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The invention relates to a system for orienting the vertical inclination of railing panels in a railing panel holder with a support part to be inserted into the railing panel holder and a sliding part which is longitudinally displaceable relative to the support part in the direction in which the railing runs, the system forming at least one inner contact side which predetermines the vertical inclination of the end-fixed railing panel and at least one outer contact side which ensures support against the railing panel holder, and it being possible to set a different vertical inclination of the inner contact side by means of the different positioning of the sliding part relative to the support part resulting from the longitudinal displacement of the sliding part.

In recent times, more and more railings have been installed in which all-glass railing panels are used that are largely free-standing and are only inserted with their lower edge in railing panel holders. The heavy glass panels themselves must be firmly fixed in the railing panel holder by means of clamping systems and must be able to absorb sufficient forces to serve as a reliable guardrail. The forces acting on the railing panel holder via the glass panel and the fixing device can be considerable if, for example, one or more persons lean against the railing due to the leverage ratios.

Suitable railing panel holder are typically U-shaped retaining profiles to be anchored to a building structure, single floor clamps to be anchored to the building structure, preferably on the floor side and spaced apart from one another, or groove-like panel holders inserted directly in a building structure. In the case of clamping fixation, the railing panel is not penetrated by a fastener, but is clamped in the panel receptacle by the clamping force exerted on the railing panel surface by means of the clamping system. The invention is also based on such basically known railing panel holders and clamping devices.

All-glass railings of this kind are regarded as design objects and high demands are placed on the visual pleasingness and quality impression of such a railing. One aspect that is of great importance in this context is that the individual railing panels of such a railing, which are arranged in numerous rows, must be precisely aligned with one another so that a railing extending over a longer distance with its numerous individual panels in the direction in which the railing runs as a whole presents a coherent overall appearance. Although the retaining profiles and the railing panels can be manufactured with low tolerances, the structural parts in particular on which the retaining profiles are mounted often do not run in a sufficiently aligned manner, so that

the possibility of adjusting the vertical inclination of individual railing panels is required so that the railing panels can be aligned precisely with one another in the direction in which the railing runs. In addition, when thermally pretreated glass is used, it can be slightly curved in itself, which can lead to visually inadequate alignment of adjacent railing panels to each other even with optimally toleranced components and optimally aligned structural parts. It should be borne in mind here that even a slight vertical inclination deviation at the lower edge of the railing panel inserted in the retaining profile compared with the adjacent railing panel is magnified at the upper edge of the railing panel due to the geometric conditions and can therefore be clearly perceptible visually. The attachment of continuous handrails, in particular grooved tubes, can also be significantly more difficult if the railing panels are not aligned with sufficient precision.

One possibility for vertical inclination adjustment is disclosed in the German utility model DE 20 2013 104 330 U1. In this system, the railing panel is clamped between a clamping wedge and a panel support within a floor profile serving as a railing panel holder. To adjust the vertical inclination of the railing panel, the vertical inclination of the panel support is adjusted by longitudinally moving a sliding element. However, the disadvantage of this adjustment system is that the vertical inclination of the railing panel is adjusted by moving the sliding element without the system being able to adapt to the simultaneous change in the gap geometry that inevitably occurs on both sides of the railing panel. Any change in the inclination of the side of the panel support facing the railing panel inevitably also changes the inclination of the side facing the inner wall of the floor profile. The gap geometry on the clamping wedge side also changes as a result of a change in the railing panel inclination, without the clamping wedge used compensating for this change. Therefore, due to the lack of adaptability to a gap geometry that changes with the railing panel inclination, the panel support and clamping wedge do not support the railing panel evenly and optimally over the entire surface, irrespective of the railing panel inclination. The uneven distribution of the clamping force at the individual force application point as well as over several clamps extending along the railing panel holder can lead to twisting of the glass panel and resulting stress peaks in the glass.

A system similar to the basic principle with a sliding element and a support element is disclosed in WO 2018/047179 A1 and DE 10 2016 007 268 A1. Here, too, however, the adaptability of the overall system to a change in gap geometry is limited.

It is therefore the task of the invention to provide a system for holding railing panels, in particular all-glass railing panels, and its components, which largely minimizes the

disadvantages of the known system described above and provides optimized mounting and support of the railing panel in the overall system. The system should be simple to manufacture, require few components, provide a robustly loadable holding of the railing panels in the railing panel holder, be easy to assemble on site, and allow simple and preferably reversible adjustability of the vertical inclination of the railing panels. In addition, a system is desired in which the railing panels can be easily removed from the railing panel holder for repair or replacement purposes.

The invention solves the problem by a system in which the sliding part and the support part cooperate in such a way that a longitudinal displacement of the sliding part results in a change of the vertical inclination of the inner contact side detached from the vertical inclination of the outer contact side. In particular, the longitudinal displacement of the sliding part should result in an adjustment of the inclination of the inner contact side that determines the vertical inclination of the railing panel, while the vertical inclination of an outer contact side that rests against the railing panel holder remains unchanged.

The invention is thus based on the realization that, by moving the sliding part, it is not only possible to adjust the inclination of a panel support which is separate from the sliding part and is simultaneously supported on the outside against an inner wall of the floor profile, but also to decouple the inclination adjustment of the inner contact side, which determines the inclination of the railing panel, from the outer contact side of the system, which rests against the inner wall of the railing panel holder. In this way, the railing panel can be adjusted in inclination, while the contact sides of the system supporting the clamping force are simultaneously able to adapt to the change in the gap geometry and an optimum contact with the adjacent surfaces is maintained.

Although the system of support and sliding part can also function when the weight of the railing panel rests on carrier parts which are separate components from the support and sliding part, it is preferred that the support part is designed as a panel support taking the weight load of the railing panel. When the railing panel is inserted, the support part is thus fixed immovably within the railing panel holder, while the sliding part can be moved even when the railing panel is inserted, because the weight of the railing panel rests on the panel support and not on the sliding part.

Irrespective of whether separate components of the supporting and sliding parts are used as carrier parts or whether the weight of the railing panel rests on the support part, the inclination adjustment system enables largely force-free displacement of the sliding part and, in particular, adjustment of the railing panel inclination with the railing

panel positioned stress-free in the railing panel, even when the railing panel is inserted in the railing panel holder and rests on the carrier parts or the support part.

It may be provided that the sliding part and the support part are arranged in such a way that, when the railing panel is inserted, the support part is arranged between the railing panel and the sliding part on at least one side of the railing panel. The inner contact side, which determines the railing panel inclination, is then the inner side of the support part facing the railing panel, and the outer contact side is then the outer side of the sliding part facing the lateral inner wall of the railing panel holder. However, a preferred embodiment is one in which the sliding part is guided between the railing panel and the support part on at least one side of the railing panel when the railing panel is inserted. The inner contact side, which determines the railing panel inclination, is then the inner side of the sliding part facing the railing panel, and the outer contact side is then the outer side of the support part facing the lateral inner wall of the railing panel holder. Just as designs are conceivable in which the support part forms the inner contact side on both sides of the railing panel or in which the sliding part forms the inner contact side on both sides of the railing panel, designs are also conceivable in which the sliding part forms the inner contact side on one side of the railing panel and in which a support part, in particular also a clamping device acting as a support part, forms the inner contact side on the other side of the railing panel.

When the railing panel is used as intended, the inner contact side is preferably in direct contact with the railing panel surface and the outer contact side is in direct contact with the inner surface of the railing panel holder facing the system on at least one railing panel side. However, it may also be provided that further components or system components are located between the inner contact side and/or the outer contact side and the railing panel surface and/or the inner surface of the railing panel holder, such as soft plastic or rubber inserts for protecting the railing panel surface and/or clamping devices for applying the clamping force ultimately fixing the railing panel in the railing panel holder. The fact that the inner contact side is supported against the railing panel and the outer contact side is supported against the railing panel holder does not necessarily mean that the inner contact side is in direct contact with the railing panel and the outer contact side is in direct contact with an inner surface of the railing panel holder.

In principle, it would be sufficient to carry out this adjustment on only one side of the railing panel in order to form an adjustment system that adapts to the change in gap geometry resulting from an adjustment of the vertical inclination of the railing panel. In such a case, it is advisable to design the sliding part and the support part in each case merely in the form of a panel or at least in sections L-shaped, in particular with a horizontally aligned bottom leg and a vertical leg to be arranged on one side of the railing panel. On the side facing away from the adjustment system when the railing panel is inserted, a clamping device can be used which is also preferably capable of adapting to a change in the gap geometry by means of a mechanism inherent in the clamping device. However, it is considered advantageous if the sliding part and the support part are designed in such a way that the system can adapt to the change in the gap geometry between the railing panel and the railing panel holder on both sides of the railing panel as a result of an adjustment of the vertical inclination of the railing panel.

For this purpose, both the sliding part and the support part can be U-shaped in cross-section, at least in sections. The preferred U-shaped design results in synchronous adaptation of the adjustment system on both sides of an inserted railing panel to a gap geometry that also changes as a result of the change in railing panel inclination.

The sliding part is preferably guided on the inside of the support part and thus moves between an inner side of the support part facing the railing panel and the railing panel surface during a longitudinal displacement and when the railing panel is inserted. An embodiment in which the sliding part is guided on the outside of the support part and moves between the inner wall of the railing panel holder and an outer side of the support part facing this inner wall during a longitudinal displacement is also conceivable. Furthermore, an embodiment is also conceivable in which the sliding part is guided on the inside of a first support part on one side of the railing panel and in which the sliding part is guided on the outside of the first support part or of a further, second support part on the other side of the railing panel.

In order to ensure that a change in the vertical inclination of the inner contact side can take place independently of the vertical inclination of the outer contact side during a longitudinal displacement of the sliding part, it can be provided in particular that mutually facing guide sides of the support part and sliding part form guide surfaces at least over a partial area of the surfaces spanned by the guide sides (preferably the

entire surface spanned by the guide sides is formed as a guide surface), which are twisted correspondingly to one another in the direction of the railing. The guide surfaces facing each other preferably follow the course of a partial surface of an imaginary screw-shaped or spiral-shaped twisted body. Lines following the twisting of the guide surfaces can describe a section of an imaginary (single or multiple) helix. When the sliding element is moved longitudinally in the direction of the railing, either the sliding part guided inside the support part twists around an axis parallel to the direction of the railing, so that its inward-facing side, which in this case forms the inner contact side, changes its vertical inclination, while the outer contact side is formed by the outside of the support part. Or the sliding part guided outside the support part twists the support part located inside the sliding part during its longitudinal displacement, so that the inner side of the support part forms the inner contact side, while the outer contact side is formed by the outer side of the sliding part sliding along the inner wall of the railing panel holder. In both cases, the support part preferably remains stationary, since it preferably acts as a support part absorbing the weight force of the panels. And in both cases, the inner contact side determining the vertical inclination of the railing panel changes without the vertical inclination of the outer contact side also changing.

The twisted guide sides or the guide surfaces of the sliding part and the support part are preferably matched to each other in such a way that an angular adjustment of about ±1° is obtained between two end positions of the sliding part. Starting from a central neutral position in which the inclination of the inner contact side preferably specifies a railing panel inclination of 0° (railing panel aligned perpendicular to the floor), the sliding part can preferably be longitudinally displaced in two directions to one displacement end position in each case, one end position allowing an inclination adjustment of the railing panel of approximately -1° and the other end position allowing an inclination adjustment of approximately +1° relative to the neutral position.

Depending on whether the sliding part is guided inside or outside the support part, the latter is longer or shorter than the sliding part. Preferably, however, the sliding part and the support part are matched to each other in such a way that the sliding part is guided inside the support part at least on one side of the railing panel and does not project beyond the support part in the longitudinal direction when the end positions of displacement, which are defined by end stops formed on the support part or on the sliding part, are reached.

In a particularly preferred embodiment, the support part and/or the sliding part is designed in two parts and preferably comprises two, in particular axially symmetrical, identical parts which, when assembled, produce a support part or sliding part which is at least partially U-shaped.

Horizontal support legs with a support height H are preferably provided on the support part to absorb the weight of the railing panel. The supporting legs preferably form the bottom legs of the at least partially U-shaped or L-shaped support part. The support height is dimensioned and matched to the height h of a bottom leg of the at least partially U-shaped or L-shaped sliding part in such a way that the sliding part does not support any weight force of the railing panel when the railing panel is inserted in the railing panel holder and therefore remains longitudinally displaceable largely without load. Preferably, such support legs are provided on both sides at the edge of the U-shaped support part, i.e. either in each case on one side of a preferably axially symmetrical identical part, which is joined together with a second identical part to form the at least sectional U-shaped support part, or on both sides of a one-piece support part. Corresponding to the at least one supporting leg on the support part, the sliding part preferably has at least one recess on the underside which receives the at least one supporting leg on the support part in at least one displacement position. Preferably, the support part and the sliding part cooperate in such a way that the supporting legs on the support part can move into the recess on the sliding part when the sliding part moves into the displacement end positions.

In particular, in an embodiment in which the sliding part is made of several parts, preferably two parts, it can be provided that the sliding part is not formed by two identical parts, but by two differently designed parts that engage in one another in a form-fitting manner at least in the longitudinal direction of the railing. In this case, a first part of the multi-part sliding part can be L-shaped and a second part can be panel-shaped. In this case, the panel-shaped second part of the sliding part can be positively engaged, as seen at least in the longitudinal direction of the railing, at its edge which points downwards when positioned as intended in the railing panel holder, with the free edge of the horizontal leg of the L-shaped first part of the sliding part, which preferably engages underneath the railing panel on the underside. The positive engagement of the two parts of the sliding part ensures that one part drags the other part during sliding. Preferably, the one tool attachment is provided for attaching a tool

to the panel-shaped second part of the sliding part, so that the first part is dragged along on the other railing panel side via the latter.

A tool attachment for a displacement tool can be formed on the sliding part, which is also accessible when the railing panel is inserted in the railing panel holder as intended. This tool attachment is preferably designed in such a way that it can cooperate with the same tool that is also used as a twisting tool for a clamping device. Preferably, one and the same tool is used both as a displacement tool and as a twisting tool. Accordingly, the system has at least one sliding part with a tool attachment and a clamping device with a tool attachment, the tool attachments on the sliding part and on the clamping device being designed in such a way that a tool assigned to the system with the identical tool part can be brought into engagement both as a sliding tool with the tool attachment provided on the sliding part and as a twisting tool with the tool attachment provided on the clamping device when the railing panel is used as intended.

A particularly advantageous design of the inclination adjustment system provides a clamping device which applies the clamping force for fixing the railing panel and is assigned to the support part or the sliding part in such a way that a change in the vertical inclination of the inner contact side leads to a corresponding change in the alignment of the clamping surfaces of the clamping device which is effective when the railing panel is clamped. By means of the support part, which is preferably designed as a carrier part that cannot be displaced when the railing panel is inserted, the clamping device can also be positioned in a stationary manner with respect to the railing panel holder without the clamping device being displaced when the sliding part is displaced. However, it is also conceivable that the clamping device is assigned to the sliding part, in particular is accommodated in a receptacle arranged in the sliding part and preferably open at the top, and the clamping device moves with the sliding part when the latter is moved.

The above-described idea of a system for holding railing panels, in which an adjustment of the inclination of an inner contact side of a system component, in particular of a support part or a sliding part, which determines the inclination of the railing panel and is located on one side of the railing panel, leads to the fact that a clamping surface of a clamping device to be provided on the other side of the railing panel or a supporting surface determining the vertical inclination of the clamping

surface follows the adjustment of the inclination of the inner contact side, is regarded as an independent invention which can be claimed separately from the possibility described above for implementing this basic idea with a sliding part longitudinally displaceable relative to a support part and the resulting decoupling of inner and outer contact sides. A system for holding railing panels, in which the clamping surface vertical inclination of a clamping device to be mounted on the clamping side of the railing panel adapts to a vertical inclination adjustment of an inner contact side of the system located on the other side of the railing panel, can also be achieved without a longitudinally displaceable sliding part, if a first system component, that forms the inner contact side and a second system component that forms the support surface, to whose vertical inclination the clamping surface vertical inclination is oriented, are coupled to one another or even formed in one piece in such a way that the vertical inclination adjustment of the inner contact side also entails a corresponding vertical inclination adjustment of the support surface on which the clamping device is supported.

If the clamping device is assigned to the support part, it is preferably held stationary relative to the support part during longitudinal displacement of the sliding part in the longitudinal direction. For this purpose, it can be provided in particular that the clamping device is in engagement with the support part, so that the clamping device is held stationary relative to the support part and thus stationary in the railing panel holder when the sliding part is displaced in the longitudinal direction of the railing. At the same time, the engagement, provided that it is designed in such a way that it allows the effective clamping surfaces of the clamping device to pivot together with the change in the vertical inclination of the inner contact side, or the assignment of the clamping device to the sliding part, enables the vertical inclination of the effective clamping surfaces of the clamping device to change correspondingly to the change in the vertical inclination of the inner contact side. For this purpose, it can be provided in particular that the inner contact side is formed by the sliding part and the part of the sliding part forming the inner contact side is guided behind the clamping device on the side of the clamping device facing away from the railing panel. The clamping device is gripped behind in such a way that, in the event of a longitudinal displacement of the sliding part, the change in the vertical inclination of the inner contact side is transmitted at least indirectly to the clamping device.

However, it can also be provided that a guide surface is formed on the side of the clamping device facing away from the railing panel, onto which a guide surface on the sliding part facing the railing panel passes when the sliding part is displaced. In this case, on the clamping side of the railing panel (on the side on which the clamping device is arranged), the guide surfaces contributing to the change in vertical inclination are located on the side of the sliding part facing the railing panel side and on the side of the clamping device facing away from the railing panel. Thus, on the clamping side of the railing panel, the clamping device itself forms a support part or, in other words, the clamping device is part of the one support part on the clamping side. This embodiment, in which the clamping device itself functions as a support part, is particularly suitable if a first support part is arranged on the side of the railing panel that is not the clamping side, which forms the outer contact side, and on the clamping side of the railing panel only a holding part is provided, which is arranged to hold the clamping device stationary in the longitudinal direction of the railing when the sliding part is displaced in order to adjust the vertical inclination of the railing panel, without the holding part simultaneously forming an inner or outer contact side. An advantageous embodiment provides that the first support part provided on one side of the railing panel is guided under the railing panel and forms the holding part on the other side of the railing panel, in particular on the clamping side. The support part provided on one side of the railing panel and the holding part provided on the other side of the railing panel can thus be formed by a single component which engages under the railing panels and is preferably U-shaped at least in sections.

The clamping device can be formed by a simple clamping wedge which is to be driven into a clamping gap formed between the railing panel and the inner surface of the railing panel holder supporting the clamping force. The component limiting the clamping gap on the side of the clamping wedge facing away from the railing panel can in particular be an inner side of the sliding part facing the railing panel, the vertical inclination of which is also adjusted during its displacement corresponding to the inclination adjustment of the inner contact side.

Preferably, however, the clamping device is formed by a rotary wedge system having a first clamping part and having a second clamping part which cooperate such that displacement of one clamping part relative to the other clamping part from an assembly orientation to a clamping orientation to produce the clamping force causes an increase in the effective clamping width of the clamping device, the one clamping

part and the other clamping part being rotatable relative to each other when the clamping device is disposed within the clamping gap to produce the clamping force.

Such a clamping device is described in detail in the German utility model application DE 20 2017 105 698, the disclosure of which with respect to the design of the clamping device and a twisting tool which can be used to actuate the clamping alignment and which, in view of the invention described herein, can also be used as a displacement tool, is made the subject of this application.

In principle, it should be noted that on the side of the railing panel on which the clamping device is arranged (clamping side), the sequence of arrangement between the railing panel surface and the inner surface of the railing panel holder can be freely selected. Thus, the clamping device can also be supported with the side facing away from the railing panel on the inner surface of the railing panel holder and with the side facing the railing panel on the sliding part or the support part. As described above, an embodiment is also conceivable in which the clamping device forms a guide surface on the side facing away from the railing panel, which guide surface is in contact directly or indirectly with the guide side of the sliding part facing the railing panel and forms a guide surface pairing with the latter that determines the vertical inclination adjustment. In particular, if a clamping wedge to be driven in is used as the clamping device, the components used to limit the clamping gap on both sides are preferably selected in such a way that the clamping gap geometry does not change as a result of the longitudinal displacement of the sliding part.

The vertical legs forming the contact sides and guide sides of the support part and/or sliding part preferably have a grid-like structure.

In the figures shows

Fig. 1 an all-glass railing system with an inclination adjustment system,

Fig. 2a-b a support part of the inclination adjustment system in two different views,

Fig. 3 the support part system from Figs. 2a/b in another view, illustrating the use of two identical parts,

Fig. 4a-b a sliding part of the inclination adjustment system in two different views,

Fig. 5 the inclination adjustment system with a sliding part guided in the support part, a clamping device and a displacement tool attached to a tool attachment provided on the sliding part,

Fig. 6a-d a clamping device provided for use with the inclination adjustment system in various views,

Fig. 7a-c a comparison of the effect of the inclination adjustment system on the vertical inclination of the railing panel with the sliding part in different displacement positions in different views in each case,

Fig. 8a-c a comparison of the effect of the inclination adjustment system on the vertical inclination of the railing panel with the sliding part in different displacement positions in an alternative embodiment of the inclination adjustment system in different views in each case,

Fig. 9a-b the sliding part used in the embodiment according to Figs. 8a-c in various views,

Fig. 10a-b the support part used in the embodiment according to Figs. 8a-c in various views,

Fig. 11a-b a further embodiment of an inclination adjustment system in two different perspective views, and

Fig. 12a-c a comparison of the effect of the inclination adjustment system on the vertical inclination of the railing panel with the sliding part in different displacement positions in one of the further embodiments of the inclination adjustment system according to Figs. 11a and 11b in different views in each case.

Figure 1 shows an all-glass railing system with an inclination adjustment system for adjusting the vertical inclination of the railing panel 1 in an exploded view. A railing panel 1 is inserted into a railing panel holder 2 formed by an extruded floor profile, with a sliding part 3 and a support part 4 engaging underneath the railing panel. A clamping device 5 is provided for clamping the railing panel 1 in the railing panel holder 2. A tool 6 which can be used for various purposes in the inclination adjustment system shown - both use as a displacement tool for displacing the sliding part 4 and use as a twisting tool for twisting a clamping part of the clamping device 5 is possible with the same tool in each case when the railing panel is inserted in the railing panel holder as intended - is shown dashed in two different positions of use.

Figure 2a shows the support part 4 in a perspective single view and Figure 2b shows the support part in a front view directed to the front side. The support part 4 has an at least partially U-shaped structure in cross-section and has two opposing vertical legs 74 with a grid-like structure and also forms a horizontal bottom leg 84 at each of its two outer ends, which with its support height H (Figure 3) serves as a supporting leg for absorbing the weight load of the railing panel within the railing panel holder. Figure 3 illustrates the structure of the support part 4 consisting of two axially symmetrical identical parts which can be engaged with each other by corresponding engagement means.

Figure 4a shows the sliding part 3 in a perspective single view and Figure 4b shows the sliding part in a front view directed to the front side. The sliding part 3 also has a cross-sectionally at least partially U-shaped structure with two vertical legs 73 and a horizontal bottom leg 83. At the end of the U-shaped structure of the sliding part 3, the bottom leg 83 is pierced by recesses 9 into which the supporting legs of the support part can enter when the sliding part 3 is displaced in the direction of two displacement end positions (Figures 7b and 7c). The resulting contact between the sliding part and the support part forms end stops on both sides of a neutral center position (Figure 7a), which limit the sliding path of the sliding part relative to the support part.

Finally, Figure 5 shows the inclination adjustment system including the displacement tool 6 inserted into the tool attachment 103 provided on the sliding part 3 and the clamping device 5 already evident from Figure 1, as it can be inserted into the railing panel holder prior to the intended insertion of the railing panel.

To understand the function of the inclination adjustment system, it is first of all important that the vertical legs 73 of the sliding part on the outside and the vertical legs 74 of the support part 4 on the inside form or span corresponding guide surfaces 113 and 114. These guide surfaces are helically wound corresponding to each other with a very high pitch, so that the vertical inclination of the inner sides of the vertical leg 73 of the sliding part 3 changes when it is moved in the direction of the railing or in the longitudinal direction L (Figure 5) within the support part 4. The inner side of the vertical leg 73, against which the railing panel 1 is pressed when it is fixed in the railing panel holder 2 as intended (Figures 7a-c and Figures 8a-c), thus forms the inner contact side 12 of the inclination adjustment system that determines the inclination of the railing panel 1. At the same time, the inclination of the vertical legs 74 of the

support part 4 and thus also their outer sides remain unchanged in their vertical inclination when the sliding part is displaced within the support part. The outer side of the vertical leg 74 of the support part, which is positioned against the inner surface of the railing panel holder when the inclination adjustment system is used as intended, thus forms an outer contact side 13 of the inclination adjustment system which retains its vertical inclination even when the sliding part is displaced. As a result of this interaction between the sliding part and the support part or their interacting guide surfaces 113 and 114, a vertical inclination adjustment of the inner contact side facing the railing panel and specifying its vertical inclination does not affect the vertical inclination of the outer contact side supported against the railing panel holder. The two contact sides are decoupled from each other and are therefore able to contact the adjacent component over their entire surface, irrespective of the set vertical inclination of the railing panel.

Figures 2b and 4b show that the inner sides of the vertical legs 74 of the support member 4 (Figure 2b) and the outer sides of the vertical legs 73 of the sliding member 3 (Figure 4b), respectively, are non-directional. The right vertical leg shown in Figure 2b is thinner at the top (at the open end of the "U") than at the bottom at the front end shown in Figure 2b, and the left vertical leg is thicker at the top than at the bottom. Due to the helical winding of the guide surfaces formed by the inside of the vertical legs 74, this difference between the upper and lower ends is reversed at the other front end of the same support part for the same vertical leg in each case. The same applies in a figurative sense to the sliding part shown in Figure 4b, where the helical winding of the guide surfaces takes place on the outer sides of the vertical legs 73.

A substantially similar design can also be seen in the sliding part 3 shown in Figures 9a and 9b with its vertical legs 73, outer guide surfaces 113 and the inner contact side 12, and the support part 4 shown in Figures 10a and 10b with its vertical legs 74, inner guide surfaces 114 and the outer contact side.

The function to be made usable from this constructive design becomes particularly clear from the comparison of various embodiments of the system shown in Figures 7a-c and Figures 8a-c.

In Figure 7a and Figure 8a, the inclination adjustment system is in a neutral or center position in each case, in which the vertical inclination of the railing panel is 0° to the

vertical and 90° to the horizontal, respectively. The sliding part 3 is arranged centrally relative to the support part 4. If the sliding part is shifted to the right relative to the support part (Fig. 7b or 8b), the inner contact side 12 of the sliding part 3 (the inner side of the sliding part in the left-hand illustrations in Figs. 7a-c or 8a-c, respectively, which rests against the railing panel from the left) inclines increasingly to the left (counterclockwise). The same inner contact side 12 inclines increasingly to the right (clockwise) when the sliding part is shifted to the left from the neutral center position (Figure 7c or 8c). The clamping force applied by the clamping device 5 in all cases and fixing the railing panel 1 in the holder is supported by the outer contact side 13, which maintains its vertical inclination independently of the vertical inclination of the inner contact side 12.

Figures 6a-6d show the clamping device 5 used in a preferred embodiment. In conjunction with Figure 5, it can be seen that an engagement extension 14 is arranged on the clamping device 5 for engagement in the support part 4, by means of which the clamping device 5 can be arranged on or suspended in a vertical leg 74 of the support part 4, at least in the vertical direction. For this purpose, the vertical leg 74 has a receptacle in the form of a recess matched to the engagement extension 14. Figure 5 also shows, as in Figures 7a-c, that a vertical leg 73 of the sliding part 3 is guided behind the clamping device 5 arranged on the support part 4. This has the effect that the inclination adjustment of this vertical leg, which slides past the rear of the clamping device during longitudinal displacement of the sliding part, is transmitted to the front clamping surface of the clamping device via the rear side of the clamping device, which rests firmly against the inner side of the vertical leg when the railing panel is fixed as intended. The inclination adjustment system is thus able to adapt to the change in the clamping gap geometry on the side of the clamping device that accompanies the change in the vertical inclination of the railing panel.

This adaptation to the gap geometry on both sides of the railing panel, which changes as a function of the slope of the railing panel, can also be realized by the alternative embodiment shown in Figures 8a-c with a sliding part 3 shown in Figures 9a-b. In this case, a simple, basically known drive-in clamping wedge is not assigned to the support part 4 but to the sliding part 3 and moves with the latter when the sliding part is moved longitudinally. The clamping device, which is designed as a simple drive-in clamping wedge, is accommodated in a clamping wedge receptacle 15 provided in the sliding part. It is obvious that even with such an arrangement, the inclination adjustment of the

vertical leg 73, to which the clamping wedge is assigned, is transferred to the clamping wedge and the clamping gap geometry of the clamping gap formed between the railing panel and the sliding part remains unchanged even when the vertical inclination of the railing panel is adjusted.

Figures 6a-d further illustrate the operation of the clamping device 5 shown in Figures 1 and 5. A first clamping part 16, which is preferably disc-shaped and faces the railing panel, with wedge surfaces 18 formed on its rear surface (the surface facing away from the railing panel) interacts with corresponding wedge surfaces formed on the surface of the second clamping part 17 facing the railing panel in such a way that a rotation of the first clamping part relative to the second clamping part causes an increase in the clamping width of the clamping device and thus the application of a clamping force.

Figure 6a shows that the same tool that serves as a displacement tool for the sliding part in Figure 5 and can be applied to the tool attachment 103 provided on the sliding part can also be applied to the tool attachment 105 provided on the clamping device 5. Both the tool attachment 103 provided on the sliding part and the tool attachment 105 provided on the clamping device 5 can be reached with the tool even when sliding part 3 and clamping device 5 are arranged in the railing panel holder as intended with the railing panel also inserted in the railing panel holder.

It should be noted that a reverse arrangement to that shown in the figures is also conceivable, in which the sliding part is guided on the outside by the support part, the surface of the support part facing the railing panel forms the inner contact side and the outer surface of the sliding part facing the railing panel holder forms the outer contact side.

Such an arrangement for at least one side of the railing panel is shown in Figures 11a to 12c, with the additional feature here that on the side of the railing panel which is not the clamping side, a panel support absorbing the weight of the railing panel is provided as a first support part 4', which with its outer side 13 facing the inside of the railing panel holder forms the outer contact side, while a first part 3' of a multi-part sliding part forms the inner contact side 12. On this side of the railing panel, the pair of guide surfaces 114/113 determining the vertical inclination adjustment is thus formed by the first part 3' of the multi-part sliding part and by the first support part 4' acting as a panel

support. On the clamping side of the railing panel, on the other hand, a second part 3'' of the sliding part forms the outer contact side 13, while a clamping device 5 simultaneously functions as a second support part 4'' or while a clamping device 5 is formed on a second support part 4'' and forms the inner contact side 12. On the clamping side, the first support part 4' acts merely as a holding part which secures the second support part 4'' forming the clamping device 5 against displacement in the longitudinal direction of the railing panel and holds it at a defined height within the clamping gap. On the clamping side of the railing panel, the pair of guide surfaces 113/114 determining the vertical inclination adjustment is thus formed by the second part 3'' of the multi-part sliding part and a clamping device 5 acting simultaneously as the second support part 4''.

In particular, it can be seen from Figure 11a and Figure 11b that on the side of the railing panel that is not the clamping side, the pair of guide surfaces 113/114 between the first support part 4' and the first part 3' of the multi-part sliding part predetermines the inclination adjustment that results from a displacement of the sliding part 3'/3'' relative to the first support part 4'. The guide sides 113 on the first part 3' of the multi-part sliding part and 112 on the first support part 4', which face each other and form the guide surfaces, slide against each other when the sliding part 3'/3'' is displaced, changing the vertical inclination. The first part 3' of the sliding part forms the inner contact side 12 and the first support part 4' forms the outer contact side 13. On the guide side of the first support part 4' and on the guide side of the first part 3' of the sliding part and also on a horizontally aligned leg of the first, sectionally L-shaped support part 4' and on a horizontally aligned leg of the first, sectionally L-shaped part 3' of the sliding part, corresponding guide members (guide groove 19 and guide extension 20) are formed, L-shaped part 3' of the sliding part are formed, which ensure that the displacement of the sliding part 3'/3'' is guided relative to the first support part 4', which absorbs the weight of the railing panel, and that the parts do not tilt against one another..

As in the previously described embodiments, bottom legs 84 are provided on the support part (here on the first support part) to absorb the weight force of the railing panel.

Figure 11a and Figure 11b further show that a second part 3'' of the multi-part sliding part is provided on the clamping side of the railing panel, i.e. on the side on which the

clamping device 5 to be actuated for fixing the railing panel is provided. Unlike on the other side of the railing panel, this second part 3'' of the sliding part forms the outer contact side 13 on the clamping side. The pairing of guide surfaces 113/114 which determines the vertical inclination adjustment when the sliding part 3'/3'' is displaced is formed by the side of the second part 3'' of the sliding part facing the railing panel and the side of the clamping device 5 facing away from the railing panel. The clamping device 5 thus forms a second support part 4'' on the clamping side itself or is a component thereof. The first support part 4' on the other side of the railing panel, via which the guide surface 114 is provided there, functions on the clamping side merely as a holding part for the clamping device 5 acting as the second support part 4'', in that the latter is placed on two upwardly projecting retaining protrusions 22 by means of downwardly open retaining holders 21 formed on it.

Figures 11a-b also show that corresponding latching members 23'/23'' are provided on the clamping device 5 or on the second support part 4'' formed by the latter and on the first support part 4', which latching members act in the vertical direction and ensure that the clamping device 5, which is to be inserted into the railing panel holder during installation of the railing, remains held in the clamping gap and, in particular, does not accidentally slip upwards when the clamping device 5 is actuated with a tool. In the embodiment shown in the figures, resiliently recessed latching fingers 23' are provided for this purpose on the first support part 4', which acts as a holding part on the clamping side, and these latching fingers are placed over latching edges 23'' provided on the clamping device 5 or on the second support part 4'' when the clamping device is placed on the holding part.

Figures 12a-c illustrate - analogously to the illustrations in Figures 7a-c and Figures 8a-c - the operation of the inclination adjustment system on the basis of various positioning of the multi-part sliding part 3'/3'' relative to the first support part 4' or relative to the clamping device 5 forming the second support part 4''.

In Figure 12a, the sliding part 3'/3'' is in a neutral center position. The railing panel 1 is not inclined relative to the railing panel holder 2. If the sliding part is moved to the right into the position shown in Figure 12b, the railing panel 1 inclines counterclockwise to the left, as can be seen from the left-hand illustration in Figure 12b. If, on the other hand, the sliding part is moved to the left into the position shown in Figure 12c, the

railing panel 1 inclines clockwise to the right, as shown in the left-hand illustration in Figure 12c.

In the right-hand illustrations of Figures 12a-c, only the first part 3' of the multi-part sliding part can be seen in each case, while the clamping device 5, which is concealed by the railing panel in the illustrations and is also the second support part 4", can only be seen in the left-hand illustrations of Figures 12a-c. From the overall view of Figures 11a-b and Figures 121a-c, it can be seen that when the sliding part is moved, the clamping surface facing the railing panel and pressing against it to fix the railing panel inclines together with the clamping device, so that this clamping surface always comes into contact with the railing panel 1 over its entire surface and under uniform load when the clamping device is actuated.

It should be noted that, as the embodiment according to Figures 11a-12c also shows, it is not absolutely necessary for the support part and sliding part to be U-shaped.

Moreover, it is not necessary to adapt the inclination adjustment system to a change in the gap geometry resulting from an inclination adjustment of the railing panel on both sides of the railing panel. It may be sufficient to provide this on one side of the railing panel. On the side of the railing panel where a clamping device is used (clamping side), a clamping device compensating for the change in the gap geometry is then preferably used.

It should also be noted that the inner contact side does not necessarily have to be in direct contact with the railing panel and the outer contact side does not necessarily have to be in direct contact with an inner lateral support surface of the railing panel holder. Further system components can also be arranged between the inner contact side and the railing panel and/or between the outer contact side and the inner lateral support surface of the railing panel holder, such as protective inserts made of soft plastic or rubber or similar intermediate parts that bridge the gap between the inner contact side and the railing panel surface or between the outer contact side and the inner lateral support surface of the railing panel holder.

The above description of various embodiments further shows that if a pair of guide surfaces determining the vertical inclination adjustment is provided on both sides of

the railing panel, this pair of guide surfaces can be provided by different components on the clamping side of the railing panel than on the other side of the railing panel.

List of reference signs

1	Railing panel
2	Railing panel holder
3	Sliding part
4	Support part
5	Clamping device
6	Tool
74/73	Vertical leg of the support part/sliding part
84/83	Bottom leg of the support part/sliding part
9	Recesses
103/105	Tool attachment on the sliding part/clamping device
113/114	Guide surfaces on the sliding part/on the support part
12	inner contact side
13	outer contact side
14	engagement extension
15	Clamping wedge receptacle
16	first clamping part
17	second clamping part
18	Wedge surfaces
19	Guide groove
20	Guide extension
21	Retaining holders
22	Retaining protrusions
23'/23"	Latching means (latching finger/latching edge)

H	support height of the supporting leg of the support part
h	Height of the bottom leg of the sliding part

PATENTKRAV

1. System til opretning af den vertikale hældning for gelænderplader (1) i en gelænderpladeholder (2) med en bæredel (4) til indsætning i gelænderpladeholderen (2) og en glidedel (3), som er langsgående forskydelig i forhold til bæredelen (4) i retningen (L), i hvilken gelænderet forløber, hvilket system danner i det mindste én indvendig kontaktside (12), som forudbestemmer den vertikale hældning for gelænderpladen (1), og i det mindste én udvendig kontaktside (13), som sikrer understøtningen i gelænderpladeholderen (2), hvor den udvendige kontaktside (13) er dannet af den udvendige side af bæredelen (4) eller den udvendige side af glidedelen (3) og en forskellig vertikal hældning for den indvendige kontaktside (12) kan indstilles ved hjælp af den forskellige positionering af glidedelen (3) i forhold til bæredelen (4), som resulterer af den langsgående forskydning af glidedelen (3), **kendetegnet ved, at** glidedelen (3) og bæredelen (4) samvirker på en sådan måde, at, i tilfælde af en langsgående forskydning af glidedelen (3), finder en ændring sted for den vertikale hældning af den indvendige kontaktside (12), uafhængigt af den vertikale hældning af den udvendige kontaktside (13).

2. System ifølge krav 1, hvor

- når gelænderpladen (1) anvendes som tilsigtet, er bæredelen (4) anbragt i det mindste på én side af gelænderpladen (1) imellem gelænderpladen (1) og glidedelen (3), og den indvendige kontaktside (12) er den indvendige side af bæredelen (4), som vender imod gelænderpladen (1) og den udvendige kontaktside (13) er den udvendige side af glidedelen (3), som vender imod den sideværts indvendige væg af gelænderpladeholderen

og/eller

- hvor, når gelænderpladen (1) er indsat som tilsigtet, er glidedelen (3) anbragt i det mindste på én side af gelænderpladen (1) imellem gelænderpladen (1) og bæredelen (4), og den indvendige kontaktside (12) er den indvendige side af glidedelen (3), som vender imod gelænderpladen (1) og den udvendige kontaktside (13) er den udvendige side af bæredelen (4), som vender imod den sideværts indvendige væg af gelænderpladeholderen (2).

3. System ifølge ethvert af de foregående krav, hvor

- glidedelen (3) og bæredelen (4) er udformede på en sådan måde, at systemet er i stand til at tilpasse sig på begge sider af gelænderpladen (1) til ændringen i spaltegeometrien imellem gelænderpladen (1) og gelænderpladeholderen (2), som forekommer som et resultat af en justering af den vertikale hældning for gelænderpladen (1), eller

hvor gllidedelen (3) og bæredelen (4) er udformede på en sådan måde, at systemet er i stand til at tilpasse sig alene på én side af gelænderpladen (1) til ændringen i spaltegeometrien imellem gelænderpladen (1) og gelænderpladeholderen (2), som forekommer som et resultat af en justering af den vertikale hældning for gelænderpladen (1).

4. System ifølge ethvert af de foregående krav, hvor

- glidedelen (3) er ført på den indvendige side af bæredelen (4) og bevæger sig imellem en indvendig side af bæredelen (4), som vender imod gelænderpladen (1) og gelænderpladefladen under en langsgående forskydning og med gelænderpladen (1) indsat
og/eller
- hvor glidedelen (3) er ført på den udvendige side af bæredelen (4) og bevæger sig imellem den indvendige væg i gelænderpladeholderen (2) og en udvendig side af bæredelen (4), som vender mod denne indvendige væg under en langsgående forskydning.

5. System ifølge ethvert af de foregående krav, hvor bæredelen (4) og/eller glidedelen (3) har føringssider, som vender imod hinanden, som danner føringsflader (113, 114) svarende til hinanden i det mindste over et delområde på en sådan måde, at, i tilfælde af en langsgående forskydning af glidedelen (3), drejes bæredelen (4) i forhold til glidedelen (3) eller glidedelen (3) drejes i forhold til bæredelen (4).

6. System ifølge ethvert af de foregående krav, hvor bæredelen (4) og/eller glidedelen (3) er dannet i adskillige dele, især i to dele, og omfatter to dele, som, samlet som tilsigtet, danner en i det mindste delvis U-formet bæredel (4) eller glidedel (3).

7. System ifølge ethvert af de foregående krav, hvor i det mindste et bæreben (84), som absorberer vægten af gelænderpladen, er tilvejebragt på bæredelen (4) og har en

bærehøjde (H), hvor bærehøjden (H) er dimensioneret og tilpasset til højden (h) af et nedre ben af den i det mindste delvis U-formede eller L-formede glidedel (3) på en sådan måde, at glidedelen (3) forbliver langsgående forskydelig, når gelænderpladen er indsat i gelænderpladeholderen.

8. System ifølge ethvert af de foregående krav, hvor en klemindretning (5), som påfører klemkraften til at fiksere gelænderpladen (1), er tilvejebragt med en klemflade, som vender imod gelænderpladen (1), hvor

- klemindretningen (5) er knyttet til bæredelen (4) eller glidedelen (3) på en sådan måde, at en ændring i den vertikale hældning for den indvendige kontaktside (12) af bæredelen (4) eller af glidedelen (3) fører til en tilsvarende ændring i orienteringen af klemfladen, som er effektiv under klemningen af gelænderpladen,
  eller hvor
- klemindretningen (5) selv danner bæredelen (4) eller glidedelen (3) eller er en integreret del af bæredelen (4) eller glidedelen (3) og klemfladen danner direkte den indvendige kontaktside (12).

9. System ifølge ethvert af de foregående krav, hvor en klemindretning (5), som påfører klemkraften til fiksering af gelænderpanelet (1), er tilvejebragt,

- hvor klemindretningen (5) er knyttet til bæredelen (4) og er fastholdt stationært i forhold til bæredelen (4) under en langsgående forskydning af glidedelen (3) i den langsgående retning (L), eller
- hvor klemindretningen (5) på klemsiden af gelænderpladen (1) selv danner en bæredel (4) eller er en integreret del af bæredelen (4) og er fastholdt af en holdedel i den langsgående retning (L) på en stationær måde i gelænderpladeholderen (2).

10. System ifølge ethvert af de foregående krav, hvor i det mindste på en klemside af gelænderpladen (1),

- den indvendige kontaktside (12) er dannet af glidedelen (3), og at en del af glidedelen (3), især et vertikalt ben (3) af en U-formet glidedel, som afbilder ændringen i vertikal hældning for den indvendige kontaktside (12), er ført bag klemindret-

ningen (5) på den side af klemindretningen (5), som vender bort fra gelænderpladen, eller

- den udvendige kontaktside (13) er dannet af glidedelen (3) og den indvendige kontaktside (12) er dannet af en klemindretning (5), som fungerer som en bæredel (3), hvor glidedelen (3) har en føringsflade (113), som vender imod gelænderpladen (1), og klemindretningen (5), der fungerer som en bæredel (3), har en føringsflade (114) på den side, som vender bort fra gelænderpladen (1), og glidedelen (3) er ført bag klemindretningen (5) på den side af klemindretningen (5), som vender bort fra gelænderpladen (1).

11. System ifølge ethvert af de foregående krav, hvor glidedelen (3) danner den indvendige kontaktside (12) på én side af gelænderpladen (1) og har en føringsside med en føringsflade (113) på den side, som vender bort fra gelænderpladen, og at glidedelen (3) danner den udvendige kontaktside (13) på den anden side af gelænderpladen (1) og har en føringsside med en føringsflade (114) på en side, som vender imod gelænderpladen.

12. System ifølge ethvert af de foregående krav, hvor, når gelænderpladen er indsat i gelænderpladeholderen (2) som tilsigtet, så er en første bæredel (4) tilvejebragt på én side af gelænderpladen (1), hvilken bæredel tjener som en holdedel for en klemindretning (5) på den anden side af gelænderpladen (1), som fungerer som en anden bæredel på den anden side af gelænderpladen (1).

13. System ifølge ethvert af de foregående krav 1 til 9, hvor en klemindretning, som påfører klemkraften til fiksering af gelænderpladen (1), er tilvejebragt, som er knyttet til glidedelen (3), og klemindretningen (5) bevæger sig med glidedelen (3) når sidstnævnte bevæger sig.

14. System ifølge ethvert af de foregående krav, hvor systemet har i det mindste én glidedel (3) med en værktøjsforbindelse (103) og en klemindretning (5) med en værktøjsforbindelse (105), hvor værktøjsforbindelserne (103, 105) på glidedelen (3) og på klemindretningen (5) er udformede på en sådan måde, at et værktøj (6), som er knyttet til systemet, med en identisk værktøjsdel kan bringes i indgreb både som et forskydningsværktøj med værktøjsforbindelsen (103) tilvejebragt på glidedelen (3) og som et drejeværktøj med værktøjsforbindelsen (105) tilvejebragt på klemindretningen (5), når gelænderpladen (1) er indsat.

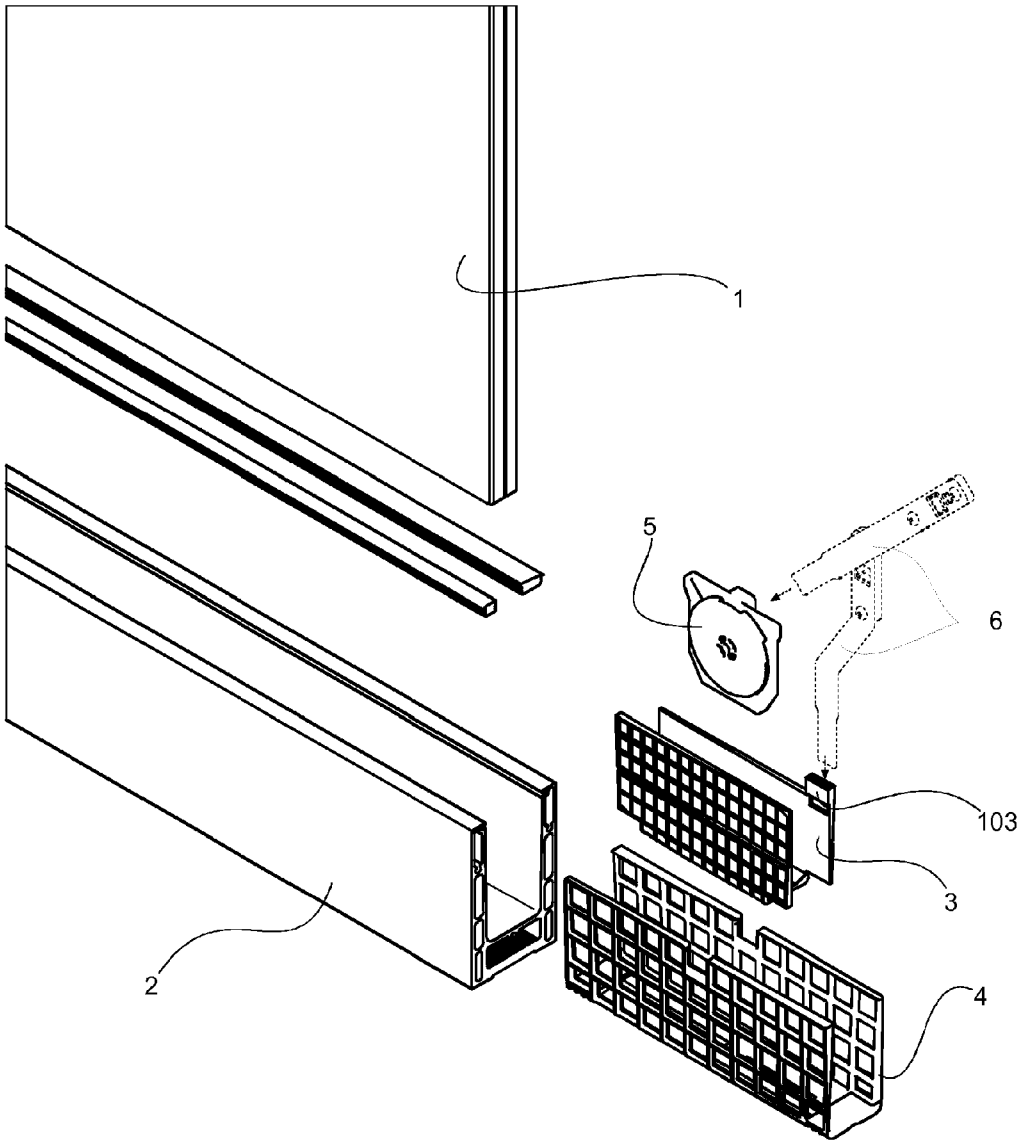


Fig. 1

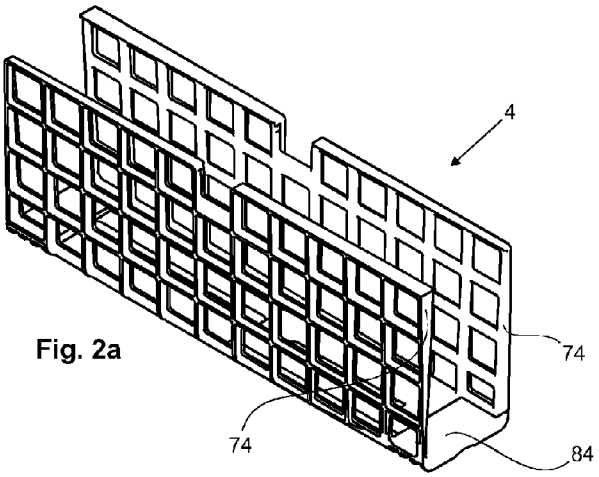


Fig. 2a

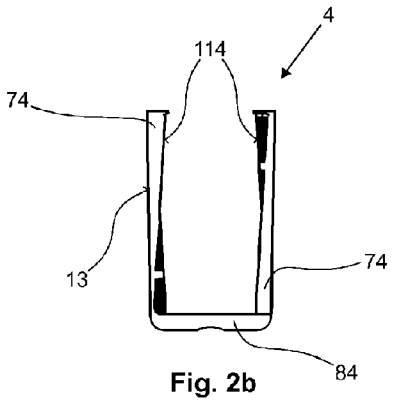


Fig. 2b

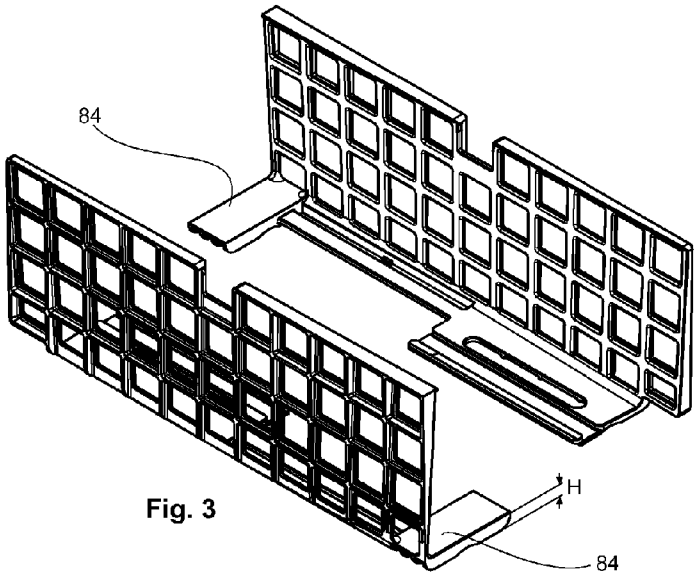


Fig. 3

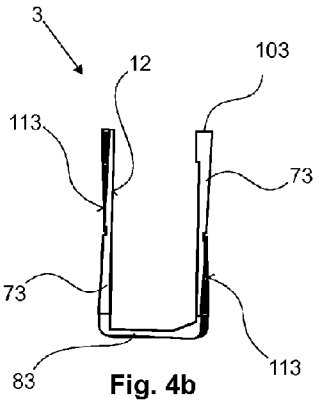


Fig. 4b

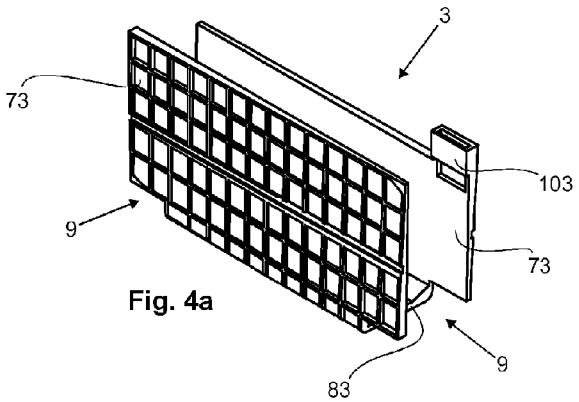


Fig. 4a

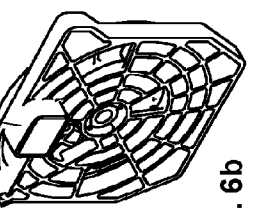


Fig. 6b

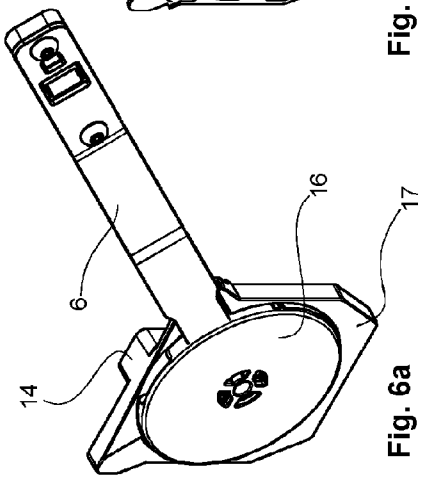


Fig. 6a

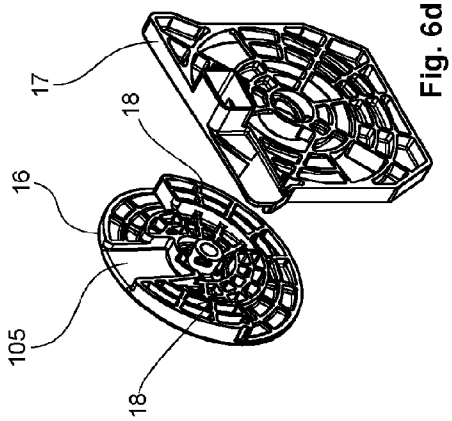


Fig. 6d

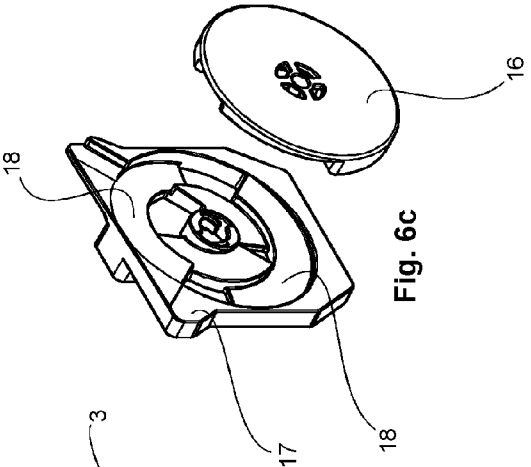


Fig. 6c

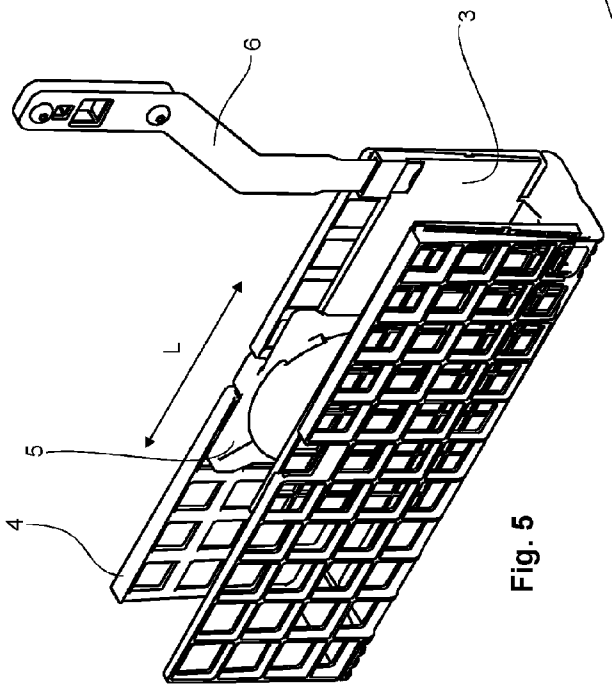


Fig. 5

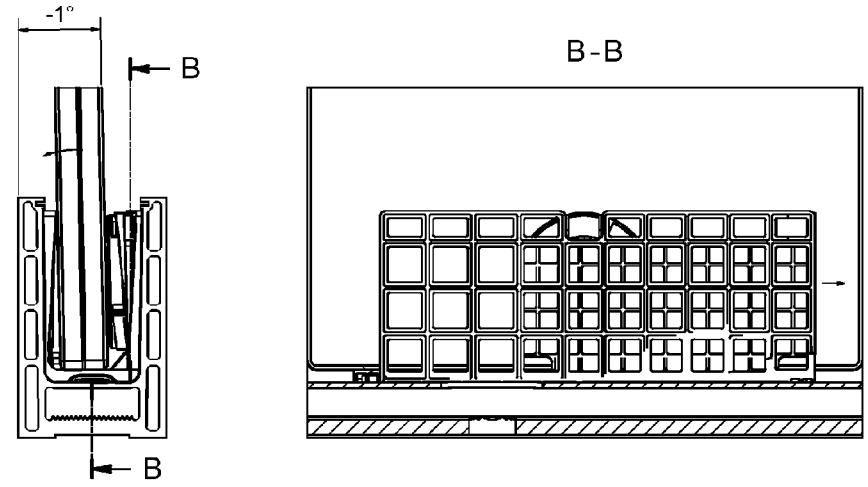


Fig. 7b

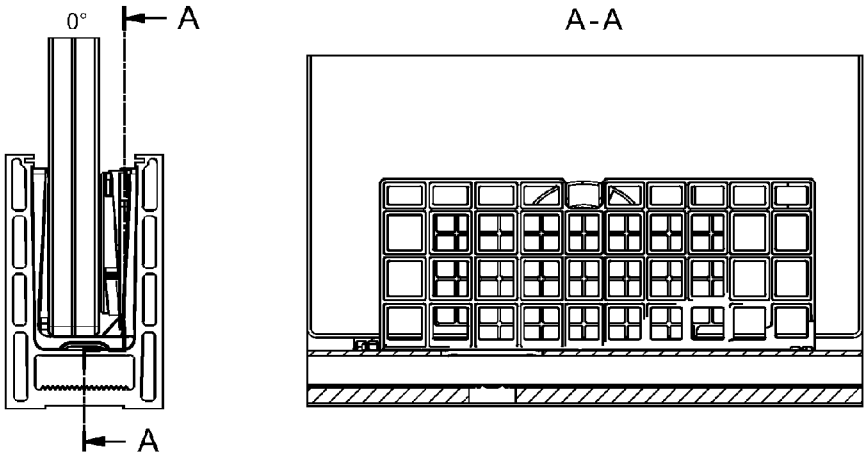


Fig. 7a

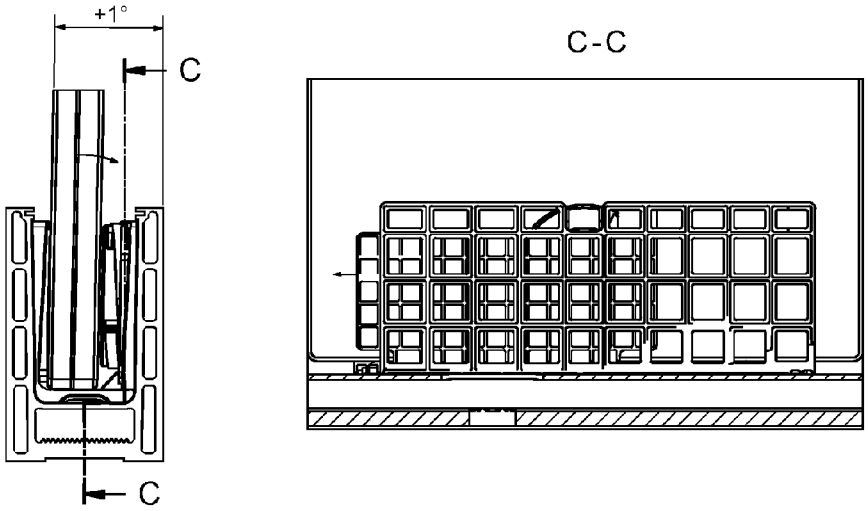


Fig. 7c

Fig. 8b

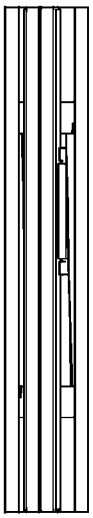


Fig. 8a

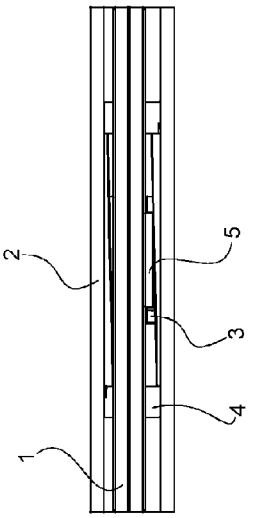
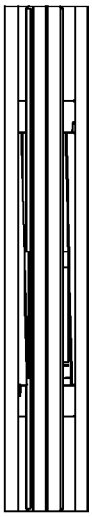
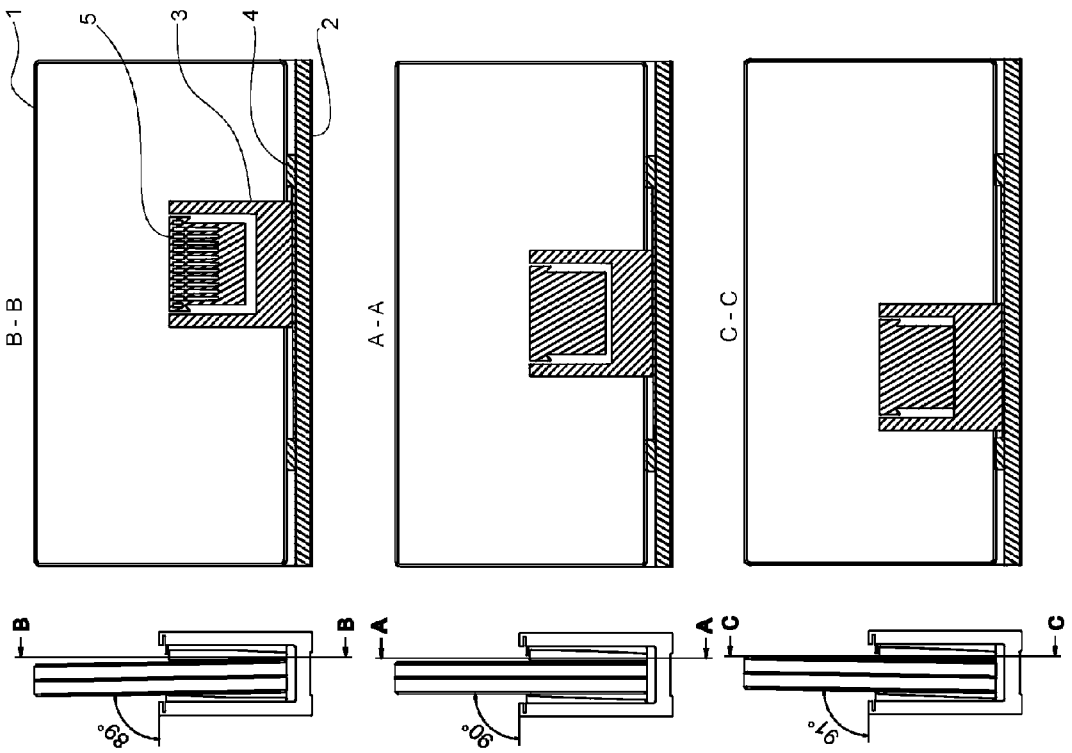


Fig. 8c





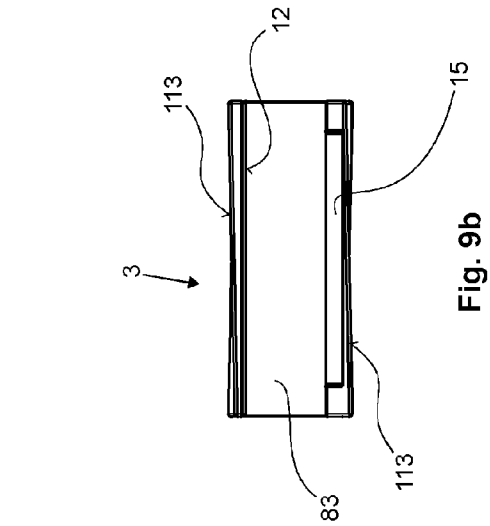


Fig. 9b

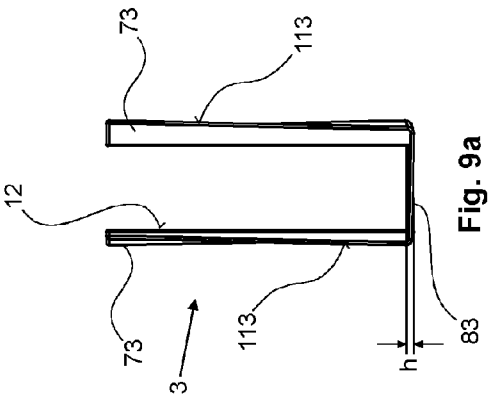


Fig. 9a

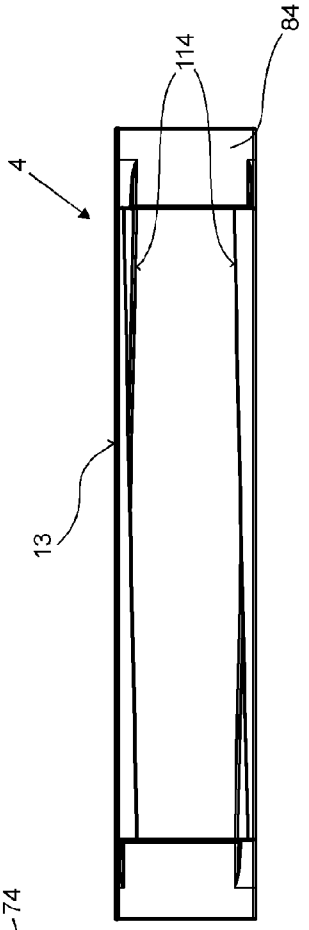


Fig. 10b

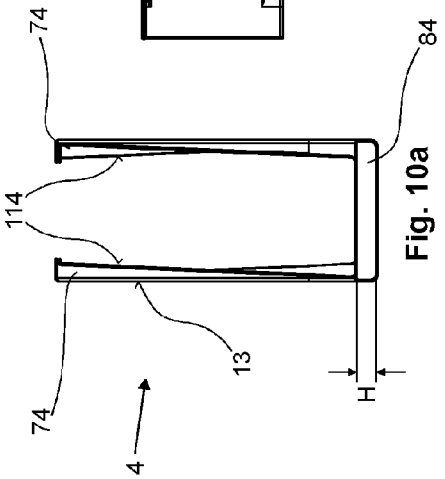
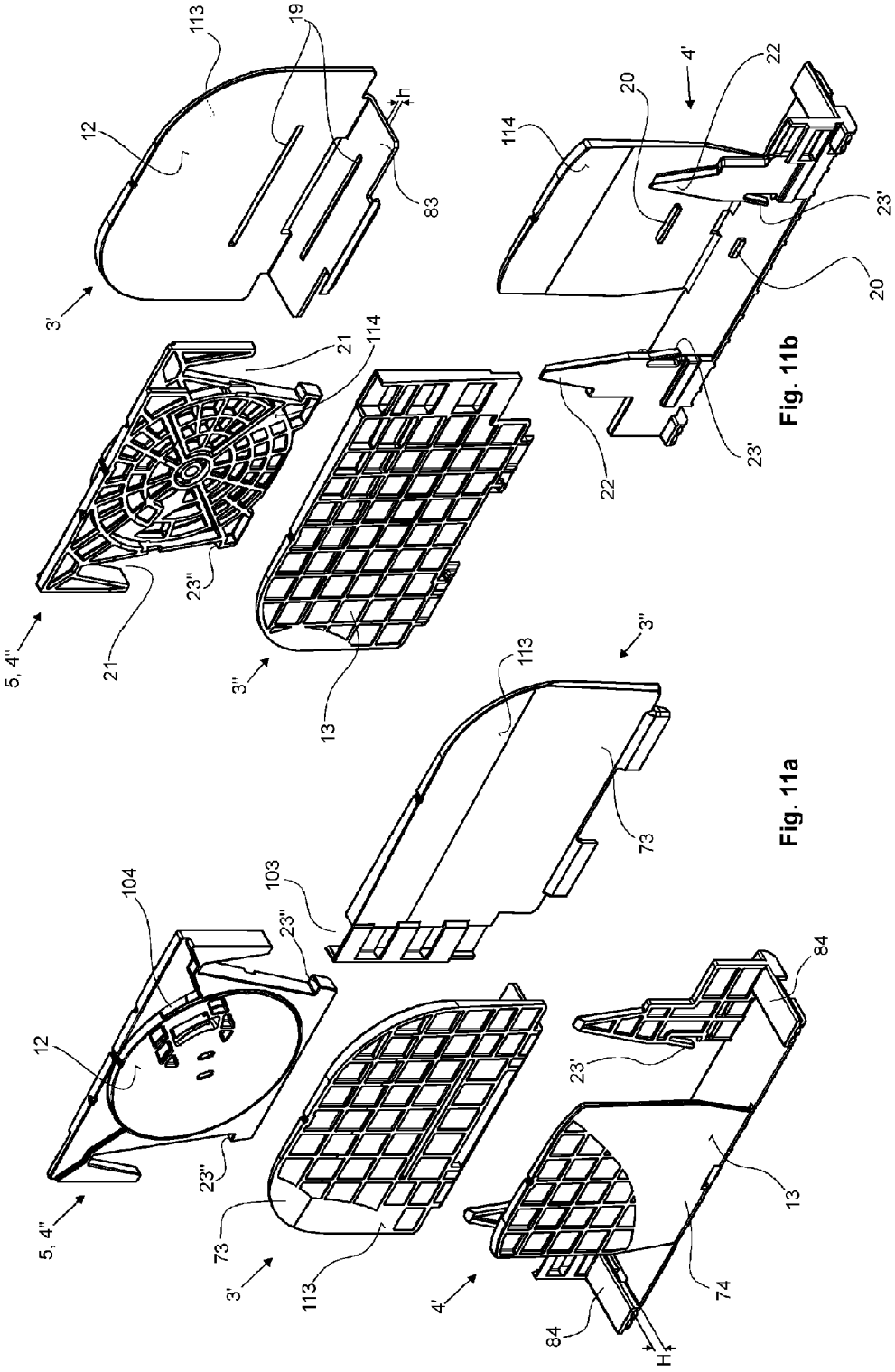
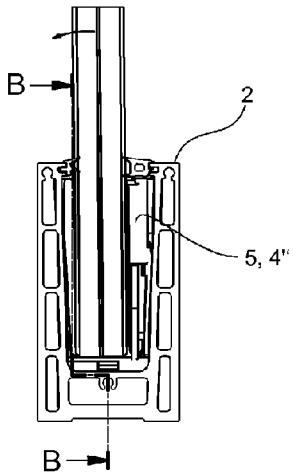


Fig. 10a


113
19
12
h
83
3'
114
20
4'
22
23'
20
22
23'
Fig. 11b
21
114
23"
5, 4"
21
3"
13
113
3"
73
Fig. 11a
104
103
23"
12
84
23'
23"
5, 4"
73
3'
113
4'
13
74
84
H



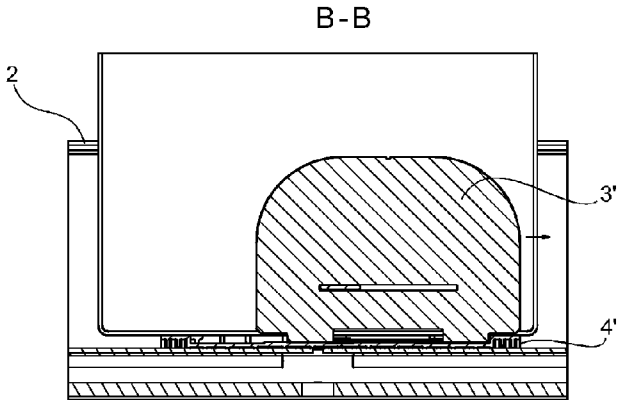
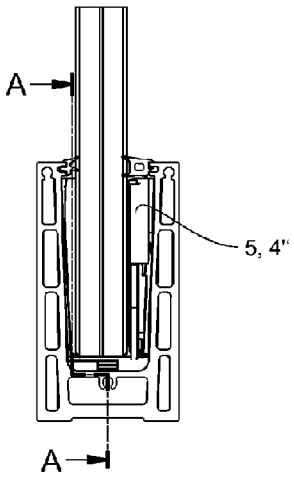


Fig. 12b



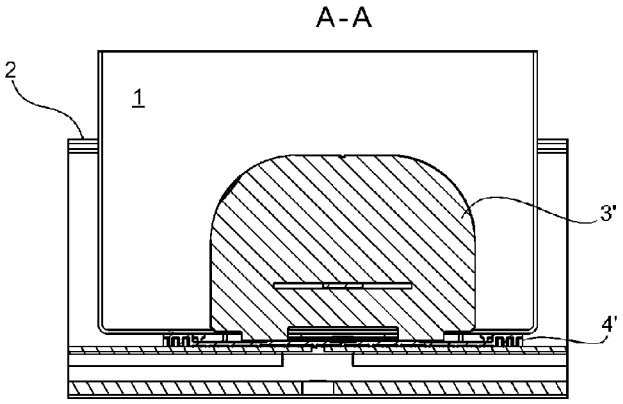
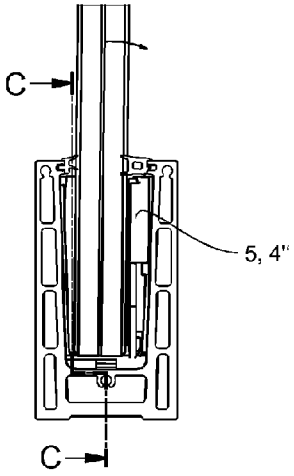


Fig. 12a



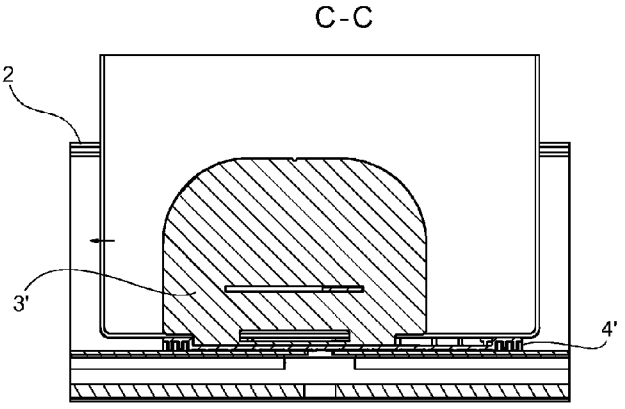


Fig. 12c