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POINT FITTING FOR INSULATING GLASS PANES

Description

The present application relates to a single point fixing according to the generic part of patent claim 1 serving to
5 connect at least two glass panes spaced apart via an air gap, which is preferably filled with a gaseous medium, said single point fixing is positively and non-positively attached to a substructure.

Such a fixing species, which can be used for a single point
10 and bending-moment-free support of multi-layer insulating glass panes has been disclosed in the German utility model 93 18 862. In this application, the single point fixing is extended through boreholes existing in the spaced glass panes. For this purpose, it is crucial to hermetically seal the
15 region of the boreholes in the spaced glass panes with regard to the surrounding closed air gap. Simultaneously these interspaces of both glass panes have to transfer the attachment forces of the insulating glass panes via the single point fixing. Therefore, respectively one locating disc abuts at
20 the insulating spaced glass panes, on the one hand in the exterior region and on the other hand in the interior region, which discs are tightened with regard to each other by means of a screwing element. In the connection region, the single point fixing is movably executed and therefore provided in
25 such a manner with a ball and therewith co-operating complementary surface within the inside positioned disc, that it is possible to rotate the fixing assembly with regard to the substructure. This allows partial compensation of possible building tolerances. Due to the fact that this single point fixing,
30 as it is otherwise conventional with single glazed panes, likewise extends through the spaced glass panes, a very



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expensive and on the other hand also a very critical connection with respect to long term stability is realised. Besides the boreholes to be drilled, it is moreover important to safely and permanently seal the air gap between the spaced
5 glass panes.

Another device of this species is disclosed by DE 44 00 979 A1, where the clamping element on the inside of the structure (locating bearing), at the envelope surface oriented towards the mounting, presents a spherical surface, on which leans a
10 compensating part with a complementary spherical calotte surface. The clamping element is provided with a through borehole to receive the clamping screw connecting the clamping elements and to receive a holding screw that penetrates a liner and the compensating part and engages the
15 clamping element. This known device allows to compensate building tolerances between the borehole in a glass pane and a substructure (mounting); a resilient elastic support for the glass pane at the mounting is not provided once the installation is completed.

20 DE 44 45 724 A1 describes a similar device, wherein the clamping element on the inside of the structure at its envelope surface oriented towards the mounting presents a spherical surface, at which a pivoting bearing of a retaining part abuts its complementary surface, said pivoting bearing is held with
25 lateral play in a union nut. Once assembly is completed here again, no relative movement of the glass pane with regard to the retaining part is possible.

Furthermore a supporting element for a fastening bolt at a suspension device is published by EP 0 784 129 A1, where a
30 plate of the suspension device is clamped between two

planoconvex lenses, which planar surfaces indirectly sit upon the plate, one of the lenses being in abutment with its convex surface at a clamping element on the inside of the structure, and the other lens being in indirect abutment with a nut
5 receiving the fastening bolt.

The object of the invention is to simplify the above-mentioned state-of-the-art such to conceive a well priced single point fixing that can be produced at reasonable cost and used for insulating glass panes. Simultaneously the single point fixing
10 should allow for bending-moment-free support while compensating at the same time tolerances with regard to the substructure.

The problem of the invention is solved with the characteristic of patent claim 1 in connection with its generic part. The sub-
15 claims reveal in this case a further embodiment of the inventive idea.

According to the invention, it is proposed to abandon the commonly existing boreholes in the glass panes and to positively and non-positively affix the single point fixing having
20 a planar assembly surface at one of the spaced insulating glass panes by means of glue. In order that the weight of the insulating glass panes, even through both spaced glass panes, is safely transferred to the single point fixing, a spacing block is provided in the air gap between the spaced glass
25 panes, which is likewise positively and non-positively connected to the glass panes by means of glue. In this case, the spacing block may consist of glass or of metal. The used glue must be UV-stable and preferably transparent. A long-term stability with regard to carrying characteristics must be
30 moreover guaranteed. The proposed fixing is furthermore

designed such to achieve a bending-moment-free support of the glass panes at a substructure. This is likewise applicable to the glued connection between the proposed fixing and the insulating glass pane. Therefore the fixing is conceived such to include, at its assembly surface opposite to the glass pane, an interior clamping element built by a permanently elastic spring member having a conical or crowned surface, against which a complementary surface of an inner envelope of a coupling bell with adaptable pre-stress is adjustable, whereby between the coupling bell and an attachment bolt on the one hand and an attachment bolt and the mounting on the other hand, respectively one stiffening three-dimensional articulation is arranged.

According to the inventive solution, wind pressure and thermal tension are compensated through the elastic support of the coupling bell at the interior clamping element, as even once assembly is completed, a relative movement of both components with regard to each other is possible without introducing restoring forces into the spaced glass panes.

This is guaranteed through the adjustable pre-stress between the clamping element and the coupling bell. The multiple partitioning of the attachment device into at least two more three-dimensional articulations not only provides a perfect adaptation possibility to more important building tolerances, but the individual articulated points of the three-dimensional articulations build, even when a solid connection is established once assembly is completed, so-called nodal points having a certain proper elasticity, which in addition contribute to tension-free support the glass panes.

According to one inventive embodiment, the interior clamping element itself can present a conical or crowned surface at its envelope surface opposite to the glass panes, in principle the conical or crowned surface can likewise be built through the permanently elastic spring member, even with a planar execution of the clamping element.

Furthermore the interior clamping element is provided with a borehole, which connects the interior clamping element with the coupling bell's regulating screw, whereby in a further embodiment of the invention, the permanently elastic spring member is executed as a permanently elastic cushion that is arranged between the conical or crowned surface of an interior clamping element oriented towards the assembly plate and the complementary surface of the coupling bell. The permanently elastic cushion can be clamped by the before-described coupling bell's regulating screw in a way that not only stress introduced into the glass panes can be absorbed by the permanently elastic cushion itself, but also a relative displacement of the coupling bell with regard to the permanently elastic cushion is possible, such that the glass panes and therefore likewise the connection between the glass panes and the nut are completely stress-free supported.

According to one special characteristic of the invention, the coupling bell presents, on its side oriented towards the mounting, a cylindrical extension executed with a male thread, between which extension and the coupling bell, in the region of the coupling bell's deepest bottom, is realised an inwardly oriented flange to support the screw head of the coupling bell's regulating screw. Here, a play, provided between the flange and a shaft of the coupling bell's regulating screw, allows to accommodate a lens-like executed disc between the

flange and the screw head of the coupling bell's regulating screw, such that the shaft of the coupling bell's regulating screw can perform an oscillating movement with regard to the coupling bell. This oscillating movement is encouraged, if the
5 locating surface of the flange and the complementary surface of the lens are conically or crowned conceived. A non-metallic lens made for example from hard rubber with sliding quality has demonstrated its suitability for this application. Herewith, practically an additional three-dimensional articulation is
10 realised between the coupling bell and the interior clamping element and thus the glass panes.

Another three-dimensional articulation consists in that the fore-part of the coupling bell's extension, oriented towards the mounting, is curved in a lens-shaped concave manner,
15 whereby a pot-like union nut, overlapping the male thread of the coupling bell's extension, presents an inner pot bottom surface, which presents an opposite curvature relative to the fore-part of the coupling bell's extension, such that there is room to accommodate two convex lenses, their planar
20 surfaces abutting against each other, between the fore-part of the coupling bell's extension and the pot bottom surface of the union nut. By means of the before-described union nut, the before-described three-dimensional articulation can be stiffened, once assembly is completed.

25 In one advantageous embodiment of the invention, the planoconvex lens, sitting close to the pot bottom surface of the union nut, is integral part of a nut receiving the attachment bolt, which circumstance provides the possibility to screw the attachment bolt more or less deep into the nut, with the result
30 to shorten or to elongate the complete attachment device, as required.

With the intention to realise the aforementioned three-dimensional articulation, the nut's shaft is dimensioned such to penetrate with play a borehole in the pot bottom of the union nut.

- 5 Another three-dimensional articulation can be realised in an on its own already known manner, in the region of the direct connection of the attachment bolt with the mounting, in a way that the attachment bolt penetrates with play a borehole in the mounting and the mounting is fastened between a nut and a
- 10 counter-nut, whereby between the nut and the counter-nut on the one hand and the mounting on the other hand, respectively one planoconvex lens is provided abutting with its planar surface against the mounting, and the nut and the counter-nut present complementary locating surfaces with
- 15 regard to the lens. A three-dimensional articulation is here again achieved that can be adjusted and adapted during assembly, and that can be stiffened once assembly is completed, whereby, between the latter three-dimensional articulation representing the link to the mounting and the
- 20 three-dimensional articulation built through the coupling bell and the union nut, a distance sleeve can be provided.

Hereinafter, the invention is explained in detail on the basis of different embodiment examples. It shows:

25 Figure 1: a cross section through an insulating glass pane with single point fixing.

Figure 1a: a cross section through an attachment device.

Figure 2: the cross section according to Figure 1a with insulating glass pane inclined with regard to the substructure.

5 Figures 3 -12: details of the interior clamping element, of the coupling bell, of the lens abutting the screw bell of the coupling bell's regulating screw, of the nut accommodating the attachment bolt, and of the union nut, all drawings respectively in perspective view
10 and in cross section.

According to Figure 1, a single point fixing 1 comprises a mounting element 5 with a planar assembly surface 4, which is glued via glue to an insulating glass pane consisting at least of two individual glass panes 2, 50. The glass panes 2, 50
15 are, at the perimetrical border in traditional manner, spaced apart by means of a spacer 54 such to create an air gap 52 between the glass panes 2, 50. This air gap 52 can be filled with a gas. The glass panes 2, 50 can be produced as single layer safety glass or as composite glass pane. In Figure 1,
20 the single point fixing 1 with its planar assembly surface 4 is positively and non-positively attached via glue 51 at an exterior surface of the glass pane 50.

A spacing block 53 exists between the glass panes 2, 50 in the region of the single point fixing 1, which is likewise
25 positively and non-positively connected with the glass panes 2, 50 via glue 51. Therefore, forces can be directly transferred from the glass panes 2, 50 to the single point fixing 1. As illustrated in the embodiment example of Figure 1, attaching such single point fixing 1 at the glass panes 2, 50 with glue,
30 does not require any machining work on the glass pane, that means no boreholes have to be drilled and no sealing of these

boreholes is necessary with regard to the air gap 52 of the insulating glass panes 2, 50. This procedure simplifies and tremendously reduces the production cost of said insulating glass panes. The glue used in this application is UV-stable
5 and preferably transparent. In this case, the spacing block 53 to be inserted can be made from glass or from metal.

In the embodiment example, opposite to the planar assembly surface 4 the mounting element 5 has got a conical envelope surface 14, at which abuts a permanently elastic spring
10 member executed as permanently elastic cushion 19 leaning on a projection 57, member which practically constitutes the proper envelope surface 6 of the mounting element 5. An inner envelope 9 of a coupling bell 10 abuts with a complementary surface 8 against this envelope surface 6. A
15 pocket borehole 16 (compare Figure 3 and 4) of the mounting element 5 connects the mounting element 5 with a three-dimensional articulation 12. For this purpose, the pocket borehole 16 presents a female thread 15. A coupling bell's regulating screw 18 engages into the female thread 15, the
20 screw head 24 leaning on a flange 23 of the coupling bell's 10 cylindrical extension 21. Between the flange 23 and the screw head 24 is provided a preferably elastic lens 27, which leans on a locating surface 28 of the flange 23, such that in this point as illustrated in Figure 2, a three-dimensional articulation
25 is realised within the limits of a play 26. For this purpose, the lens 27 includes a complementary surface 29. The coupling bell's 10 cylindrical extension 21 beginning in the region of the bottom 22 presents a concave curved fore-part 30, which is oriented against a substructure 3. A union nut's 31 inner pot
30 bottom surface 32 has a corresponding opposite curvature, such that two lenses 34 and 35, which planar surfaces 33 are

superposed, can be arranged between the fore-part 30 of the extension 21 and a pot bottom 39 of a union nut 31, and one of the two lenses, the loose lens 34 leans with its convex surface at the fore-part 30 of the extension 21, whereas the
5 second lens 35 forms integral part of a nut 36 receiving an attachment bolt 11, and with its convex surface it leans on the pot bottom 39. The nut 36 is equipped with a shaft 37 penetrating with play 40 the borehole 38 in the union nut 31.

Figure 1a illustrates that by screwing the union nut 31 onto the
10 coupling bell 10 by means of a male thread 20 in the region of the extension 21, the three-dimensional articulation, built by the two lenses 34 and 35 and generally identified by the numeral 12, can be stiffened. The nut 36 (compare Figure 9 and 10) comprises a pocket borehole 56 with a female thread
15 55, into which the attachment bolt 11 can be screwed, whereby wrench areas 58 are provided on the outside envelope of the nut 36. Figure 1a furthermore illustrates in this embodiment example, that a distance sleeve 49 annexes the nut 36, which sleeve itself leans against a nut 43 clamping the
20 substructure 3. Lenses 46 and 47 are provided between the nut 43 and a counter-nut 44, which lenses abut at complementary locating surfaces 48 of the nut 43 respectively of the counter-nut 44. Planar surfaces 45 of the lenses 46 and 47 directly abut against the mounting 3. As an attachment bolt
25 11 penetrates with play 42 a borehole 41 of the mounting 3, here again with the reference numeral 13 a three-dimensional articulation is realised that can contribute to compensate building tolerances.

Figure 2 reveals a possible inclined position of an insulating
30 glass pane of the spaced glass panes 2, 50 with regard to the substructure 3, with appropriate setting of the three-

dimensional articulations 12 and 13, as well as corresponding inclination in the region of a shaft 25 of the coupling bell's regulating screw 18 with regard to the coupling bell 10 on the one hand and with regard to the union nut 31 on the other hand. It is obvious that a displacement of coupling bell 10 occurred with regard to a permanently elastic spring member 7. As a result at this place a non-stiffening three-dimensional articulation is realised. The permanently elastic spring member 7 has not changed its position with respect to the mounting element 5, as a result of the leaning on the projections 57.

The before-described attachment device is thus suitable to maintain the elasticity of the glass panes 2, 50, as it does not intervene in their freedom of motion and thus contributes to neutralise forces. The inventive attachment device means adaptation to prevailing conditions and not rigidity inherent to the building material glass, leading forcibly to its destruction, which is the case in the above-mentioned state-of-the-art.

References

1. Single point fixing
2. Glass pane
3. Substructure, mounting
4. Assembly surface
5. Mounting element
6. Envelope surface
7. Permanently elastic spring member
8. Complementary surface
9. Inner envelope
10. Coupling bell
11. Attachment bolt
12. Three-dimensional articulation
13. Three-dimensional articulation
14. Envelope surface
15. Female thread
16. Pocket borehole

	18.	Coupling bell's regulating screw
	19.	Permanently elastic cushion
	20.	Male thread
	21.	Cylindrical extension
5	22.	Bottom
	23.	Flange
	24.	Screw head
	25.	Shaft
	26.	Play
10	27.	Lens
	28.	Locating surface
	29.	Complementary surface
	30.	Fore-part
	31.	Union nut
15	32.	Inner pot bottom surface
	33.	Planar surface
	34.	Lens
	35.	Lens
	36.	Nut
20	37.	Shaft
	38.	Borehole
	39.	Pot bottom
	40.	Play
	41.	Borehole
25	42.	Play
	43.	Nut
	44.	Counter-nut
	45.	Planar surfaces
	46.	Lens
30	47.	Lens
	48.	Complementary surface
	49.	Distance sleeve
	50.	Glass pane
	51.	Glue
35	52.	Air gap
	53.	Spacing block
	54.	Spacer
	55.	Female thread
	56.	Pocket borehole
40	57.	Projections
	58.	Wrench areas

Claims

1. Single point fixing for the attachment at insulating glass panes comprising at least two glass panes (2, 50) spaced apart through an air gap (52) that is preferably filled with a gaseous medium, said single point fixing is also positively and non-positively connected to a substructure, characterised in that the single point fixing (1) presents a mounting element (5) with a planar assembly surface (4), which is positively and non-positively attached to an exterior surface of the glass panes (2, 50) with glue (51), and, between the glass panes (2, 50) in the air gap (52) in the region of the single point fixing (1), a spacing block (53) is likewise positively and non-positively attached to them with glue (51).
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2. Single point fixing according to claim 1, characterised in that the spacing block (53) consists of glass.
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3. Single point fixing according to claim 1, characterised in that the spacing block (53) consists of metal.
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4. Single point fixing according to claim 1, characterised in that the glue (51) is UV-stable and transparent.
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5. Single point fixing according to claim 1, characterised in that the single point fixing (1) includes a bending-moment-free support of the glass panes (2, 50) at a substructure (3).
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6. Single point fixing according to the claims 1 and 5, characterised in that the bending-moment-free support comprises the mounting element (5), and that it presents, at the envelope surface (6) opposite to the assembly surface (4), a conical or crowned surface (envelope surface 6), which is built by a permanently elastic spring member and against which surface a complementary surface (8) of an inner envelope (9) of a coupling bell is adjustable with adaptable pre-stress, and that between the coupling bell (10) and an attachment bolt (11) and the substructure (3) respectively one stiffening three-dimensional articulation (12, 13) is arranged.
7. Single point fixing according to claim 6, characterised in that the mounting element (5) presents a conical or crowned surface at an envelope surface (14) opposite to the assembly surface (4).
8. Single point fixing according to the claims 6 and 7, characterised in that the mounting element (5) presents a centric pocket borehole (16) with a female thread (17) to accommodate a coupling bell's regulating screw (18) connecting the coupling bell (10) with the mounting element (5).
9. Single point fixing according to claim 6, characterised in that a permanently elastic cushion is arranged between the conical or crowned surface of the mounting element (5) and a complementary surface (8) of the coupling bell (10).

10. Single point fixing according to the claims 6 to 9, characterised in that on its side oriented towards the substructure (3) the coupling bell (10) presents a cylindrical extension (21) provided with a male thread (20), between said extension and the coupling bell (10) in the region of a bottom (22) of the coupling bell (10) an inwardly oriented flange (23) is executed to support the screw head (24) of the coupling bell's regulating screw (18).
11. Single point fixing according to claim 10, characterised in that a play (26) is provided between the flange (23) and a shaft (25) of the coupling bell's regulating screw.
12. Single point fixing according to the claims 10 and 11, characterised in that a disc (lens) (27) is arranged between the flange (23) and the screw head (24) of the coupling bell's regulating screw (18).
13. Single point fixing according to the claims 10 to 12, characterised in that a locating surface (28) of the flange (23) and a complementary surface (29) of the disc (lens) (27) are conical or crowned executed.
14. Single point fixing according to claim 10, characterised in that a fore-part (30) of the coupling bell's (10) extension (21) oriented towards the substructure (3) is concave lens-like curved.

15. Single point fixing according to any of the claims 6 to 14, characterised in that a pot-like union nut (31), which overlaps the male thread (20) of the coupling bell's (10) extension (21) and which inner pot bottom surface (32) has got an opposite curvature relative to the fore-part (30) of the coupling bell's (10) extension (21).
16. Single point fixing according to claim 15, characterised in that two planoconvex lenses (34, 35), with their planar surfaces (33) abutting against each other, are arranged between the fore-part (30) of the coupling bell's (10) extension (21) and the pot bottom surface (32) of the union nut (31).
17. Single point fixing according to claim 16, characterised in that the planoconvex lens (35) abutting the pot bottom surface (32) of the union nut (31) forms an integral part of a nut (36) accommodating the attachment bolt (11).
18. Single point fixing according to claim 17, characterised in that a shaft (37) of the nut (36) penetrates with play (40) a borehole (38) in the pot bottom (39) of the union nut (31).
19. Single point fixing according to one or several of the preceding claims, characterised in that the attachment bolt (11) penetrates with play (42) a borehole (41) in the substructure (3) and the substructure (3) is located between a nut (43) and a counter-nut (44), whereby respectively one planoconvex lens (46, 47), abutting with its planar surface (45) at the mounting, is provided

5 between the nut (43) respectively the counter-nut (44) on the one hand and the substructure (3) on the other hand, and the nut (43) and the counter-nut (44) present complementary locating surfaces (48) with regard to the lens (46, 47).

20. 20. Single point fixing according to any of the claims 6 to 19, characterised in that a distance sleeve (49) is arranged between the nut (36) receiving the attachment bolt (11) and the nut (43) fastening the substructure (3).
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21. 21. Single point fixing according to the claims 1 and 5, characterised in that the bending moment-free support consists of an assembly comprising a ball, which is completely or partially enclosed by complementary surfaces, which pre-stress is adjustable.
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22. 22. Single point fixing according to one or several of the preceding claims, characterised in that at least one of the spaced glass panes (2, 50) consists of a single layer safety glass or of multi-layer composite safety glass.
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