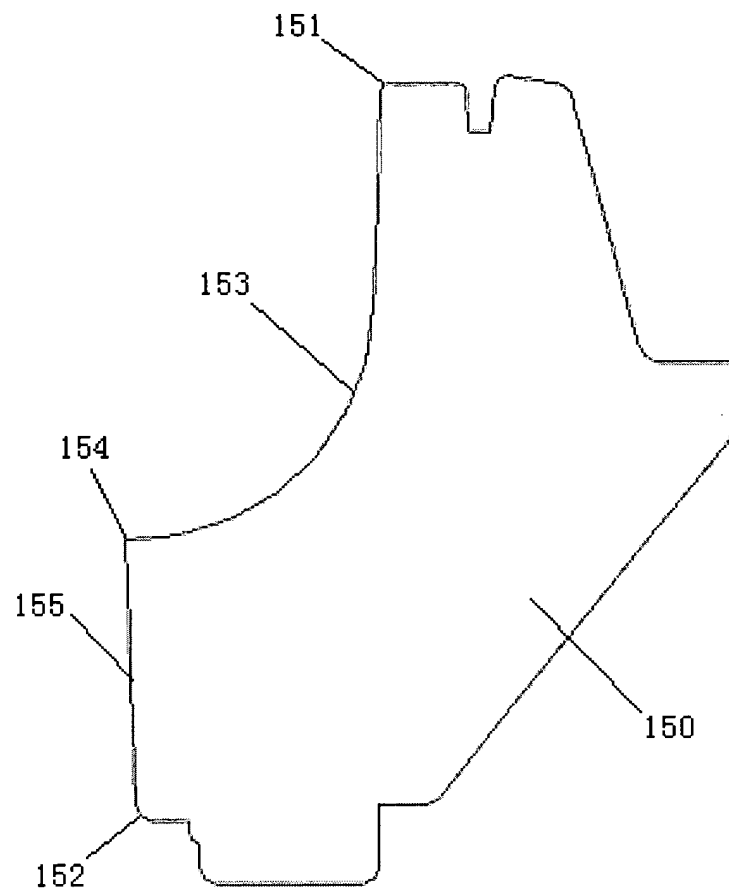


Fig. 2a



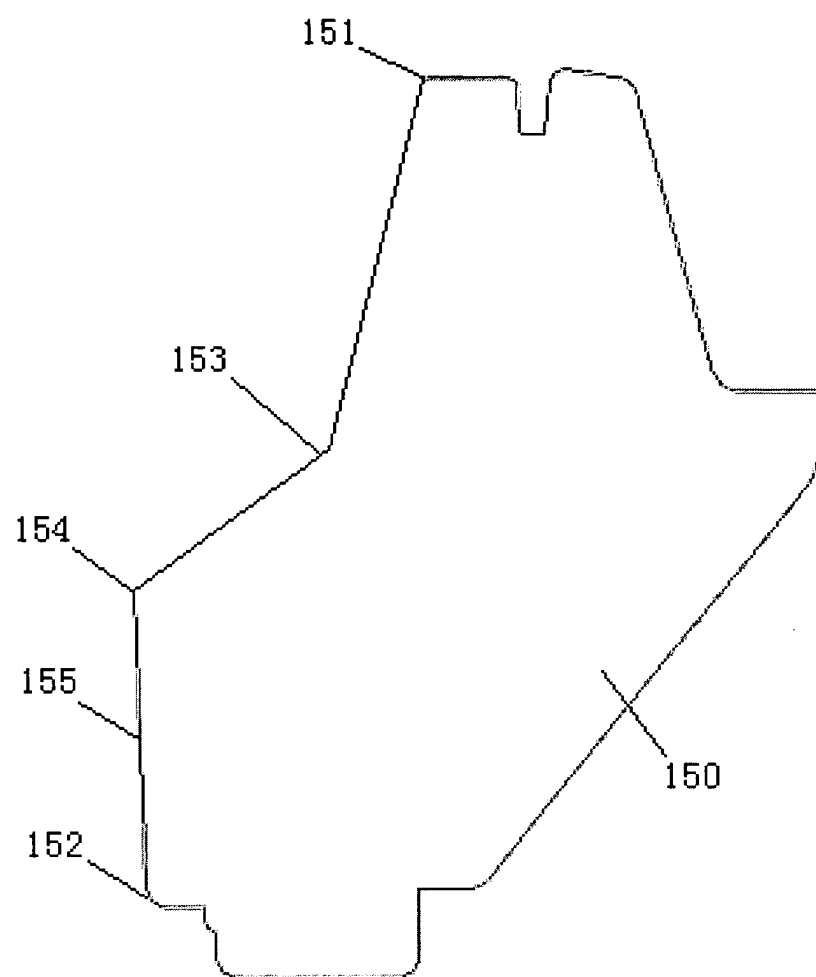


Fig. 2b

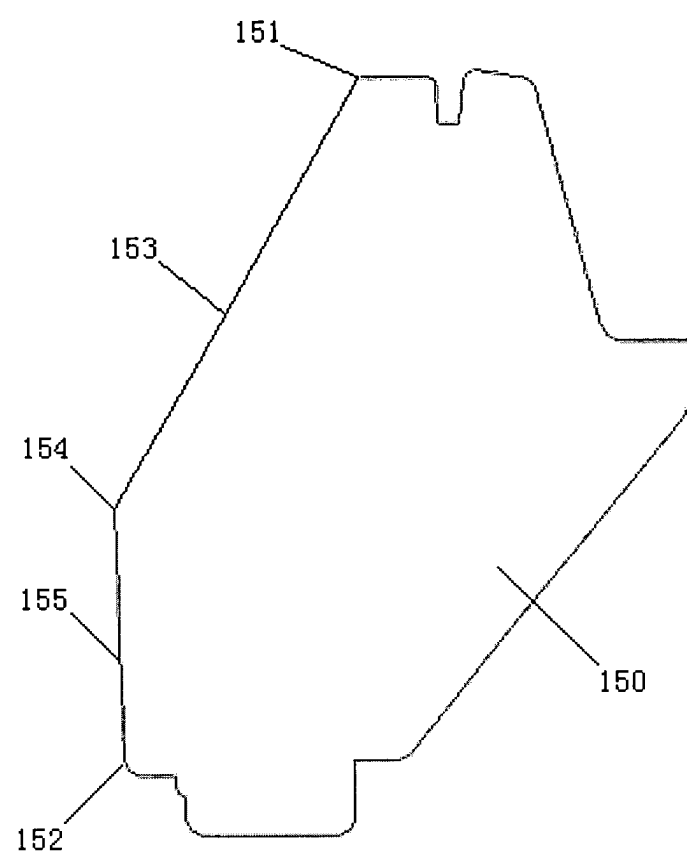


Fig. 2c

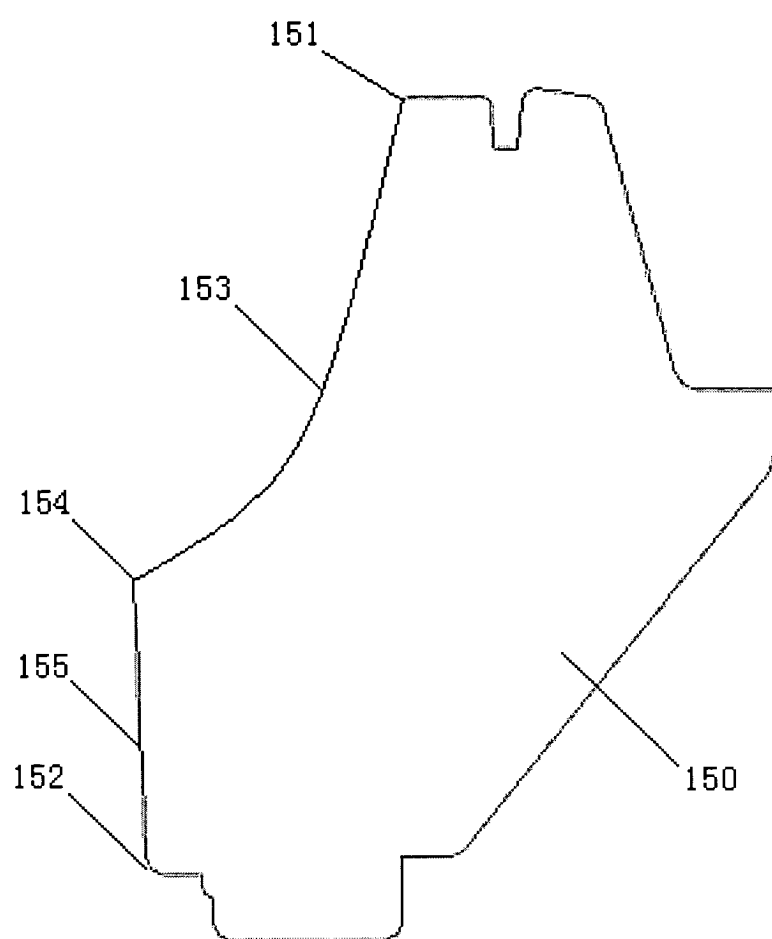


Fig. 2d

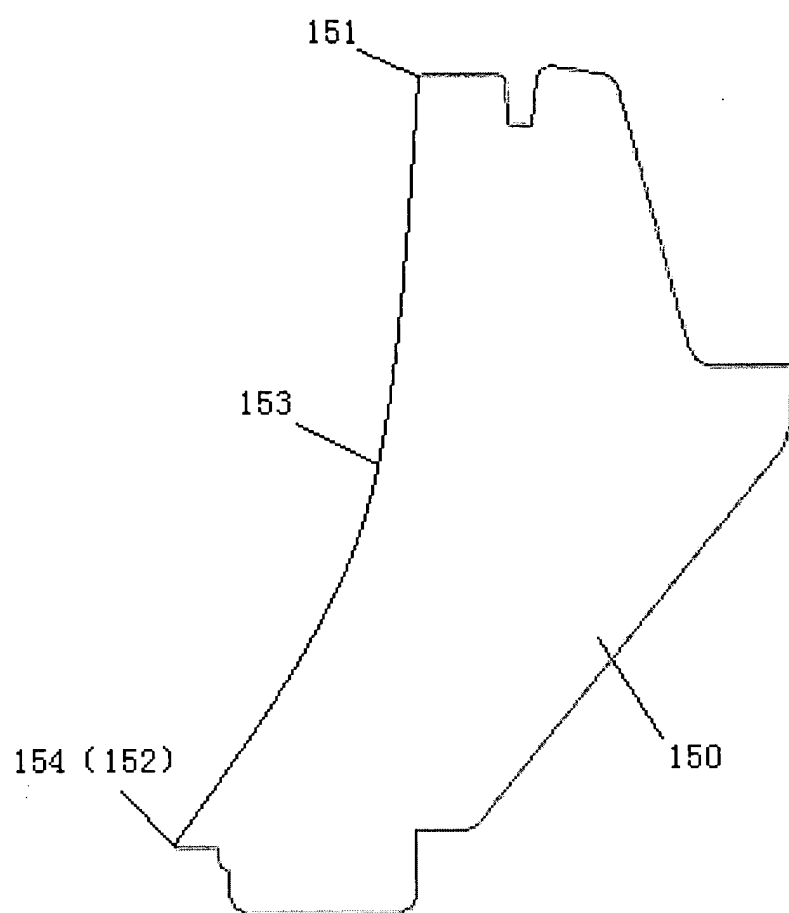


Fig. 2e

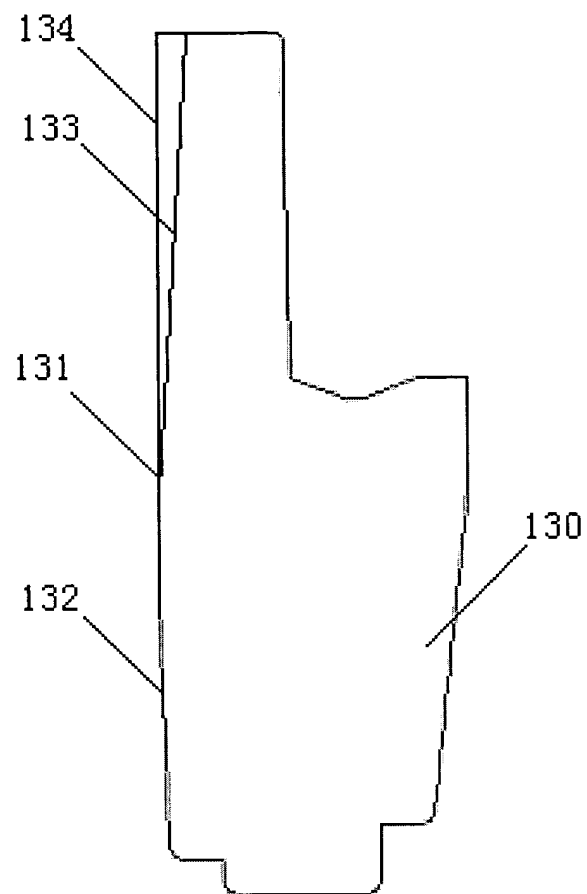


Fig. 3

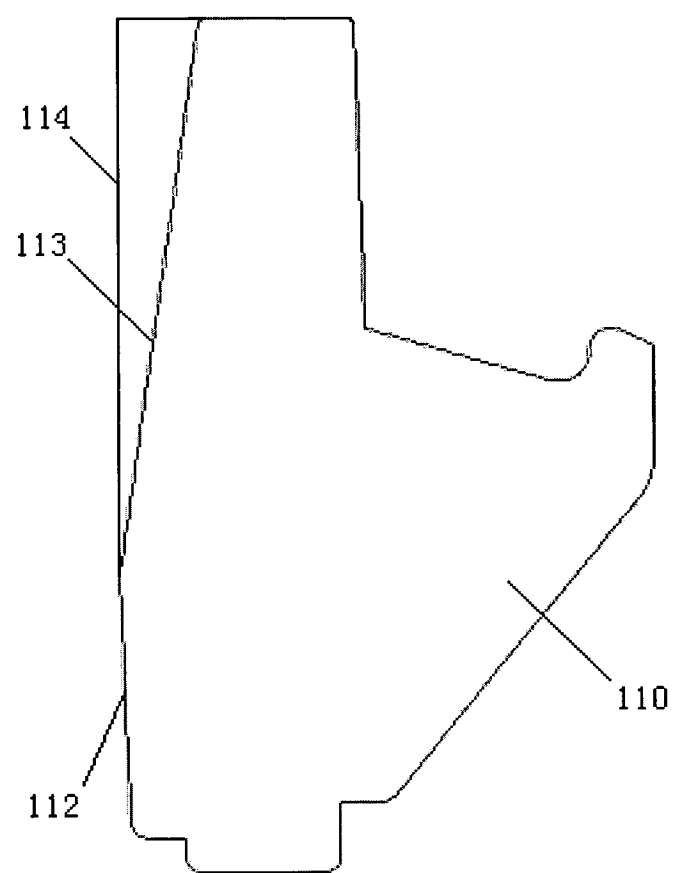


Fig. 4

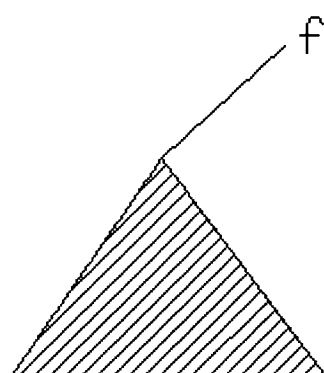


Fig. 4a

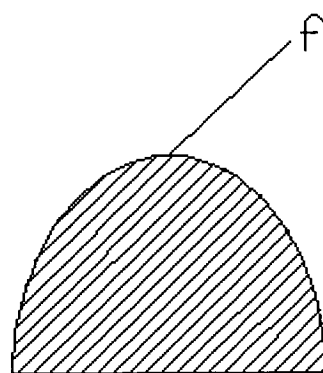


Fig. 4b

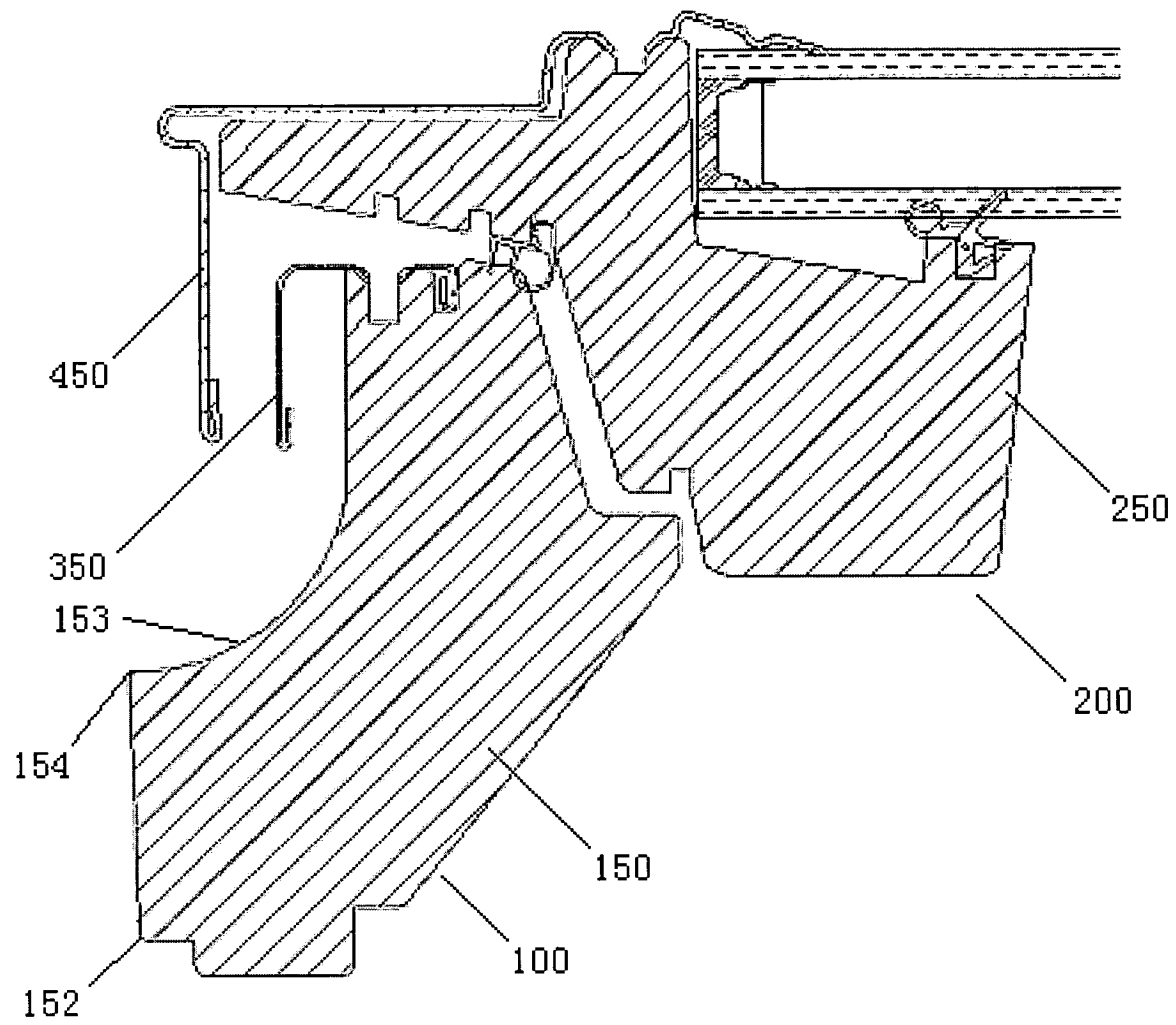


Fig. 5

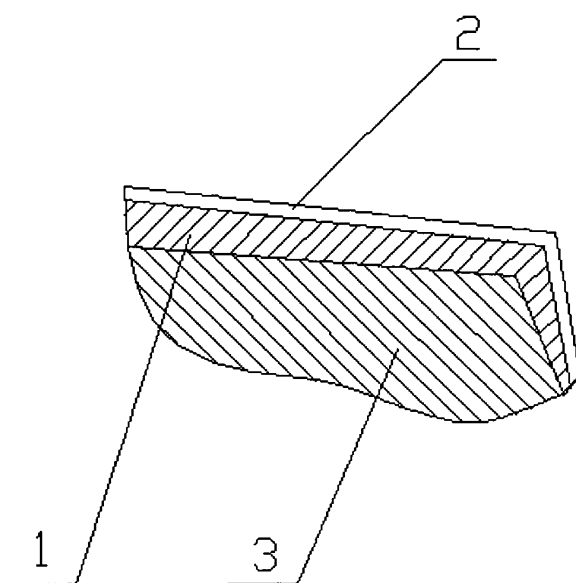


Fig. 6

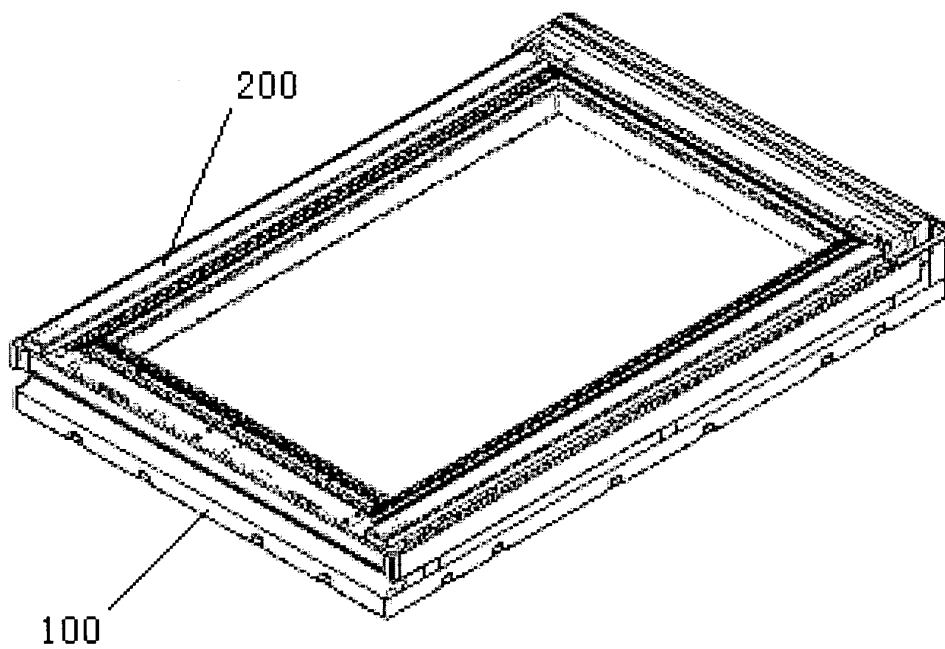


Fig. 7