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(54) **A profile bar to be locked to a panel, and a glass panel**

(57) A panel structure for a glazing system, comprising a panel and a profile bar to be locked to the panel. The panel (22) is made of glass material, comprising a first and a second side surface (22a, 22b) which are parallel, and an end surface (22c) which is placed between said side surfaces and to which said side surfaces are limited; and the panel (22) further comprises one or more elongated grooves (25) provided in the first side surface (22a) and being substantially parallel with said end surface. The profile bar (20) has a profile form extending away in the longitudinal direction of the profile bar, comprising a slot (21) with a long opening (18) for the installation of the panel, and a side wall (21 b) which limits said slot and is placed on the first side surface (22a) of the panel placed in the slot. The profile bar (20) further comprises at least one locking formed part (23, 24) provided in said side wall and placed in said groove (25).

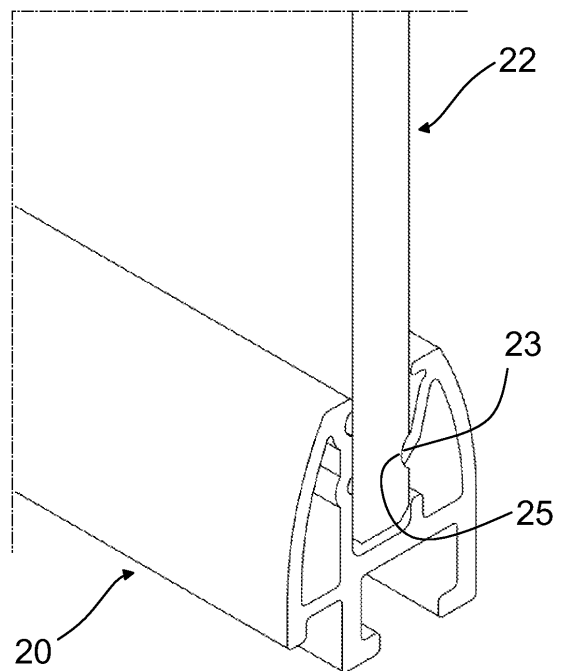


Fig. 5

Description

[0001] The invention relates to a glass panel. The invention relates to a profile bar to be locked to a panel. The invention relates to the panel structure of a glazing system. The invention relates to a method in the manufacture of a glass panel.

[0002] Glazing systems of prior art, which are used, among other things, in balconies, are installed in buildings. The systems typically comprise an upper profile and a lower profile, which are used as guide tracks and inside which the necessary movable guide track parts are placed, between which, in turn, the single glass panes are suspended. The glass panes form walls and doors, as well as limit the space or protect it, for example, from weather conditions, for example on balconies or terraces, or divide the space into several parts and section off spaces, for example in rooms or business facilities. Typically, the profiles extend in the horizontal direction and are fastened to the structures of the building. By means of guide track parts, the single glass panes can be moved and also opened and closed around a vertical axis of rotation. The glass panes can be transferred and bunched up when opened. Some known glazing systems are disclosed, for example, in documents EP 1892362 A1 and EP 188996 A1.

[0003] Glass panes, or corresponding panels, are normally unconnected, and when the panel is turned, the guide member of the panel must be locked into place so that the panel will not assume an inclined position. During the locking, the guide member is locked, for example, to an adjacent guide member, according to WO 03/042482 A1, or, for example, to a locking member inside an upper profile, which is, for example, a socket or a form, in which the guide member or a part of it is placed during the turning of the panel.

[0004] The panels typically comprise profile bars which are normally provided at both the upper edge and the lower edge of the panel. The profile bar is normally an aluminium profile made by extrusion. The guide members and, if necessary, also guides, are attached to the profile bar.

[0005] The profile bars are normally fixed to the panels in such a way that the panel is placed in a slot in the profile bar, and the profile bar is kept in place by compression. Normally, the fixing is also secured by means of glue and fixing members, for example screws, extending through a hole made in the panel. Some examples of profile bars and their fixing are disclosed in WO 03/040505 A1, WO 03/040510 A1 and WO 02/29177 A1.

[0006] The fixing of a profile bar to a glass pane may turn out to be a time consuming and laborious operation. Problems may be caused, for example, by the machining of holes in the glass pane, because for the time of making the holes, the glass pane which is transferred e.g. by means of a conveyor in a factory or a workshop, must be stopped and aligned with precision in two perpendicular directions, which slows down the manufacturing process.

It is difficult to combine these steps, for example, with the grinding of the edges or other processing of the glass panes to a single efficient operation. The use of screws will secure the fixing of the profile bar to the glass pane but also slow down the installation work.

[0007] It is an aim of the invention to eliminate problems presented above. The glass pane according to the invention will be presented in claim 1. The profile bar to be locked to panel according to the invention will be presented in claim 5. The panel structure for a glazing system according to the invention will be presented in claim 9. The method according to the invention will be presented in claim 14.

[0008] The invention will enable the attachment of the profile bar to a glass pane or a panel in a way that is easy and fast with respect to the installation. The invention will enable the processing of glass panes for fastenings, for example, in a factory in such a way that the processing method is significantly faster than the methods of prior art. The new processing method can be easily integrated in other processing of the glass panes. Yet another significant advantage is the secure way of fixing the profile bar, so that it will not be necessary to use securing screws.

[0009] Yet another significant advantage in an example of the invention is the fact that the fixing of the profile bar to a glass pane or panel by pressing requires less force than the detachment of the profile bar by pulling in the opposite direction. As a result, the installation is easy and the fixing is secure and safe.

[0010] Yet another advantage in some examples of the invention is the fact that the installation of the profile bar on the glass pane and its detachment can also be performed by sliding in the direction of the profile bar.

[0011] In an example of the invention, the glass pane comprises locking shapes, particularly one or more grooves or open channels, in which the locking members of the profile bar are placed. Preferably, the profile bar comprises a structure that presses the glass pane against the locking members. Said structure and/or locking member can be selected so that they yield during the installation. In another example of the invention, the profile bar to be utilized comprises an elastic locking member which is a protrusion and is placed in a shape in the glass pane and efficiently prevents the pulling out of the glass pane.

[0012] A particular advantage of the invention is the fact that the machining of the locking shape in the glass pane will not require the stopping of the glass pane, which speeds up the processing methods to a significant extent. The alignment of the glass pane in connection with the machining of the locking shape is facilitated to a significant extent, because it will suffice that one end surface of the glass pane is placed accurately and in a desired way, for example, against a stopper for the time of the machining.

[0013] The invention can be applied in glazing systems which are used outdoors or indoors. The invention can

also be applied in various systems in which different panels and panel materials are utilized.

[0014] The invention will be illustrated in the following description by means of some examples and with reference to the appended drawings, in which:

- Fig. 1 shows a glazing system according to a known example in a principle view,
- Fig. 2 shows a profile bar according to an example of the invention in a cross-sectional view,
- Fig. 3 shows a profile bar according to another example of the invention in a cross-sectional view,
- Fig. 4 shows a panel or a glass pane according to an example of the invention,
- Fig. 5 shows a profile bar according to Fig. 2 and a glass pane according to Fig. 4, fixed to each other,
- Fig. 6 shows a cover according to an example of the invention, and
- Fig. 7 shows a profile bar according to Fig. 2, a glass pane according to Fig. 4, and a cover according to Fig. 6, fixed to each other.

[0015] Figure 1 shows a panel and a panel system of prior art that is simultaneously, for example, a glazing system for e.g. balconies, or a wall limiting a space. The system normally comprises several successive glass panes which are movable. The panels 1 are normally rectangular, wherein they are normally in an upright position and form a closed wall or a large window when placed one after the other. They can be transferred in the direction of the guide tracks, which is typically the horizontal direction. The panels 1 can be opened into a position which is normally perpendicular to the closed position shown in Fig. 1. In the open position, the panels 1 may be placed close to each other, wherein they may be stored, for example, on one side of a balcony, where they have first been moved along the guide tracks. The upper guide track 3 and the lower guide track 2 are placed in the horizontal direction and, among other things, an upper guide track part 4 and a lower guide track part 5 are placed inside them and are movable in the guide tracks, the panels 1 being fixed from above and from below between the guide track parts, and the panel is in the vertical plane. The guide tracks are normally extruded profiles made of aluminium and provided with a long continuous slot or channel for the guide track parts. The panel 1 is preferably formed by a glass pane whose lower and upper edges are provided with profile bars 7 and 8, to which, in turn, the guide members 4, 5 and 9 are fixed, for example, by means of hinge pins 6, 11 and 15 or shafts.

[0016] In the guide members and their lockings, it is possible to apply various solutions of prior art. The panel 1 and/or the guide tracks 3, 4 are equipped with guiding members and means of prior art, for example guiding members 13, 14 and stoppers 10 and 12, whose functionality facilitates or secures the locking of the panel into

place, so that the panel can be turned fully open. For opening the panel 1, an opening 16 is provided at the side of the guide track 3, through which the guide track part 9 can come out of the guide track during the turning.

[0017] Figure 2 shows an extruded aluminium profile according to the presented example that is utilized as a profile bar to be fixed to the panel, for example in the system shown in Fig. 1. The shapes of the profile, visible in the cross-section, extend uniformly in the longitudinal direction of the profile. Different parts of the system, particularly the hinge pin, are fixed to an elongated slot 19 or channel. The profile bar 20 also comprises an elongated slot 21 or channel for the panel, placed on the opposite side of the profile bar 20 with respect to the slot 19. The side walls 21a and 21b limiting the slot 21 are placed against the side surfaces 22a and 22b of the panel or glass pane 22 (see Fig. 4), and the transverse end wall 21c is placed against the narrow transverse end surface 22c of the glass pane 22, close to it or spaced from it. Furthermore, the slot 21 comprises an opening 18, through which the panel is installed. The end wall 21c and the end surface 22c are preferably parallel. Furthermore, the profile bar 20 comprises a varying number of other walls which are adjacent to the side walls 21a, 21b or the end wall 21c and, if necessary, parallel with them. Normally, the profile bar comprises outer walls 20a and 20b which are connected in a seamless manner via necks to the side walls and the end wall and which are also profiled, if necessary. Closed or open chambers are left between the walls. It is also possible that, for example, the side wall 21a is simultaneously the outer wall of the profile bar 20.

[0018] In the example of Fig. 2, the side wall 21b is an elastic structure and it is simultaneously a locking member for locking the panel or glass pane 22 into place. The side wall 21b is placed in a groove 25 machined in the glass pane and mechanically prevents the detachment of the glass pane. The side wall 21b is connected as a protrusion to the profile bar 20 and extends from the opening 18 towards the end wall 21c, substantially in the direction of the side wall 21a and the glass pane installed in the slot 21. Simultaneously, the side wall 21b extends towards the end surface 22c of the glass pane. The end 23 of the side wall 21b is free and capable of moving by bending in a direction substantially perpendicular to the side wall 21a and the glass pane. The slot 21 is dimensioned so that the installation of the glass pane in the slot by pressing will force the end 23 to yield, which increases the friction between the glass pane and the end 23. The perpendicular distance between the free end 23 and the side wall 21a is thus smaller than the thickness of the panel or the glass pane.

[0019] The locking of the panel or glass pane in its place takes actually place so that the end 23 is placed in a groove 25 in the glass pane 22 (see Fig. 4). To remove the glass pane, in turn, a greater force will be needed, because when the glass pane is lifted off the profile bar 20, the end 23 is strongly supported to the groove 25.

The shapes of the groove 25 and the end 23 are matched so that the groove 25 does not push the end 23 to the side but they are set tightly against each other. The shapes can be matched so that a given, relatively great force will be needed to move the end 23 off the groove 25, or the side wall 2 b would otherwise, by yielding, allow such a movement of the end 23 that would shift the end 23 off the groove 25. The shapes can even be selected so that the end 23 comes tighter against the glass pane 22 rather than transversely away from it. The yielding is also influenced by the length of the side wall 21b and the thickness of the material. The locking can be enhanced by supplementing the side wall 21 b with, for example, ridges which correspond to the end 23 in its shape and functionality and which are placed in grooves in the panel or glass pane.

[0020] The side wall 21a is attached at its both ends to the profile bar 20, but even this can be arranged so that it will yield during the installation of the panel or glass pane. The side wall 21a may also be provided with ridges that are placed in grooves in the panel. Typically, a layer of glue is applied between the side wall 21 a and the panel, to secure the locking.

[0021] Figure 3 shows an extruded aluminium profile according to another example that is utilized as a profile bar 20 to be fixed to the panel or glass pane, for example in the system shown in Fig. 1. Because of the similarity in the functionality, reference numerals corresponding to those of Fig. 2 are used. In this example, the side wall 21b is an elastic structure that yields in a direction substantially perpendicular to the side wall 21 a and the glass pane, or a normal side wall that only yields to some extent or not at all. The side wall 21b is also a locking member that locks the panel into place. The side wall 21b is placed in a corresponding groove 25 machined in the panel or glass pane 22 (see Fig. 4) and prevents the detachment of the panel mechanically. The side wall 21b comprises one or more ridges 24 placed in a groove 25 in the panel or glass pane. The side wall 21b is attached at its both ends to the profile bar 20 and is substantially parallel to the side wall 21 a and, for example, the glass pane 22. One or more ridges 24 are provided in the central part of the side wall 21b.

[0022] In the example of Fig. 3, the side wall 21 a is an elastic structure that yields in a direction substantially perpendicular to the side wall 21b. The side wall 21b is attached at its both ends to the profile bar 20, and the ridge 24 or ridges are placed substantially at the height of the centre of the side wall 21a. The slot 21 is dimensioned so that the installation of the panel in the slot 21 by pressing will force the side wall 21a to yield, which increases the friction between the panel and the side wall 21a. The perpendicular distance between the ridge 24 and the side wall 21a is thus smaller than the thickness of the panel. A glass pane 22 according to Fig. 4 is locked into place in such a way that the ridge 24 is placed in the groove 25 in the glass pane 22. During the installation, the side wall 21a or the side wall 21b yields, or they both

yield, or the whole profile bar 20 yields, depending on the structure of the profile bar. A sufficient force will be needed for removing the glass pane 22, because when the glass pane 22 is lifted off the profile bar 20, the ridge 24 is in the groove 25. The shape of the groove and the ridge can be matched in such a way that the lifting of the glass pane off the profile bar will require a greater force than its installation. The shape can be fitted so that a relatively great force is needed to remove the ridge from the groove. The yielding is also influenced by the length and the thickness of the side wall. The locking can also be enhanced by supplementing the side wall 21 a with ridges which match with the ridge 24 in their shape and functionality and which are placed in grooves in the panel or glass pane. In this case, grooves whose functionality corresponds to the groove 25 are provided on both sides of the glass pane. In view of the strength of the glass pane, grooves are preferably provided on one side surface of the glass pane only. Figure 4 shows a glass pane 22 that is utilized, among other things, as a panel, for example in the system of Fig. 1, and to which for example a profile bar according to Fig. 2 or 3 is fixed. The glass pane 22 is typically rectangular in shape, and, for example, its end surface 22c is preferably perpendicular to the side surfaces 22a and 22b. The glass pane 22 is made by cutting, and its edges 17 which are placed in the intersections of the side surfaces and the end surface, are typically grounded to an angle of about 45 degrees. The glass pane 22 also comprises two other perpendicular end surfaces, of which the end surface 22d is shown.

[0023] According to prior art, cylindrical holes are generally drilled in the glass pane which extend through the glass pane in the perpendicular direction and which are utilized in fixings that fix the glass pane to a profile bar by means of, for example, screws. The glass pane 22 according to the example of Fig. 4 comprises an engraving, a channel or a groove 25, by means of which the glass pane 22 is fastened to the profile bar 20. The groove 25 is straight and long or elongated, wherein its length in the direction of the end surface 22c is greater or multiple in relation to the width of the groove 25. There may be several grooves, and they are parallel, as sketched by a broken line in Fig. 4. The groove is made by machining the glass pane by means of, for example, a rotating diamond wheel. The groove can also be made in another way, for example by means of a broaching tool, so that the cross-sectional shape of the groove may vary and comprise round, curved or straight walls, according to the need. As a process, the machining may be continuous, if the groove is continuous and extends from one edge of the glass pane to another, that is, over the side surface 22a to the end surface 22d, so that the glass pane does not need to be stopped for the time of the machining. With respect to the machining process, it will be sufficient that for example the side surface 22c is placed against an aligning stopper, along which the end surface 22c glides or rolls at the same time when the glass pane 22 moves and a tool machines the glass pane

passing by. In this case, the tool may be stationary, but it is obviously also possible to use a moving tool and to stop the glass pane for the time of the machining. In spite of the stopping, the process is faster than the known technique, because the alignment is simple.

[0024] The groove 25 is preferably continuous and open at least at one end, wherein the installation of the profile bar to the glass pane 22 is also possible by pushing the profile bar onto the glass pane by a movement that is parallel with the groove 25. The groove 25 is preferably open at its both ends, as shown in Fig. 4. Thus, it will not be necessary to stop the glass pane or lift up the tool during the machining and when the glass pane is moving, and it will not be necessary to align the tool accurately to the starting and end points of the groove. Preferably, the groove 25 is continuous in the longitudinal direction of the profile bar 20, as are also the locking structures and shapes in the profile bar 2; the end 23 and the ridge 24 serving as examples. The perpendicular distance of the groove 25 from the end surface 22c is substantially equal to or shorter than the distance between the end 23 or the ridge 24 and the end surface 21 c.

[0025] The groove 25 may also consist of two or more successive and parallel grooves, but in this case, the portion that is placed between the successive grooves must be removed from the side wall 21 b, the end 23 or the ridge 24 of the profile bar 20, for example by cutting or drilling. Alternatively, the profile bar consists of several parts to be placed one after the other, which may differ from each other in their cross-section, method of fastening, and structure.

[0026] In an example, the open end of the profile bar 20 is closed with a cover 26 shown in Fig. 6, which is normally a cover, a plug or a lid made of plastic. The cover comprises protrusions 26a and 26b which are connected for example by means of friction to the walls or chambers in the profile bar. Furthermore, the cover comprises a wedge 27 whose thicker end is attached to the cover and whose sharper end extends away from the cover, substantially in the perpendicular direction. The wedge 27 is pushed underneath the panel or glass pane, being placed, for example, between the end surface 22c of the glass pane 22 and the end wall 21c. When the cover 26 is inserted, the wedge 27 pushes the glass pane 22 upwards and the wedge 25 is placed tightly against either the end 23 or the ridge 23. The attachment presented will remove any clearance between the profile bar and the panel, and the profile bar cannot move in a useless manner with respect to the panel. The cover 26 of Fig. 6 also comprises a slot 26c open on top and on one side for receiving a corner of the glass pane 22.

[0027] Figure 7 shows a panel structure according to an example, which is utilized, for example, in a system according to Fig. 1. The panel structure 28 comprises a panel or glass pane 22, a profile bar 20 and a cover 26 as presented above. The total length of the profile bar 20 may be smaller than the width of the glass pane 22. In the example of Fig. 7, the profile bar 20 does not extend

all the way to the end surface, because a cover 26 is provided at the corner of the glass pane.

[0028] Figure 5 shows a profile bar 20 of Fig. 1 and a glass pane 22 of Fig. 4 fixed to each other. As shown in Fig. 5, the end 23 is placed in the groove 25 in the glass pane 22. The functionality of the locking is presented in more detail in the description relating to Fig. 2.

[0029] The invention is not restricted solely to the embodiments presented above. The invention is applied within the scope of the appended claims. The material for manufacturing the panel is selected according to the need, and it may comprise transparent or opaque alternatives. In this specification, particularly a variant made of glass is disclosed. The shapes and more accurate dimensions of the profile bar and the profiles may vary as desired.

Claims

1. A glass panel, comprising:

- a panel (22) made of glass material, comprising a first and a second side surface (22a, 22b) which are parallel, and an end surface (22c) which is placed between said side surfaces and to which said side surfaces are limited;

characterized in that the glass panel further comprises:

- one or more elongated grooves (25) provided in the first side surface (22a) and being substantially parallel with said end surface, for locking a profile bar (20) to be fixed to the glass panel.

2. The glass panel of claim 1, **characterized in that** the panel (22) also comprises a second end surface (22d), to which the first side surface (22a) is limited, wherein said groove extends to the second end surface (22d).

3. The glass panel according to claim 2, **characterized in that** the panel (22) also comprises a third end surface which is substantially parallel to the second end surface (22d) and to which the first side surface (22a) is limited, wherein said groove extends over the whole first side surface (22a) also to the third end surface.

4. The glass panel according to any of the claims 1 to 3, **characterized in that** the groove is straight.

5. A profile bar to be locked to a panel, comprising:

- a profile form (20) extending in the longitudinal direction,
- a slot (21) with a long opening (18) for the installation of the panel,
- a first side wall (21 a) which limits said slot and

- is placed on the first side of the panel to be placed in the slot, **characterized in that** the profile bar further comprises:
- a second side wall (21 b) which limits said slot on the opposite side with respect to the first side wall (21a) and is placed on the other side of the panel to be placed in the slot, wherein the second side wall (21 b) is an elastic protrusion whose free end extends away from the opening (18) and which, thanks to its own elasticity, yields and is simultaneously pressed against the panel to be placed in the slot.
6. The profile bar according to claim 5, **characterized in that** the free end of said protrusion comprises a form (23) that faces the first side wall (21a) and is pressed against the panel to be placed in the slot.
7. The profile bar according to claim 5 or 6, **characterized in that** said protrusion is placed in the groove on the side surface of the panel when the panel is in the position installed in the slot.
8. The profile bar according to claim 7, **characterized in that** the shape of said protrusion and the shape of said groove are functionally matched to lock the panel in the slot.
9. A panel structure for a glazing system, comprising:
- a panel (22) made of glass material, comprising a first and a second side surface (22a, 22b) which are parallel, and an end surface (22c) which is placed between said side surfaces and to which said side surfaces are limited;
 - at least one profile bar (20) to be locked to the panel, the profile bar having a profile form extending in the longitudinal direction of the profile bar, comprising a slot (21) with a long opening (18) for the installation of the panel, and a side wall (21 a) which limits said slot and is placed against the first side surface (22a) of the panel placed in the slot,
- characterized in that:**
- the panel (22) further comprises one or more long grooves (25) provided in the first side surface (22a) and being substantially parallel to said end surface,
 - the profile bar (20) further comprises at least one locking formed part (23, 24) provided on said side wall and placed in said groove (25).
10. The panel structure according to claim 9, **characterized in that** the profile bar further comprises a second side wall (21 a) which limits said slot on the opposite side with respect to said first side wall (21b) and is placed on the other side of the panel placed in the slot.
11. The panel structure according to claim 10, **characterized in that** at least one of said side walls (21 a, 21 b) is elastic, wherein it, thanks to its own elasticity, yields and is simultaneously pressed against the panel placed in the slot.
12. The panel structure according to claim 9 or 10, **characterized in that** said side wall (21 b) is an elastic protrusion whose free end extends away from the opening (18) and which, thanks to its own elasticity, yields and is simultaneously pressed against the panel placed in the slot.
13. The panel structure according to any of the claims 9 to 12, **characterized in that** the profile bar comprises at least one cover (26) that covers the end of the profile bar and comprises a wedge (27) that is placed between said end surface (22c) and the profile bar.
14. A method in the manufacture of a glass panel, the glass panel comprising:
- a panel (22) made of glass material, comprising a first and a second side surface (22a, 22b) which are parallel, and an end surface (22c) which is placed between said side surfaces and to which said side surfaces are limited;
- characterized in:**
- machining one or more long grooves (25) in said panel, being provided on the first side surface (22a) and being substantially parallel with said end surface, for locking a profile bar (20) to be fixed to the glass panel.
15. The method according to claim 14, **characterized in that** said machining is performed simultaneously when said panel is moved.

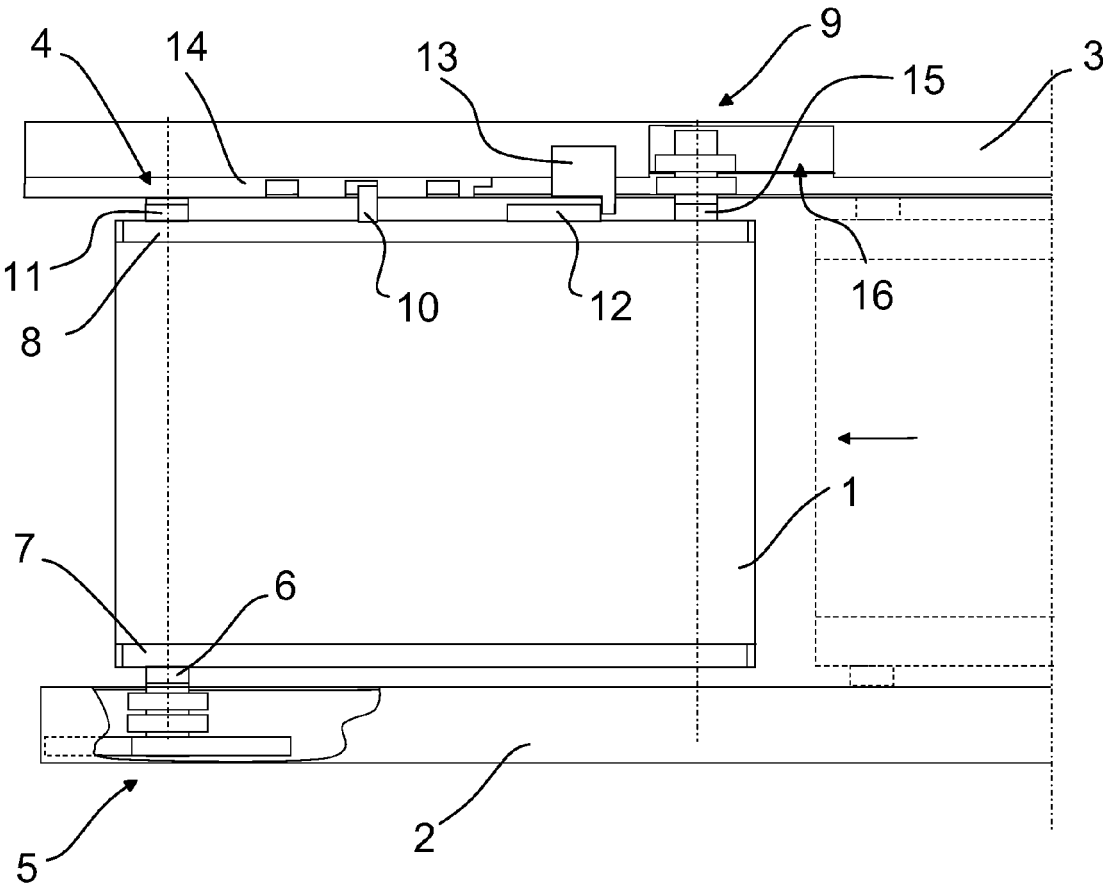


Fig. 1

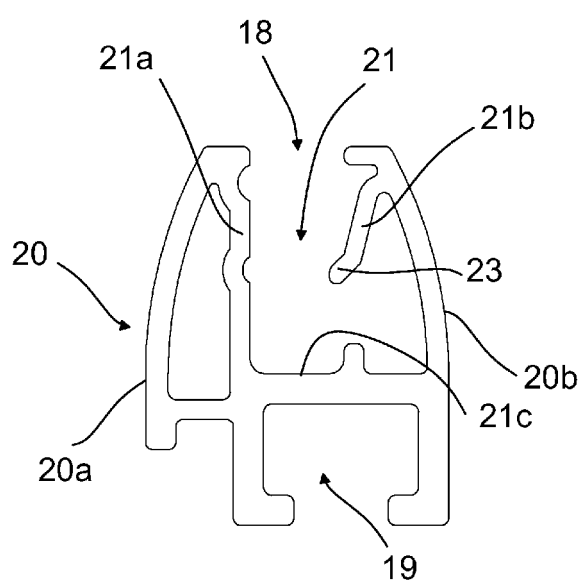


Fig. 2

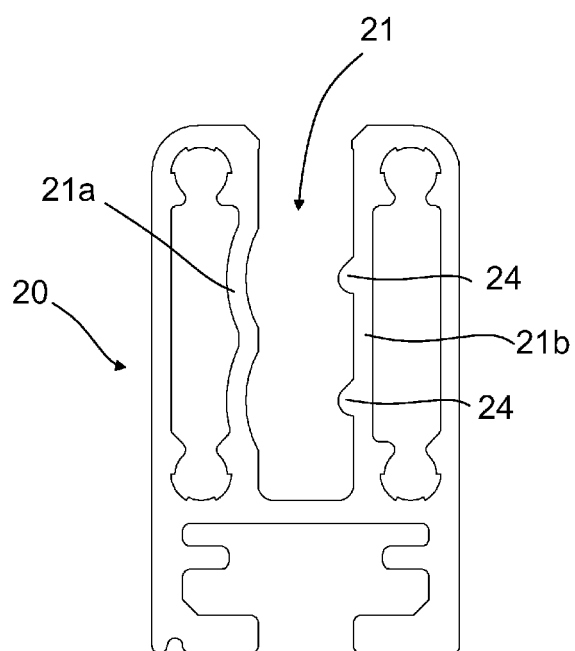
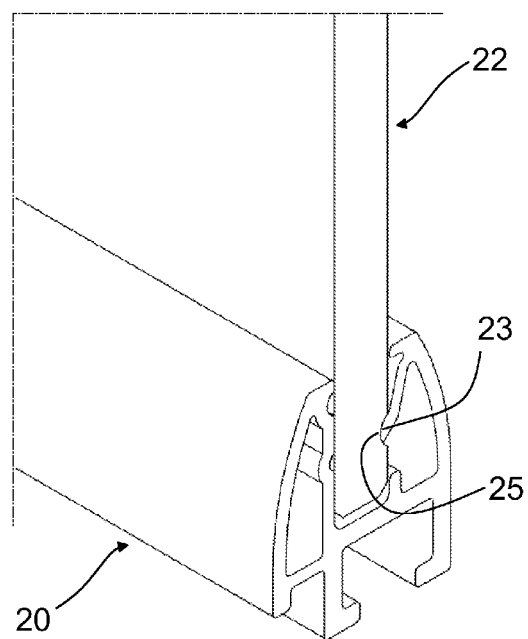
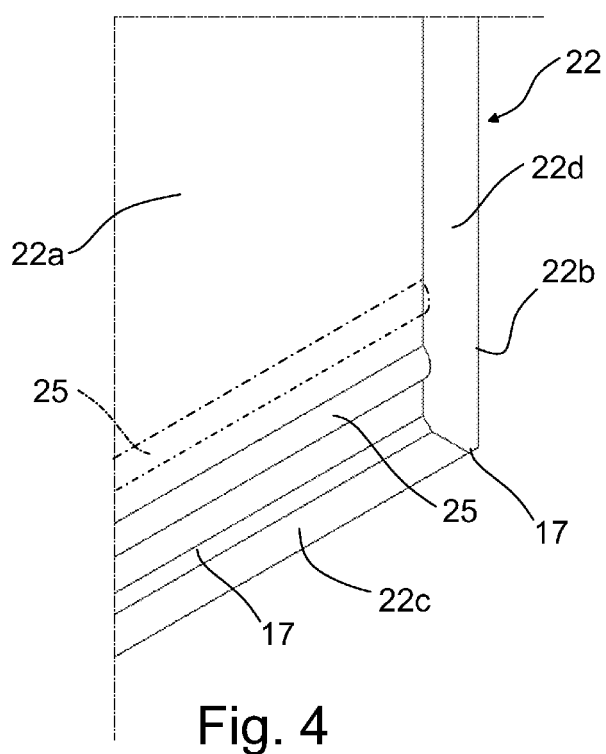


Fig. 3



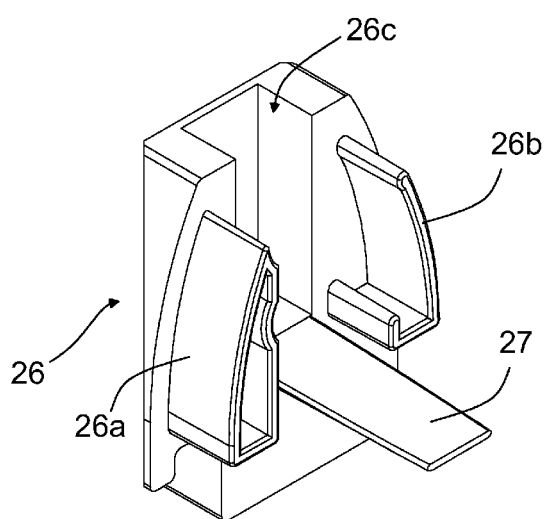


Fig. 6

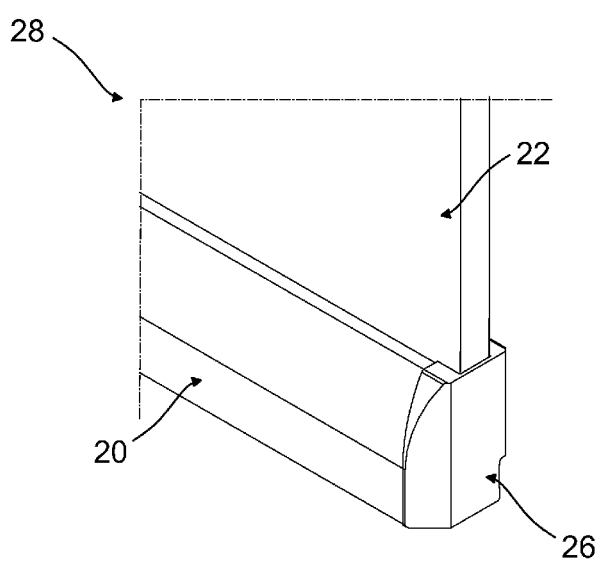


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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