

The present invention relates to an arrangement of holding profiles for fastening a glass pane, in particular an outer wall or roof glazing, to a façade sub-structure, according to Claim 1.

5 In the case of glass panes in, for example, an outer wall glazing, it is necessary to support or secure at least the lower and upper glass pane margin by means of a holding profile if the glass pane is to be disposed, without bonding, on the façade sub-structure. Even in the
10 case of glass panes which are fitted to the façade sub-structure by means of bonding, it is necessary additionally to secure at least the upper and lower glass pane margins by means of holding profiles, a part of the holding profile having to enclasp the glass pane margin
15 on the weather side to ensure that the glass pane continues to be held on the façade sub-structure if the bonding should fail, e.g. in the event of fire.

From German Offenlegungsschrift 38 08 513, an arrangement of a holding profile for fastening the glass
20 panes of a double-glazing are known, in which the glass plate disposed on the weather side exhibits, on the outer side, a step-shaped offset in which there engages an outer angular deviation of the holding profile. The holding profile of the known arrangement is part of the
25 façade sub-structure. The glass pane margin of the outer glass plate is enclaspd by the holding profile on the weather side and in the marginal region of the glass. Between the glass surface pointing to the room side and a stabilizing bar, disposed behind it, of the holding
30 profile, an elastic adhesive is introduced, whereby the lower glass pane margin is enabled, in the event of wind pressure or wind suction, to execute a rotational movement in the holding profile.

In this known arrangement, in the event of wind
35 suction, for example, the glass pane is supported against the free end of the outer angular deviation of the holding profile and executes a rotational movement about this point or about this fictitious rotational axis. There is herein a danger of the glass pane margin

slipping out of the holding profile. Moreover, this rotational movement or the supporting of the glass pane margin against the free end of the outer angular deviation give rise to peak stresses in the marginal region of the glass, which may result in glass fracture. In the case of wind pressure, although no squeezing force is generated on the rear by the arrangement of the elastic adhesive, the lower glass pane margin nevertheless moves away from the outer angular deviation of the holding profile. Peak stresses can also herein lead, on the inner edge of the glass, to glass fracture. Moreover, rainwater or moisture is then able to enter into the region between the holding profile and the bottom edge of the glass, which is undesirable. Finally, the glass pane margins sag upon deformation of the glass pane resulting from wind suction or wind pressure. Any such sagging leads, in the known arrangement, to gaping between the glass pane margin and the outer angular deviation of the holding profile, resulting in leaks.

The object of the present invention is to achieve a permanently secure mounting for glass panes, in particular on a façade sub-structure, by virtue of an arrangement of holding profiles in which a fracture in the region of the glass margins is prevented, whilst it is additionally possible to refrain from bonding the glass panes to the façade sub-structure.

This object is achieved by the features of Claim 1.

A permanently secure mounting for glass panes is achieved when the glass pane margin is enclasp ed in tight bearing contact, from without and within, in a profile having a respective angular deviation. No such enclasp ing of the glass pane margin has hitherto been proposed, since the squeezing forces in the region between a thus configured holding profile and the embraced glass pane margin are sufficiently great that, in the event of wind pressure or wind suction, a fracture has to be expected in the region of the glass pane margins. According to the invention, this problem is circumvented in that each

holding profile is configured or disposed or supported outside the glass pane margin in such a way that it allows a pre-defined rotational movement about a rotational axis lying parallel to the glass pane margin and outside this. This rotational axis can herein be formed physically or even fictitiously in certain regions outside the glass pane margin. A fundamental effect of the invention consists in the fact that each holding profile, together with the firmly encased glass pane margin, is able to execute a rotational movement and peak stresses in the glass pane margin are herein prevented. As a result of these rotational movements of the holding profiles together with the firmly encased glass pane margin, the moments which develop in the glass pane margin due to squeezing forces in the holding profile are reduced to an amount at which any fracture of the glass pane margins is precluded.

Moreover, each holding profile, in conjunction with the sub-structure supporting it or with the play between the holding profile and the sub-structure, is flexibly configured or disposed, so that it can subsequently yield to any sagging of the glass pane margin within pre-defined limits. In conjunction with the firm bearing contact of the angular deviations of each holding profile against the glass pane margin, which bearing contact is provided according to the invention, the above-described flexible configuration of the holding profiles and their arrangement on the façade sub-structure allowing flexible movements, performs a corresponding function, where necessary with play between the holding profile and sub-structure.

From aesthetic points of view, it is envisaged in an advantageous embodiment of the invention that the outer angular deviation of the holding profile engages in an offset margin or a step of the glass pane margin, so that the weather side of the glass pane and the outer side of the outer angular deviation lie flush in one plane.

The inner angular deviation of the holding

profile can herein likewise engage in a step of the glass pane margin.

Advantageously, the holding profile exhibits in the region of the glass pane margin a design of essentially U-shaped cross-section, in which the inner angular deviation is higher than the outer angular deviation.

In order to achieve a favourable bearing contact or firm clamping of the holding profile against the glass pane margin, the holding profile is pre-bent prior to insertion. Consequently, when the glass panes are inserted into the holding profile, the holding profile must initially be elastically bent open in order to create a permanent pre-tensioning of the connection.

An additional prevention of peak stresses in the glass pane margin is achieved by the fact that that edge of the outer and/or [lacuna] angular deviation which faces the glass pane and lies remote from the region of the glass pane termination is rounded.

A secure clamping of the glass pane in the holding profile and the prevention of the glass pane slipping out of the holding profile is advantageously achieved by the fact that that face of the inner and/or outer angular deviation which faces the glass pane is of tapered configuration in a wedge shape from its edge lying remote from the region of the glass pane termination towards the region of the glass pane termination. The lower marginal region of the glass pane, which is of tapered configuration by virtue of the steps, consequently exhibits a wedge-shaped configuration and is thereby held securely in the holding profile.

A seal-tight bearing contact of the edges of the region of the glass pane termination of the lower glass pane margin in the holding profile is achieved by the fact that the transition of the outer and/or inner angular deviation to the intervening connecting bar of the holding profile is formed out in a rounded fashion, since the corresponding edges of the region of the glass pane termination can also exhibit, for production engineering reasons, a rather rounded shape.

An additional securement of the glass pane in the holding profile is achieved by holding mechanisms between the holding profile and the glass pane margin. Such holding mechanisms can preferably be created by the outer
5 and/or inner angular deviation exhibiting, on the face facing the glass pane, at least one continuous or broken elevation, the glass pane margin exhibiting, at the corresponding locations, channels or notches.

In place of channels, the holding securements can
10 also comprise [lacuna] disposed on the outer and/or inner angular deviation on the face facing the glass pane in the form of at least one row of knobs advantageously disposed in one plane, the glass pane margin exhibiting, at the corresponding locations, a full-length channel or
15 notches.

Finally, elevations can also conversely be provided on the glass pane margin, which elevations are produced for example from enamel by screen printing methods and engage in corresponding full-length channels
20 or notches on those faces of the outer and/or inner angular deviation facing the glass pane.

The penetration of moisture between the glass pane margin and the holding profile is advantageously created by a seal, at least in the region of the free end
25 of the outer angular deviation of the holding profile. The seal herein consists, for example, of silicon or some other permanently elastic sealant.

A firm connection between the holding profile and the glass pane margin can also be created by at least
30 parts of those faces of the holding profile which face the glass pane margin exhibiting a friction-enhancing coating and/or an adhesive.

From static and/or aesthetic points of view, the holding profile is preferably made from special steel, in
35 particular electrolytically blackened, or from aluminium, preferably anodized. The holding profile can thus also be more easily produced by extrusion methods.

In order to keep the development of moments and peak stresses in the region of the glass pane margin,

resulting from the arrangement of the holding profile, as low as possible, the rotational axis about which the pre-defined rotational movement is made is advantageously disposed at the least possible distance from the glass pane margin. The lever arm of the rotational axis to the glass pane margin is thereby kept low, which subsequently results in small moments in the region of the glass pane margin.

A laminated glass pane comprising two or more individual plates or a glass pane comprising individual plates having photo-voltaic elements disposed therebetween can also be provided with the holding profile. Since the material provided in the region between the individual plates - synthetic material or cast resin, for example, in the case of the laminated glass pane and a foil interlay having inlaid photo-voltaic elements in the case of the glass pane exhibiting photo-voltaic elements - is relatively soft in relation to the glass pane and can thus be compressed, there are disposed in the region between the outer and inner angular deviation of the holding profile means which prevent the glass pane margin from being compressed in this region.

The compression-preventing means can consist of pressure-resistant inlays, which are disposed respectively between the individual plates of the glass pane, or of free spigots, which are firmly connected to the connecting bar of the holding profile. The pressure-resistant inlays as well as the free spigots herein exhibit a cross-sectional width which corresponds to the thickness of the material respectively located between the individual plates.

Preferably, the respective cross-sectional height of the pressure-resistant inlays or of the free spigots is configured to correspond at least to the cross-sectional height of the outer angular deviation of the holding profile. Preferably, the cross-sectional height can also correspond to that of the inner angular deviation of the holding profile.

In the case of a double-glazing or a panel

having, as cover plate, a glass plate disposed on the weather side, it is only necessary to provide the glass plate disposed on the weather side with a holding profile. Advantageously and in order to prevent the described peak stress or moments in the region of the glass pane margin, it is herein envisaged that the rotational axis is disposed between the two glass plates or in the region of the panel, preferably at the least possible distance from the glass plate disposed on the weather side.

For static reasons or from other points of view, the rotational axis can also be allowed to be disposed or configured behind that glass plate of a double-glazing which is disposed on the room side or behind the room-side termination of the panel and is herein advantageously disposed at the least possible distance from this glass plate disposed on the room side or from the room-side termination of the panel, in order, as explained, to minimize the peak stresses or moments in the glass pane margin.

In order to prevent peak stresses or moments in the region of the glass pane margin of the glass plate disposed on the room side or of the panel region disposed behind the weather-side glass plate, the said glass plate disposed on the room side or the said panel region is preferably floatingly mounted or elastically bedded. In the event of a rotational movement, the glass pane margin of the glass plate disposed on the room side or the corresponding margin of the panel region is then able to execute a twisting movement, free from squeezing force.

Preferably, the rotational axis is disposed in the region of a heat-insulating element preventing the transfer of heat between the holding profile and the façade sub-structure, in particular of a synthetic part, and/or in the region of a specially designed connecting point between the holding profile and the façade sub-structure, or the rotational axis is advantageously formed in the aforementioned regions. Known elements can thus be used, in whose region the rotational axis, due to

the elasticity of these elements, is able to be formed.

Advantageously, the insulating element and/or the connecting point reduce the moments transmitted to the region of the glass pane margin, in order to preclude
5 fracture of the glass pane margin.

The pre-defined rotational movement of the holding profile is preferably facilitated by the fact that the insulating element on the holding profile and/or on the façade sub-structure is disposed over a rounded
10 part in the manner of a swivel joint.

A pre-defined rotational movement of the holding profile is additionally advantageously promoted, if the stiffness of the insulating element is as slight as possible around the developing rotational axis.

15 A low degree of stiffness around the rotational axis can be particularly achieved if the cross-sectional height of the insulating element, which cross-sectional height runs parallel to the plane of the glass pane, is less than its cross-sectional width, advantageously a
20 third to a half less.

It has proved favourable to the pre-defined rotational movement for the insulating element to exhibit a taper, preferably in the middle of the cross-section.

In a particular embodiment of the invention, the
25 connecting point comprises a suspension mounting of the holding profile in the façade sub-structure, thereby achieving a simple design of the connecting point and a simple assembly.

Preferably, the connecting point comprises an
30 extension piece of the holding profile, which extension piece is distanced from the inner angular deviation and extends in the direction of the glass pane margin or away from this and engages in a correspondingly formed-out cavity in a profiled part of the façade sub-structure,
35 and a connecting part connecting the holding profile and the extension piece, the extension piece and the holding profile preferably exhibiting play to enable the pre-defined rotational movement of the holding profile by virtue of the play and/or elasticity of the extension

piece and connecting part. To enable the rotational axis for the pre-defined rotational movement to appear also in the region of the connecting point, care is taken to ensure, by specific designs of this connecting point, that the rotational axis is able to be formed in this region without problems. It is particularly necessary in this regard that a squeezing-force-free arrangement is provided between the holding profile and the extension piece.

10 The pre-defined rotational movement is additionally facilitated by means of an extension piece exhibiting a preferably arc-shaped cross-section, since, in the region of the connecting point, a type of swivel joint is formed due to the design of the extension piece. 15 This advantageous embodiment also allows expansions or shortenings of the glass pane or plates, since, in the region of the connecting point, longitudinal displacements in the direction of the plane of the glass pane are able to occur free from squeezing force.

20 A preferably arc-shaped cross-section of the extension piece supports the pre-defined rotational movement, since, in the region of the connecting point, a type of swivel joint is formed.

 The connecting point can also comprise a longitudinal sliding joint, in particular in the form of a 25 plug connection having a bar running perpendicular to the plane of the pane and a recess embracing the said bar, an elastic material being disposed between the bar and the recess to enable the pre-defined rotational movement of the holding profile by virtue of the arrangement of the 30 elastic material and/or the elasticity of the bar. With this embodiment, a very simply configured connecting point is created, whereupon it is additionally possible to relinquish the insulating element preventing the heat transfer, since the arrangement of the elastic material 35 additionally prevents any heat transfer.

 For an additional reduction in own weight and/or as protection against fire, metallic mouldings are advantageously disposed on the glass pane margin,

preferably on the holding profile, between the glass pane and the façade sub-structure. Where the metallic mouldings are fastened by means of a screw connection, it can additionally be envisaged that the individual screws exhibit play in order thereby to avoid obstructing the necessary, pre-defined rotational movement.

As protection against fire, parts of the insulating element can also consist of metal, these parts, which are only provided in sections, not causing obstruction to the pre-defined rotational movement of the holding profile, even where the rotational axis is formed in the region of the insulating elements.

From static and/or aesthetic points of view, it can be desirable or necessary for the holding profiles to be disposed on all glass pane margins of the glass pane.

Advantageously, the holding profiles can be disposed on the glass pane margins, for aesthetic reasons, such that they continue right into the corner regions of the glass pane. To enable the holding profiles to expand in the corner regions free from squeezing force, the free ends of the holding profiles are spaced apart in the corner regions.

Preferably, there are disposed in the corner regions of the glass pane, adjoining the holding profiles, expandable receiving parts or corner mouldings, in particular in the form of elastomer parts or special steel parts. These corner mouldings reach over the free ends of the holding profiles and ensure that the expansions of the holding profiles can occur free from any squeezing force.

The arrangement, according to the invention, of the holding profiles is advantageously suitable for use in single or multiple glazing systems, the plate formats, in the case of multiple glazing systems, being able to exhibit different dimensions. Accordingly, the proposed arrangement of holding profiles is able to be provided for all pane systems.

The invention is intended to be explained below with reference to advantageous illustrative embodiments

according to the following figures, in which:

- Fig. 1 shows a cross-section through a holding profile disposed on a glass pane margin;
- Fig. 2 shows a cross-section through a holding profile;
- Figs. 3 - 9 show cross-sections according to Fig. 1 exhibiting respectively different holding profiles;
- Figs. 10 & 11 show the cross-section of marginal regions of a laminated glass pane comprising a plurality of individual plates, provided with a holding profile;
- Figs. 12 & 13 show cross-sections of marginal regions of a glass pane comprising two individual plates having photo-voltaic elements disposed therebetween, provided with a holding profile;
- Figs. 14 & 15 show various cross-sections of marginal regions of a double-glazing in stepped configuration exhibiting a holding profile, a heat-insulating element for preventing heat transfer and parts of the façade sub-structure;
- Fig. 16 shows a cross-section of a marginal region of a panel exhibiting a glass pane as cover plate, which glass pane exhibits a holding profile;
- Figs. 17 & 18 show various cross-sections according to Figs. 14 and 15, exhibiting specially designed insulating elements;
- Figs. 19 - 22 show various cross-sections according to Figs. 14 to 16, exhibiting an additional connecting point between the holding profile and the façade sub-structure;
- Fig. 23 shows a cross-section according to Figs. 14 and 15, but without an insulating element;
- Figs. 24 - 26 show a cross-section according to Figures 14 and 15 in the case of a double-glazing

without stepped configuration;
Figs. 27 & 28 show heavily diagrammatized cross-sections according to Figs. 14 and 15, in the case of a single glazing; and
5 Fig. 29 shows a top view of a corner region of a glass pane having holding profiles running fully along the glass pane margins.

Fig. 1 shows a cross-section through a glass pane
10 2 having a holding profile 6 which is disposed on the glass pane margin 4. The represented glass pane 2 can be a glass pane of a single glazing or the glass plate, disposed on the weather side, of a multiple glazing, which can constitute elements, for example, of an outer
15 wall or roof glazing. The holding profile 6 exhibits, in the region of the glass pane margin 4, an essentially U-shaped cross-section, comprising an outer angular deviation 8, disposed on the weather side, an inner angular deviation 10 and a connecting bar 12 connecting
20 the two angular deviations 8, 10. The inner angular deviation 12 is adjoined, via a connecting part 14, by an extension piece 16, which is spaced apart from the inner angular deviation 10 and extends essentially parallel to this in the direction of a glass pane termination region
25 18. The outer and inner angular deviations 8, 10 enclose the glass pane margin 4 in tight bearing contact, the connecting bar 12 likewise bearing closely against the glass pane termination region 18. The holding profile 6 is suspended by its connecting bar 12 in a façade sub-
30 structure.

The shown holding profile 6 is fitted to at least two mutually opposing margins of the glass pane 2, i.e. for example to the horizontally running upper and lower margins of the glass pane 2 or, indeed, to the vertically
35 running, lateral margins of the glass pane 2. From static or aesthetic points of view, the holding profile 6 can also however be disposed on three or all four margins of the glass pane 2. On the respective margins of the glass pane 2, the holding profile 6 can herein be provided in

sections or reaching right into the corner regions of the glass pane 2.

The glass pane 2 exhibits in the lower region of the glass pane margin 4, on the weather side, a recess or step 20, in which the outer angular deviation 8 engages in such a way that the weather side of the glass pane 2 and the outer side of the outer angular deviation 8 lie in one plane. The upper edge 22, facing the glass pane 2, of the outer angular deviation 8 is rounded, as is the step 20 of the glass pane 2 in this region. Advantageously, the transition regions of the outer and inner angular deviations 8, 10 to the connecting bar 12 disposed therebetween are also formed out in a rounded fashion, as are the glass pane termination edges 28, 30 in this region.

Between the holding profile 6 and the glass pane margin 4 there is provided, at least in the region of the free end of the outer angular deviation 8, a seal. For better connection, the holding profile 6 exhibits, on its faces facing the glass pane margin 4, a friction-enhancing coating and/or an adhesive, for example a 2-component-epoxy adhesive. As is represented, the inner angular deviation 10 is longer or higher than the outer angular deviation 8.

Fig. 2 shows a cross-section through the holding profile 6 prior to being fitted to the margin of a glass pane, which holding profile is pre-bent for better connection to the corresponding glass pane margin. Quite clearly, the holding profile 6 has to be clamped on prior to the introduction of a glass pane. The remaining tension ensures that the connection between the holding profile 6 and the corresponding margin of a glass pane is enhanced.

The holding profile 6 is produced, for example, from special steel or aluminium and is preferably electrolytically blackened or anodized, thereby enabling it to be matched to the colouring of the glass panes of, for example, an outer façade.

Figures 3 to 9 show cross-sections according to

Fig. 1 exhibiting, in each case, differently designed holding profiles 6, the numerals from Fig. 1 being adopted for identical parts.

Fig. 3 shows that the connection between the holding profile 6 and the glass pane margin 4 of the glass pane 2 can be enhanced by the outer angular deviation 8 tapering in a wedge shape from its free end in the direction of the glass pane termination region 18.

Fig. 4 shows that the inner angular deviation 10 can also exhibit a wedge-shaped design of this kind, so that the outer angular deviation 8, the connecting bar 12 and the inner angular deviation 10 form a dovetail groove in which the correspondingly formed-out glass pane margin 4 of the glass pane 2 engages.

In addition to the particular embodiments according to Figures 3 and 4, the holding profile 6 can also exhibit yet further holding mechanisms creating a positive connection, as is shown in Figures 5 to 8. The shown holding mechanisms can also however be provided independently from the wedge shape according to Figures 3 and 4.

Fig. 5 shows elevations 32 configured on those faces of the outer and inner angular deviations 8, 10 facing the glass pane margin 4, which elevations can be fitted on the corresponding faces in continuous or broken arrangement. In Fig. 5, the elevations 32 are disposed, for example, in pairs on the outer and inner angular deviations 8, 10. Correspondingly, the glass pane margin 4 of the glass pane 2 is provided with recesses or notches, in which the elevations 32 engage. The notches are herein ground into the glass pane margin 4. The elevations 32 can also be individual, spaced-apart knobs, which engage either in full-length notches in the glass pane margin 4 or in individual notches. Individual or punctiform notches in the glass pane margin 4 can be ground in by a spot drill.

Fig. 6 shows that the elevations 32 can also be disposed individually on those faces of the outer and inner angular deviations 8, 10 facing the glass pane margin 4. The shown elevations 32 serve as an additional

holding securement between the holding profile 6 and the glass pane margin 4 of the glass pane 2.

A further variant is shown in Fig. 7, in which the elevation 32 is disposed only on the inner angular deviation 10. For production engineering reasons, it is advantageous if the elevation 32 comprises a continuous or full-length elevation which engages in a correspondingly full-length notch on the glass pane margin 4.

Fig. 8 illustrates that the glass pane margin 4 of the glass pane 2 can also exhibit the elevation 32, which in this case engages in a correspondingly shaped notch in the inner angular deviation 10. This preferably full-length elevation 32 is produced by the silk-screen printing methods, particularly from enamel, and is applied to the glass pane margin 4. In this case, all the aforementioned elevations 32, notches and knob arrangements and individual notches advantageously run parallel to the glass pane margin 4.

Fig. 9 shows the use of the holding profile 6 in the case of a laminated glass pane 34, which comprises an inner glass plate 36 disposed on the room side and an outer glass plate 38 disposed on the weather side, the thickness of the outer glass plate 38 corresponding approximately to the cross-sectional thickness of the outer angular deviation 8. Between the inner glass plate 36 and the outer glass plate 38, a transparent adhesive film or, indeed, a transparent cast resin layer is present. The outer glass plate 38 is configured smaller all round, in relation to the inner glass plate 36, at those margins on which a holding profile 6 is intended to be disposed. Engaging in the round-running step produced by this configuration is the outer angular deviation 8, so that the outer glass plate 38 and the outer angular deviation 8 lie in one plane. The dimension of the step 40 is herein chosen such that the glass pane termination region 18 and the connecting bar 12 lie close together without an interspace.

Fig. 10 shows the use of the holding profile 6 in a laminated glass pane 150 which comprises a plurality of

individual plates having transparent adhesive film disposed respectively between the individual plates or, indeed, a transparent cast resin layer. In contrast to Fig. 9, the individual plates in the lower glass pane margin 4 are configured in equal length. The material disposed between the individual plates is thus also found in the region between the outer and inner angular deviations 8, 10 of the holding profile 6. In order, if the laminated glass pane 150 sags, to prevent the lower glass pane margin 4 being compressed as a result of being clamped in the holding profile 6 and due to the elasticity of the material disposed between the individual plates, there are provided in the region between the outer and inner angular deviations 8, 10 means which prevent any such compression. In Fig. 10, the means are in this case represented as pressure-resistant inlays 154, which can also be designated as stiff interlays. There is sufficient stiffness present, for example, if the inlays 154 consist of metal or correspondingly hard synthetic material. Quite clearly, the cross-sectional width of the pressure-resistant inlays 154 corresponds to the cross-sectional width of the material disposed respectively between the individual plates. The pressure-resistant inlays 154 thus prevent the lower glass pane margin 4 from being compressed, thereby enabling the holding profile 6 to be used also in this type of laminated glass panes 150. If the means for preventing the compression of the lower glass pane margin 4 were not there disposed, then the laminated glass pane 150 would be able, when it sagged, to slip out of the holding profile 6.

Fig. 11 corresponds essentially to Fig. 10, the only difference being that the means for preventing the compression of the lower glass pane margin 4 of the laminated glass pane 150 are represented as a different variant. In place of the pressure-resistant inlays 154 from Fig. 10, in Fig. 11 the holding profile 6 exhibits free spigots 156 disposed in the region of the connecting bar 12 disposed between the outer and inner angular

deviations 8, 10. The free spigots are herein connected firmly or in one piece to the holding profile 6. In relation to the cross-sectional width of the free spigots 156, that which was stated in Fig. 10 with respect to the pressure-resistant inlays 154 also applies.

Figs. 12 and 13 show a glass pane 152 consisting of two individual plates, in which photo-voltaic elements are disposed between the glass plates. The photo-voltaic elements are preferably placed in a film interlay and can thus be disposed easily between the individual plates of such a glass pane 152. As also in the case of the laminated glass pane 150 from Figs. 10 or 11, where there is this kind of intermediate layer of photo-voltaic elements the problem of compression of the lower glass pane margin 4 exists whenever a glass pane 152 of this kind is held in its marginal region by a holding profile 6. In order to prevent this compression in the lower glass pane margin 4 of the glass pane 152, there are provided in Fig. 12 a pressure-resistant inlay 154 and in Fig. 13 a free spigot 156, which is configured in one piece with the holding profile (6) [sic]. With regard to the cross-sectional width and the material of the inlay 154 or of the free spigot 156, reference is made to the comments made with respect to Figs. 10 and 11. With regard to the cross-sectional height of the pressure-resistant inlay 154 or of the free spigot 156 from Figs. 10 to 13, it is expedient for this to correspond to the cross-sectional height of the outer angular deviation 8. Under certain circumstances, it can also then be advantageous for this cross-sectional height to correspond to the cross-sectional height of the inner angular deviation 10. In Figs. 12 and 13 there are respectively shown, adjoining the holding profile 6, synthetic parts 50, which are explained in greater detail following Fig. 14.

All those design options for the holding profile 6 which have already been depicted can also be used in respect of the laminated glass panes or glass panes 150, 152 shown in Figs. 10 to 13. In particular in the case of the glass panes 152 provided with photo-voltaic elements,

the outer angular deviation 8 of the holding profile 6 engages in the step 20 of the glass pane margin 4. As a result of this design, a hard shadow resulting from an unfavourable position of the sun, which shadow is cast onto the photo-voltaic elements by the outer angular deviation 8, can be kept within limits. The photo-voltaic elements are accordingly not covered at all or are only slightly covered by the hard shadow of the outer angular deviation 8. The individual photo-voltaic elements, which are disabled by a hard shadow of this kind, are namely not only unable to produce any energy, but present themselves as blocking diodes, whereby, due to a hard shadow cast onto individual photo-voltaic elements, a whole pane element having a large number of photo-voltaic elements can be disabled.

The double-glazing 42 represented in the following figures shows always the same construction and has a stepped configuration, i.e. the inner glass plate 44 disposed on the inside of the room is, at least at the upper and lower margin, continuously smaller than the outer glass plate 46 disposed on the weather side, whence the stepped configuration is obtained. Between the two glass plates 44, 46 there are disposed the glass spacing and sealing elements. Basically the same construction is also exhibited by the shown panel 146, in which there is likewise a stepped construction, since the glass pane 148 which is disposed on the weather side as a cover plate is guided further downwards, at the shown margin, than the adjoining room-side panel region. It is likewise common to all the arrangements shown below that the holding profile 6 and the outer glass plate 46 or 148 - as described - lie in one plane. The transfer of heat between the holding profile 6 and the façade sub-structure 48 is prevented by "heat-insulating elements" as they are known, which are hereinafter provided, in identical embodiment, with identical numerals.

In Fig. 14, the function of insulating element is served by a cross-sectionally approximately cube-shaped synthetic part 50, which is introduced into

dovetail-shaped notches in the inner angular deviation 8 and in a profiled part 52 of the façade sub-structure 48 and hence constitutes a connecting element between the holding profile 6 and the façade sub-structure 48. The additional own weight take-up and fire protection functions are served by a further profiled part 54, which is disposed beneath the profiled part 52 and is screw-connected to a transom 56 of the façade sub-structure 48 and to the profiled part 52 - as indicated in dashed representation. The supporting connection between the double-glazing 42 and the façade sub-structure 48 consists of a bonding 58 between the inner glass plate 44 and the façade sub-structure 48, which additionally exhibits, on its top side, a sealing part 60. The glass pane margin of the inner plate 44 is mounted on the profiled part 52, an elastic sealing material being introduced therebetween. The inner plate 44 is thus, by virtue of this design, elastically bedded or mounted.

In the event of wind pressure or wind suction, the double-glazing 42 will bend or sag respectively in the direction of the room side or weather side. In order to prevent this sagging resulting in a fracture in the region of the glass pane margin of the double-glazing 42, a rotational movement must there be enabled. In the case of the inner glass plate 44, the rotational movement is guaranteed by the elastic bedding. The outer glass plate 46 is encased however by its glass pane margin, in tight bearing contact, by the holding profile 6. In order to prevent resulting glass fracture, the holding profile 6 has to be able to be twisted together with the outer plate 46. A pre-defined rotational movement about a rotational axis lying parallel to and outside the glass pane margin and outside the holding profile 6 must therefore be enabled. This rotational axis is formed in the synthetic part 50 on the basis of its elasticity or its material properties. If the outer glass plate 46 sags and hence the holding profile 6 is twisted, the synthetic part 50 is able to deform, thereby enabling the holding profile 6 to twist in the direction of the room side and

weather side. In static terms, a type of hinged joint is formed in the synthetic part 50, whereby only a small amount of moments are able to be transmitted into the region of the holding profile 6 and hence into the region of the glass pane margin of the outer glass plate 46. Advantageously, the synthetic profile 50 is disposed as close as possible to the holding profile 6, so that the shortest possible lever arm to the holding profile 6 is obtained. The necessary pre-defined rotational movement of the holding profile 6 which is necessary in order reliably to prevent a glass fracture can be calculated according to the materials used and the dimensions of the parts which interact in this region.

The further profiled part 54 will be disposed only in sections throughout the margin of the double-glazing 42, so that, where necessary, the profiled part 52 is also able to twist somewhat in support of the necessary rotational movement, in particular when the screw connection between the profiled part 52 and the further profiled part 54 exhibits play.

In a design variant to Fig. 14, the securement of the double-glazing 42 in the region of the bonding 58 can be realized by means of a screw, which is disposed with play so that, in this variant also, a twisting of the profiled part 52 can, where necessary, occur. The inner glass plate 44 is again, in this case, elastically bedded and the twisting of the outer plate 46 and of the holding profile 6 is permitted in the region of the synthetic part 50. An additional reduction in own weight and a protection against fire can alternatively be achieved by the synthetic part 50 exhibiting piece by piece metallic inserts. Such metallic inserts do not however prevent the twisting of the holding profile 6 together with the lower margin of the outer glass plate 46 in such a way that a fracture might result in the region of the glass pane margin.

Fig. 15 shows the arrangement of the double-glazing 42 on the façade sub-structure 48 by means of an auxiliary profile 64, which is connected via suitable

means to the transom 56 of the façade sub-structure 48. Accordingly, the arrangement, according to the invention, of the holding profile 6 can also be used for double-glazings 42, which are fastened without load-bearing bonding to the façade sub-structure 48. In this illustrative embodiment also, the inner glass plate 44 is elastically bedded, thereby enabling the necessary twisting to occur. The twisting of the outer glass plate 46 together with the holding profile 6 is realized, as explained in Fig. 14, in the region of the synthetic part 50. Likewise represented is the further profiled part 54 for additionally taking up the own weight of the double-glazing 42 and for fire protection, the arrangement of which does not however cause obstruction to the necessary twistings.

A variant to Fig. 15 can consist in the use of a differently configured auxiliary profile 64. The twisting facilities of the double-glazing 42 in the region of the glass pane margins of the inner glass plate 44 and of the outer glass plate 46 are not thereby altered. The description of the various design variants should make clear, inter alia, that no limits are set in terms of the options for connecting up the double-glazing 42 to the façade sub-structure 48, as long as an elastic bedding of the inner glass plate 44 and a twisting facility of the outer glass plate 46 together with the holding profile 6 can produce a twisting in the region of the synthetic part 50, for example. It is also immaterial whether the auxiliary profile 64 adjoining the synthetic part 50 on the side of the façade sub-structure 48 is disposed rigidly or slightly movably on the transom 56 of the façade sub-structure, as long as the necessary twisting can occur only by virtue of the material properties of the synthetic part 50. At this point, it should also be pointed out that where the proposed arrangement of the holding profile 6 is disposed on the lateral margins of a double-glazing 42, the transom 56 can also be replaced by an upright of the façade sub-structure 48. Various anti-fire protections have been described with respect to

the preceding figures and are, in part, no longer shown in the following figures. It is fundamental, however, that the anti-fire protections do not obstruct the necessary twisting.

5 Fig. 16 shows the use of the holding profile in a panel 146. The panel exhibits on the weather side a glass pane 148 serving as a cover plate. Such panels 146 are used, for example, whenever outer façades are intended to be glazed from aesthetic points of view, but
10 where a through-view or an outlook from the room side is not desirable or not necessary. The construction from Fig. 16 corresponds basically to that in Fig. 15, the only difference being that in place of the inner glass plate 44 from Fig. 15 there is provided a panel region
15 which adjoins, on the room side, the glass pane 148. In the shown representation, the panel region consists of an insulant 158 and a thereto adjoining covering 160. The glass pane 148 is held in corresponding manner at the lower margin by the holding profile 6, which is adjoined
20 by the synthetic part 50 and, following on from this, by the auxiliary profile 64 - as also shown in Fig. 15. The twisting of the glass pane 148 together with the holding profile 6 is thus realized, as explained in Fig. 14, in the region of the synthetic part 50. It is herein funda-
25 mental that, analogously to the inner glass plate 44 from Fig. 15, the panel region adjoining the glass pane 148 is likewise elastically bedded and hence does not prevent the necessary twisting of the glass pane 148. Nor is the twisting which takes place, of course, together with a
30 sagging of the glass pane 148 prevented therefore, since the insulant 158 located between the glass pane 148 and the cover 160 is elastic, i.e. allows a sagging of the glass pane 148.

 In Fig. 17, a double-glazing 42 is once again
35 shown which is connected without bonding to the façade sub-structure 48. Differences manifest themselves in this figure in the form of the design of the insulating element, which is presented as an elongated synthetic part 68, which engages conventionally in the dovetail-

shaped recesses in the inner angular deviation 10 of the holding profile 6 and of an auxiliary profile 70. In the case of the synthetic part 68, the cross-sectional height running parallel to the glass pane plane of the double-glazing 42 is less than its cross-sectional width. This produces a lower stiffness of the synthetic part 68 around the rotational axis which appears in the region of the said synthetic part and parallel to the glass pane margin of the double-glazing 42. The synthetic part 68 still constitutes a sufficient connection between the double-glazing 42 and the façade sub-structure 48, whilst its bending or twisting properties are however improved.

Alternatively, a synthetic part of rectangular cross-section can serve, at the lower margin of the double-glazing 42, as a connecting part between the holding profile 6 and the façade sub-structure 48. A synthetic part of this kind engages in this case in corresponding rectangular recesses in the holding profile 6 and in the façade sub-structure 48 and is secured there by a screw connection. Here too, the cross-sectional height, running parallel to the glass pane plane of the double-glazing 42, of the synthetic part is less than its cross-sectional width, whereby the twisting or sagging of the synthetic part is facilitated. Another embodiment of a synthetic part can consist in its cross-sectional middle region being weakened, i.e. in the cross-sectional height running parallel to the glass pane plane of the double-glazing 42 exhibiting a taper. As a result of such a taper, the stiffness of the synthetic part relative to the rotational axis arising in the region of the said synthetic part is diminished still further. From static points of view, it can be necessary for a synthetic part which is thus tapered to be able to be disposed not at the lower margin of the double-glazing 42, but only at its upper margin or at its lateral margins.

In this context, it should further be mentioned that the inner glass plate 44 of the double-glazing 42 can also be stood on a block, without the twisting facility of the lower margin of the inner glass plate 44

being thereby obstructed. In the event of the inner glass plate 44 sagging, the lower glass pane margin will be supported by its preferably rounded edges on the block and will twist about this edge. A fracture of the lower
5 glass pane margin of the inner glass plate 44 is still prevented, since in this region the build-up of corner edge stresses is sufficiently prevented due to an elastic yielding of the block itself and/or a yielding of the block or of the holding parts below the block (fictitious
10 rotational axis).

Fig. 18 shows a further variant of a synthetic part 80, which is connected to the holding profile 6 via a dovetail-shaped recess and engages in an auxiliary profile 82, by means of a rounded part 84, in a corre-
15 spondingly shaped recess in the auxiliary profile 82. A type of hinged joint is thus produced, in which the rounded part 84 snaps into the recess in the auxiliary profile 82, i.e. is in large part enclasp- ed by the recess, so that the synthetic part 80 is clamped by means
20 of the rounded part 84 of [sic] the recess in the auxiliary part 82, but can therein be twisted. The necessary rotational movement of the lower glass pane margin of the outer glass plate 46, together with the holding profile 6, is additionally promoted by this hinge-type binding of
25 the synthetic part 80 to the façade sub-structure 48. The rotational movement is therefore not only dictated solely on the basis of the material properties of the synthetic part 80. Advantageously, the rounded part 84 can also be disposed on the side of the holding profile 6 in order
30 thereby to shorten the lever arm to the lower glass pane margin of the outer glass plate 46. It is also conceivable for the synthetic profile 80 to be connected on both sides, by a rounded part 84, to the holding profile 6 or the auxiliary profile 82.

35 Fig. 19 shows the connection of the holding profile 6 to a profiled part 86 of the façade sub-structure 48 via a special connecting point. The inner angular deviation 10 is adjoined, as a continuation of the connecting bar 12, by a connecting part 88 merging into

an extension piece 90, which extension piece extends away from the glass pane margin, is directed at the glass pane centreline and runs parallel to the glazing. The extension piece 90 is held with play in a recess in the profiled part 86 and exhibits a thickening at its free end. The pre-defined rotational movement of the holding profile 6 is enabled, on the one hand, by the play between the extension piece 90 and the recess in the profiled part 86 and, on the other hand, by the elasticity of the extension piece 90 and of the connecting part 88. In the event of, the double-glazing 42 and hence the outer glass plate 46 being twisted, the holding profile 6, due to the aforementioned play and/or the elasticity of the aforementioned parts, is able to execute a twisting movement, so that a fracture in the lower glass pane margin of the outer glass plate 46 is prevented. The inner glass plate 44 is again floatingly or elastically mounted in order, here too, to prevent a fracture in the region of the lower glass pane margin.

Figs. 20 and 21 show a further variant of the arrangement of the holding profile 6 on the façade sub-structure 48. In support of the pre-defined rotational movement of the holding profile 6, there is disposed next to the synthetic part 50 described, inter alia, in Fig. 10, a special connecting point. This connecting point comprises a profiled part 92, which adjoins the synthetic part 50 and constitutes, in the direction of the façade sub-structure 48, a recess in which there engages a bar 94 extending away from the façade sub-structure 48. Between the bar 94 and the recess in the profiled part 92 there is disposed an elastic material 96 of sufficient thickness. A securement between the profiled part 92 and the bar 94 is realized by means of a screw connection, the screw being disposed with play at the connecting point. The pre-defined rotational movement of the holding profile 6, together with the outer glass plate 46 of the double-glazing 42 or together with the outer glass pane 148, is additionally enabled in the shown construction by the fact that the profiled part 92, by virtue of the

arrangement of the elastic material 96 and/or the elasticity of the bar 94, is likewise able to move or rotate. In order to avoid obstructing the rotational movement of the profiled part 92, the screw connection exhibits the
5 aforementioned play. In order to avoid the profiled part 92 being obstructed by the arrangement of the inner glass plate 44 or of its [sic] region of the panel 146 adjoining, on the room side, the glass pane 148, there is provided between the lower glass pane margin of the inner
10 glass plate 44 or the corresponding region of the panel 146 and the profile 92 an elastic material, for example a double adhesive tape, which can be compressed or expanded according to the rotational movement of the profiled part 92.

15 Given an appropriate choice of material, it is also possible to do completely without the synthetic part 50, whereby the pre-defined rotational movement takes place only in the region of the profiled part 92 or the bar 94, this connecting point constituting a type of
20 longitudinal sliding joint. The elastic material 96 could then prevent the insulating transfer.

Fig. 22 shows the use of the holding profile 6 as shown in Fig. 1. The extension piece 16, which extends away from the glass pane centreline in the direction of
25 the glass pane margin of the double-glazing 42 and runs parallel to the glazing, herein engages in a recess in a profiled part 98. It is herein important for a spacing to be present between the inner angular deviation 10 and the profiled part 98, so that the holding profile 6 can also
30 then twist whenever the outer glass plate 46 sags outwards due to wind suction. No squeezing force can therefore arise between the holding profile 6 and the adjoining profiled part 98. In the case of this connecting point shown in Fig. 22, the pre-defined rotational
35 movement is realized on the basis of the elasticity of the extension part 16 on the one hand and of the connecting bar 12 on the other hand, which connecting bar connects the extension piece 16 to the inner angular deviation 10. The synthetic part 50 is herein

additionally able to support the pre-defined rotational movement, the lower glass pane margin of the inner glass plate 44 being in this case advantageously stood, by means of an elastic material or an elastic block, on the synthetic part 50.

Alternatively, the holding profile represented in Fig. 22 can exhibit a specific configuration. The holding profile 6 can be adjoined by an arc-shaped extension piece to the inner angular deviation 10, which engages in a likewise arc-shaped recess in a profiled part. It is herein crucial that, on the one hand, the free end of the arc-shaped extension piece is spaced apart from the end of the recess in the profiled part and, on the other hand, that a spacing is likewise present between the inner angular deviation 10 and the profiled part to enable the pre-defined rotational movement of the holding profile 6 to occur. The arc-shaped extension piece must be enabled to execute, in the recess in the profiled part, a rotational movement which cannot be obstructed by squeezing forces. The pre-defined rotational movement of the holding profile 6 is additionally facilitated by the elasticity of the arc-shaped extension piece. The synthetic part 50 can also additionally promote the pre-defined rotational movement provided, as explained with respect to Fig. 22, the connection between the lower glass pane margin of the inner glass plate 44 of the double-glazing 42 is elastically configured.

The variant of a connecting point, configured in the style of a plug-in connection, between the holding profile 6 and the façade sub-structure 48 without the use of a synthetic part as an insulating element, which variant has already been mentioned with respect to Figs. 20 and 21, is shown in Fig. 23. The inner angular deviation 10 is adjoined by a double-bar-like recess in which the bar 94, as part of the façade sub-structure 48, engages. Between the bar 94 and the recess there is disposed the elastic material 96. The elastic material 96 herein serves, on the one hand, as an insulating element preventing the transfer of heat and serves, on the other

hand, to ensure that the holding profile 6 is able to execute the pre-defined rotational movement. This pre-defined rotational movement is promoted by the elasticity of the bar 94, which bends upwards or downwards according to the rotational movement of the holding profile 6. The securement between the recess and the bar 94 is realized by means of a screw connection, which exhibits play in order to avoid obstructing, by squeezing forces, the pre-defined rotational movement. In this variant, the inner glass plate 44 can be stood on a rather non-elastic material on the façade sub-structure 48, since the bending of the bar 94 is not obstructed by its bracket-like configuration, spaced apart from the other parts. The material properties and material thicknesses in the region of the connecting point are herein dependent upon the maximum necessary pre-defined rotational movement of the holding profile 6 or of the lower glass pane margin of the outer glass plate 46 of the double-glazing 42.

Fig. 24 shows that the arrangement, according to the invention, of the holding profile 6 can also be used in a double-glazing 104 in which the inner glass plate 106 and the outer glass plate 108 exhibit equal dimensions, i.e. where there is a double-glazing 104 without stepped configuration. It is herein important for the inner glass plate 106 to be floatingly or elastically mounted in order thereby to avoid obstructing the pre-defined rotational movement of the holding profile 6 or of the lower glass pane margin of the outer glass plate 108. The twisting of the holding profile 6 is enabled by the synthetic part 50, as explained, inter alia, with respect to Fig. 14. The elastic bedding of the inner glass plate 106 is realized by means of an elastic material 110, which is disposed in sufficient thickness between the lower glass pane margin of the inner glass plate 106 and the profiled part 112 embracing this lower glass pane margin. In the embodiment shown, the profiled part 112 is fastened by means of a bonding 114 to the façade sub-structure 48. Since the material used for the bonding 114 is likewise elastic, the rotational axis

forming parallel to the glass pane margin for the pre-defined rotational movement of the holding profile 6 can also be formed in the region of the bonding. It is herein dependent upon the material properties of the synthetic part 50 as to whether the rotational axis for the pre-defined rotational movement is formed, in greater or lesser part, also in the region of the bonding 114. The further profiled part 54, which is disposed, mainly as fire protection, in sections in the marginal region of the double-glazing 104, does not prevent the pre-defined rotational movement, since, on the one hand, it is only disposed in sections and, on the other hand, its screw connection can exhibit play.

Figures 25 and 26 show that the arrangement, according to the invention, of the holding profile 6 can also be used in a double-glass pane 128 in which the outer glass plate 130 and the inner glass plate 132 exhibit equal dimensions, i.e. there is no stepped glass present, but rather a normal insulating glass. The shown double-glass panes 128 are firmly enclasped, on the weather side of the outer glass plate and on the room side of the inner glass plate, by the holding profile 6. As described, the holding profiles 6 exhibit, on the corresponding weather side and corresponding room side, the outer and inner angular deviations 8, 10.

In Fig. 25, there is disposed between the outer and inner glass plates 130, 132, above the connecting bar 12 and in bearing contact with this, an intermediate part 142. The intermediate part 142 may be a synthetic part, for example, in which case this part must be suitably hard to ensure that the double pane 128 is firmly enclasped by the holding profile 6. The necessary pre-defined rotational movement of the holding profile 6 is realized about a rotational axis which will appear at the connecting point of the extension piece 16 to a profiled part of the façade sub-structure. Such a connecting point has already been described with reference to above figures, the extension piece 16 also being able to exhibit an arc-shaped cross-section. As likewise

described, the twisting at the connecting point is dictated by the elasticity of the connecting parts on the one hand and/or by the presence of play between the connecting parts. It is important in this arrangement of the holding profile on the double-glass panes 128 that at least one of the sealants or spacers located in the interspace of the double-glass pane 128 should exhibit a material property such that any relative movement of the outer and inner glass plates 130, 132 is reliably prevented, so that the firm clasp of the holding profile 6 around the lower margin of the double pane 128 is guaranteed at all times. In order, in particular, to prevent any heat transfer between the weather side and the room side resulting from the chosen arrangement of the holding profile 6, the connecting bar 12 of the holding profile 6 can be perforated, as indicated in Fig. 25, in the middle region of the cross-section of the connecting bar 12.

Fig. 26 shows, in contrast to Fig. 25, additional angular deviations 134, 136 of the holding profile 6, which are additionally disposed on the room side of the outer plate 130 and on the weather side of the inner plate 132. In place of the connecting bar 12, as shown in Fig. 25, the holding profile 6 can be broken and the connection between the thus generated part profiles 138, 140 can be replaced by a pressure-resistant and traction-resistant heat-insulating element 50. In this case, the holding profile 6 is separated into a part-profile 138, serving as a holding profiled part, for the outer glass plate, and a part-profile 140, likewise serving as a holding profiled part, for the inner glass plate. The respective glass pane margins of the outer and inner glass plates 130, 132 are once again firmly encased by the outer angular deviation 8, the further angular deviation 134 or by the inner angular deviation 10 and the further angular deviation 136. Serving as binding between the outer 8 and the further angular deviation 134 or between the inner angular deviation 10 and the further angular deviation 136 are, in contrast to Fig. 25,

respectively shorter connecting bars 12. The heat-insulating synthetic part 50, which connects the two part-profiles 138, 140 in a pressure-resistant and traction-resistant manner, is inserted into dovetail-shaped
5 recesses which are configured on the outer sides, pointing respectively towards the interspace of the double pane 128, of the two further angular deviation [sic] 134, 136.

In the embodiment of the invention shown in Fig.
10 26, the pre-defined rotational movement is enabled at the connecting point between the holding profile 6, or the part-profile 140, and the façade sub-structure, i.e. the rotational axis is enabled to be disposed in this region. The connecting point comprises, as in Fig. 25, an extension
15 piece 16, which is disposed in a correspondingly shaped recess in the façade sub-structure 48. The extension piece 16, by virtue of its spacing from the inner angular deviation 10 and its extent running parallel to the double-glass pane to the glass pane margin, itself
20 forms a recess. In this recess there engages an extension part 144 shaped like the extension piece 16. The free end of the extension piece 16 and the free end of the extension part 144 respectively exhibit a thickening, thereby
25 giving rise, at the connecting point, to play between the connecting parts. The twisting of the holding profile 6 or of the part profiles 138, 140 are [sic] once again guaranteed by the elasticity of the connecting parts at the connecting point and by the play which is present. Depending upon the material properties of the synthetic
30 part 50, an additional rotational axis can also appear in the region thereof.

In an alternative embodiment, the holding profile 6 can also exhibit a continuous configuration in the region of the synthetic part 50, thereby producing a
35 holding part 6 as shown in Fig. 25, in which case there would additionally be disposed, at the designated locations, the further angular deviations 134, 136.

Figs. 27 and 28 show heavily diagrammatized cross-sections of the arrangement according to the

invention in the case of a single glazing:

The holding profile 6 disposed on the glass pane 116 shows [sic], in both figures, an arc-shaped recess adjoining the inner angular deviation 10. The connection
5 between the holding profile 6 and a profiled part 118 comprises, in Fig. 27, a synthetic part 120 exhibiting two arc-shaped extension pieces. The profiled part 118 likewise has, like the recess in the holding profile 6, an arc-shaped recess. Inserted into these two recesses
10 are the arc-shaped extension pieces of the synthetic part 120. The recesses herein enclasp the arc-shaped extension pieces in considerable part, so that a secure mounting of the synthetic part 120 is ensured. The necessary pre-defined rotational movement of the holding profile 6,
15 together with the lower margin of the glass pane 116, is in large part enabled by the connection of the synthetic part 120 to the holding profile 6 or to the profiled part 118, which connection constitutes a type of swivel joint. The pre-defined rotational movement is additionally
20 enabled, by virtue of the elasticity of the synthetic part 120, since a bending of the synthetic part 120 is able to take place in the region connecting the arc-shaped extension pieces. In order largely to prevent any moments developing in the region of the lower glass pane
25 margin, the synthetic part 120 is disposed as close as possible to the glass pane 116.

Fig. 28 shows a variant in relation to Fig. 27, in which a synthetic part 124 connecting the holding profile 6 and a profiled part 122 engages in a dovetail-
30 shaped recess in the profiled part 122. The pre-defined rotational movement can consequently only take place by virtue of the arc-shaped extension piece of the synthetic part 124 on the side of the holding profile 6 and by virtue of the connecting region of the synthetic profile
35 124 between the holding profile 6 and the profiled part 122. The arc-shaped extension piece of the synthetic part 124 herein allows, in interplay with the arc-shaped recess in the region of the inner angular deviation 10, a rotational movement of the holding profile 6, in which

case the connecting region of the synthetic part 124 is additionally able to bend due to the elasticity present and thereby lends support to the pre-defined rotational movement.

5 Fig. 29 shows a top view of the weather side of the glass pane 2 in a corner region exhibiting holding profiles 6, which run fully along the glass pane margins and extend right into the corner region. The holding profiles 6 do not lie close together in the corner region
10 so as not to provoke any squeezing forces, resulting from the different expansions of the glass pane 2 and the holding profiles 6, in the corner region between the holding profiles 6. For reasons of sealing-tightness and from aesthetic points of view, there is provided in the
15 corner region a corner moulding 126, which is slid over the free ends of the holding profiles 6 and clipped on there. A sufficient covering of the free ends of the holding profiles 6 by the corner moulding 126 ensures that, even if the holding profiles 6 shrink heavily, they
20 do not come out of the corner moulding 128. Analogously, the free ends of the holding profiles 6 are spaced apart in the corner region in such a way that, even if the holding profiles 6 expand heavily, no squeezing forces can be generated in the corner region. Advantageously,
25 the corner moulding 126 is matched to the colour of the holding profiles 6 and can consist, for example, of a black elastomer moulding or correspondingly coloured special steel. An elastic sealant or a bond ensure the necessary seal between the corner moulding 126 and the
30 holding profiles 6.



Patent Claims

1. Arrangement of holding profiles (6) for fastening a glass pane (2; 34; 46; 108; 128; 148; 150; 152), in particular an outer wall or roof glazing, to a façade construction (48), which holding profiles run along at least two opposite margins of the glass pane (2; 34; 46; 108; 128; 148; 150; 152) and enclasp these in tight bearing contact, from without and within, with an outer and inner angular deviation (8; 10) respectively and are fastened to a part of the façade sub-structure (48), each holding profile (6) being configured or disposed or supported outside the glass pane margin (4) in such a way that it allows, if the glass pane (2; 34; 46; 108; 128; 148; 150; 152) should sag, a pre-defined rotational movement about a rotational axis lying parallel to the glass pane margin (4) and outside this.

2. Arrangement according to Claim 1, in which the outer angular deviation (8) and/or the inner angular deviation (10) of the holding profile (6) engages in an offset margin or a step (20; 40) of the glass pane margin (4), so that at least the weather side of the glass pane (2; 34; 46; 108; 128; 148; 150; 152) and the outer side of the outer angular deviation (8) lie in one plane.

3. Arrangement according to one of Claims 1 to 2, in which the holding profile (6) is pre-bent, prior to attachment, in order to clamp the glass pane margin (4) in the holding profile (6).

4. Arrangement according to one of Claims 1 to 3, in which between the holding profile (6) and the glass pane margin (4) there are disposed positively interlocking holding mechanisms.

5. Arrangement according to Claim 4, in which, as the holding mechanism, the outer and/or inner angular deviation (8; 10) exhibit(s), on the face facing the glass pane (2; 34; 46; 108; 128; 148; 150; 152), at least one continuous or broken elevation (32) parallel to the glass pane margin (4), the glass pane margin (4) exhibiting, at the corresponding locations, channels or notches.

6. Arrangement according to Claim 4, in which, as



- the holding securement, the outer and/or inner angular deviation (8; 10) exhibit(s), on the face facing the glass pane (2; 34; 46; 108; 128; 148; 150; 152); at least one continuous channel or notches, the glass pane margin (4) exhibiting, at the corresponding locations, elevations (32) which are made, in particular, with enamel.
7. Arrangement according to Claim 1, in which the rotational axis is disposed at the least possible distance from the glass pane margin (4).
8. Arrangement according to Claim 1, in which the glass pane (150; 152) is a laminated glass pane (150) comprising at least two individual plates or a glass pane (152) comprising individual plates having photo-voltaic elements disposed therebetween, there being disposed in the region between the outer and inner angular deviation (8; 10) means which prevent the glass pane margin (4) from being compressed due to the elasticity of the material disposed between the respective individual plates.
9. Arrangement according to Claim 8, in which the compression-preventing means comprise a pressure-resistant inlay (154), which is disposed respectively between the individual plates of the glass pane (150; 152), corresponding to the thickness of the material respectively located between the individual plates.
10. Arrangement according to Claim 8, in which the compression-preventing means comprise free spigots (156), which reach in between the individual plates of the glass pane (150; 152) and are firmly connected to the connecting bar (12) of the holding profile (6) and correspond, in their cross-sectional width, to the thickness of the material respectively located between the individual plates.
11. Arrangement according to Claim 1, in which the glass pane (46; 108; 148) is an outer glass plate (46; 108), disposed on the weather side, of a double-glazing (42; 104) or a glass pane (148) which is disposed on the weather side and serves as the cover plate of a panel (146), the rotational axis being disposed in the region



of the double-glazing (42; 104) or in the region of the panel (146), advantageously at the least possible distance from the glass plate (46; 108; 148) disposed on the weather side.

- 5 12. Arrangement according to Claim 1, in which the glass pane (46; 108; 148) is an outer glass plate (46; 108), disposed on the weather side, of a double-glazing (42; 104), or a glass pane (148) which is disposed on the weather side and serves as the cover plate of a panel
10 (146), the rotational axis being disposed behind the inner glass plate (44; 106) disposed on the room side or behind the room-side termination of the panel (146) and advantageously at the least possible distance from the said plate or termination of the panel.
- 15 13. Arrangement according to Claim 11 or 12, in which the inner glass plate (44; 106) disposed on the room side or the region of the panel (146) disposed behind the glass pane (148) is mounted in an elastically bedded or floating disposition.
- 20 14. Arrangement according to one of Claims 1, 7 or 11 to 13, in which the rotational axis is disposed in the region of a heat-insulating element preventing the transfer of heat between the holding profile (6) and the façade sub-structure (48), in particular of a synthetic
25 part (50; 68; 80; 120; 124), and/or in the region of a specially designed connecting point between the holding profile (6) and the façade sub-structure (48), the insulating element and/or the connecting point very largely preventing a transmission of moments to the glass
30 pane margin (4).
15. Arrangement according to Claim 14, in which the stiffness of the insulating element is as slight as possible around the developing rotational axis.
16. Arrangement according to Claim 14 or 15, in which
35 the connecting point comprises an extension piece (16; 90) of the holding profile (6), which extension piece is distanced from the inner angular deviation (10) and extends parallel to the glass pane (2; 34; 46; 108; 150; 152) in the direction of the glass pane margin (4) or



- away from the and engages in a correspondingly formed-out cavity in a profiled part (98) of the façade sub-structure (48), and a connecting part (14; 88) connecting the holding profile (6) and the extension piece (16; 90),
- 5 the extension piece (16; 90) and the holding profile (6) preferably exhibiting play to enable the pre-defined rotational movement of the holding profile (6) by virtue of the play and/or elasticity of the extension piece (16; 90) and connecting part (14; 88).
- 10 17. Arrangement according to Claim 14, in which the connecting point comprises a longitudinal sliding joint, in particular in the form of a plug connection having a bar (94) running perpendicular to the plane of the pane and a recess embracing the said bar, an elastic material
- 15 (96) being disposed between the bar (94) and the recess to enable the pre-defined rotational movement of the holding profile (6) by virtue of the arrangement of the elastic material (96) and/or the elasticity of the bar (94).
- 20 18. Arrangement according to one of Claims 1 to 7, in which the glass pane is a double glass pane (128), which is encased in tight bearing contact, on the weather side of the outer glass plate (130) and on the room side of the inner glass plate (132), by the holding profile
- 25 (6).
19. Arrangement according to Claim 18, in which the holding profile (6) exhibits two additional angular deviations (134; 136), by which it encasps, in tight bearing contact, the outer glass plate (130) on the room
- 30 side or the inner glass plate (132) on the weather side, the holding profile (6) being divided up into a weather-side and a room-side part profile (138; 140) and the part-profiles (138; 140) being firmly interconnected by a pressure-resistant and traction-resistant insulating
- 35 element, in particular a synthetic part (50).