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CLAMPING FIXTURE FOR SECURING PANES OF GLASS

Description

- The present invention relates to a clamping fitting for the attachment of glass panes and includes an exterior and an interior clamping element clamping the glass pane between them, and a clamp screw, connectable to a substructure, which is in a restricted way elastically supported at the interior clamping element via a bushing embracing the clamp screw.
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- 10 An aforementioned assembly species is known from DE 197 13 678 A1. With this clamping fitting species a bushing, embracing the clamp screw, annexes the clamping element on the interior building side, which bushing is in a restricted way elastically supported via O-rings at a separating flange of the
- 15 clamping element on the interior building side. This support is basically executed to absorb stress acting upon the glass pane once assembly is completed, it provides however an additional adaptation possibility for the glass pane respectively for the clamping elements, clamping the glass panes, relative
- 20 to the position of the clamp screw connectable to the substructure, if, according to the aforementioned embodiment, a spacing screw surrounding the clamp screw is angular-movably arranged with regard to the clamping element on the interior building side. As a result, the clamping element on the
- 25 interior building side is provided with restricted relative movement in all six degrees of freedom with regard to the screw shaft of the clamp screw.

The invention is based on the idea that the glass panes, covering for example facades, are attached by means of a so-



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called four-point suspension. In this case it is desirable to connect the glass pane in the first place at the substructure by means of a so-called fixed point, whereas the other three suspension points must be equipped as to reliably absorb
5 building tolerances as well as, once installation is completed, forces acting upon the glass pane prompted by thermal tension or wind pressure. Consequently the individual clamping fittings must be differently executed.

The object of the invention is, while considering the
10 aforementioned requirement, to conceive the individual clamping fittings for the four-point suspension such that to the largest possible extent identical components can be used to reach a low cost and assembly-friendly solution.

The invention solves the problem with the teaching according
15 to claim 1.

Accordingly, at its side pointing towards the substructure, an interior clamping element presents a cylindrical locating space to accommodate a bearing that supports the clamp screw in axial direction, and optionally the clamp screw can be
20 supported in the bearing in axial direction without play, in a plane intersecting the center longitudinal axis and in axial direction with play, or with axial play and polydirectional perimetrical play.

According to the invention, in each case, an identical designed
25 clamping element is put to use on the exterior building side and on the interior building side. The first partial characteristic, namely the execution of the bearing in a way

that the clamp screw can be supported in axial direction without play, supplies a so-called fixed bearing.

5 The second partial characteristic, namely the support of the clamp screw in the clamping element on the interior building side in a plane intersecting the center longitudinal axis and in axial direction with play, realises a so-called vertical bearing or friction bearing, which once installation is completed, still allows the clamp screw to move in one plane with regard to the clamping element on the interior building side.

10 The third partial characteristic, namely the bearing of the clamp screw in the clamping element on the interior building side with axial play and polydirectional perimetrical play, creates a movable bearing, which allows the glass pane to move with regard to the clamping fitting as well in horizontal
15 direction as in vertical direction, consequently for example in an X-plane or a Y-plane.

The inventive solution creates, only through slightly different embodiments of the bearing accommodated by the interior clamping element, different degrees of freedom for the clamp
20 screw supported in the above-described bearing, without having to modify the clamping element on the interior building side. As a result, tolerance compensation is possible during assembly work because of manufacturing tolerances, as well as once assembly is completed due to stress acting upon the
25 glass pane.

Further features of the embodiment are characterised by the sub-claims.

According to the invention, the bearing is conceived such to present a compensating bushing embracing without play the clamp screw's shaft and a distance sleeve embracing the compensating bushing, whereby on its outer circumference
5 the distance sleeve presents a separating flange, via which the bearing is in a restricted way elastically supported by means of resilient elastic means, for example O-rings, at the interior clamping element. Even with a fixed bearing, this support allows height adjustment to a small extent, for
10 example plus or minus 2 millimetres.

Conceiving a fixed bearing is achieved according to one particular characteristic of the invention, by blocking the compensating bushing without play in axial direction at the distance sleeve, whereby the compensating bushing is
15 supported on the one hand at a collar of the distance sleeve and on the other hand via a nut screwed to the compensating bushing it is supported together with the distance sleeve. A distance washer, arranged between the nut and the fore-part of the distance sleeve, has in this case the task to eliminate
20 any play. Consequently - irrespective of the bearing's support via the above-described O-rings - any movement of the clamp screw with regard to the clamping element on the interior building side is eliminated.

According to another characteristic of the invention, the
25 distance sleeve presents in its cross section a hole-like indentation or boring, the compensating bushing being supported with a basically oval or elliptical bushing head at a collar of the distance sleeve. While in the above-described fixed bearing, the clamp screw is reliably prevented from

displacing or from moving within the oblong hole-like indentation in the compensating bushing on account of the axial fastening, the invention proposes furthermore, with the intention to achieve a friction bearing, to provide axial play
5 between the nut screwed to the compensating bushing and the distance sleeve. As the axial fastening is now abandoned, even once assembly is completed, the compensating bushing can slide within the oblong indentation of the distance sleeve such that a compensation possibility is given in a plane
10 intersecting the clamp screw's center longitudinal axis.

As it will be explained later in the embodiment example, this is achieved through abandoning the above-described distance washer assigned to the fixed bearing, such that the only constructive difference between the fixed bearing and the
15 friction bearing or vertical bearing consists in abandoning the distance washer.

A slightly constructive modification in the bearing's conception results when realising a movable bearing, whereby however as described above the clamping element on the interior
20 building side is used in identical way. To realise a movable bearing, the compensating bushings as well as the distance sleeve present concentric boreholes, whereby the distance sleeve embraces the compensating bushing with radial play and is supported with axial play between the clamp screw's
25 screw head and a compensating bushing's flange. The constructive difference resides only in the conception of the distance sleeve on the one hand and the compensating bushing on the other hand, the clamp screw however can-

move in four degrees of freedom with regard to the clamping element on the interior building side.

In all three embodiments, in the fixed bearing, as well as in the friction bearing and the movable bearing, the compensating
5 bushing presents a threaded bush which points towards the substructure and serves to accommodate a counter-nut that can be fastened to abut the substructure.

As a result, the present invention provides a clamping fitting, achieving different degrees of freedom for the clamping fitting
10 with regard to the glass pane while maintaining almost identical components.

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

- 15 Figure 1: a diagrammatic illustration of a four-point suspension.
- Figure 2: the legend to the individual clamping fittings according to Figure 1.
- Figure 3: a cross section through a fixed bearing.
- 20 Figure 4: a view in the direction of arrow A-A according to Figure 3.
- Figure 5: a cross section through a friction bearing or vertical bearing.
- Figure 6: a view in the direction of arrow B-B according to Figure 5.
- 25 Figure 7: a cross section through a movable bearing.

Figure 8: a view in the direction of arrow C-C according to Figure 7.

In the illustration according to Figure 1, a fixed bearing 3, a friction or vertical bearing 4 as well as two movable bearings 5 are suggested on a glass pane identified by the numeral 2, serving to attach the glass pane 2 at a non-illustrated substructure. The fixed bearing distinguished by "F" is only adjustable by plus or minus two millimetres, that is within the limits of the usual play for bearing parts, as well as due to the support, which will be explained later, of a distance sleeve 9 via O-rings 30. The vertical bearing distinguished by "V" only permits the attachment bolt to move in the plane of the center longitudinal axis 11, this plane can be optionally oriented, for example likewise in the X- or Y-direction. The movable bearing identified by "L", however allows the attachment bolt to move orthogonally with regard to its center longitudinal axis 11 in all directions.

The fixed bearing 3 illustrated in a cross section in Figure 3, like the friction bearing 4 and the movable bearing 5, has an interior clamping element 6 and an exterior clamping element 7. At the side of the clamping element 6 pointing towards the non-illustrated substructure, the clamping element 6 presents a cylindrical locating space 10 which accommodates the proper fixed bearing 3. The fixed bearing 3 basically consists of a compensating bushing 17 embracing a clamp screw 8 and of the distance sleeve 9, which presents in its cross section an oblong hole-like indentation or boring 22, and which embraces the compensating bushing 17 (compare Figure 4). At its free end pointing at the non-illustrated substructure, the

compensating bushing 17 is provided with a male thread to which a nut 20 is screwed. Between the nut 20 and the distance sleeve's 9 fore-part oriented against the nut 20 is arranged a distance washer 21 serving to fasten the distance
5 sleeve 9 with the compensating bushing 17 and thus with the clamp screw in the direction of the clamp screw's 8 axis (arrow Z).

The distance sleeve 9 presents furthermore a separating flange 18 (compare Figure 5), engaged between two O-rings
10 30, which on their side are fastened by means of an adjusting ring 27 screwable into a female thread of the interior clamping element 6. The clamp screw 8, fastened as explained above, leans with its oval or elliptical bushing head 23 on a collar 24 of the distance sleeve 9.

15 The embodiment example according to the Figures 5 and 6 illustrates the execution of a vertical or friction bearing, wherein the clamp screw 8 with its bushing head 23 is slidably guided in an oblong hole-like indentation 22 of the distance sleeve 9. As a result, the clamp screw 8 can laterally move,
20 illustrated by the X-direction in Figure 6, within the limits of a play 12. With reference made to Figure 3, the therein-described distance washer 21 has been removed, such to create an axial play identified by the numeral 13 for the distance sleeve 9 between the collar 24 of the distance sleeve
25 and the nut 20.

Therefore on the exterior circumference of the compensating bushing 17, a thread 29 is dimensioned such to tighten the nut 20 against the locating stop of the thread 29. The nut 20 can also be fastened in its end position by means of the grub

screw 28. In the Figures 7 and 8, a clamping fitting 1 is executed as movable bearing 5, that means the compensating bushing 17 and the distance sleeve 9 concentrically embrace a screw shaft 16 of the clamp screw 8. For this purpose the compensating bushing 17 is equipped with a flange 25, the distance sleeve 9 being arranged with radial play 14 and axial play 15 between said flange and a washer 19 sitting close to the screw head 31 of the clamp screw 8. This fact allows the clamp screw 8 a small axial (direction of arrow Z) as well as radial movement within the interior clamping element 6, as indicated in Figure 8 in the directions of arrows X and Y.

In the region of the compensating bushing's 17 free end pointing towards the substructure a threaded bush 32 is executed onto which a counter-nut 26 is screwed via the thread 29 locatable at the substructure.

References:

1	Clamping fitting
2	Glass pane
3	Fixed bearing
20 4	Friction or vertical bearing
5	Movable bearing
6	Interior clamping element
7	Exterior clamping element
8	Clamp screw
25 9	Distance sleeve
10	Cylindrical locating space
11	Center longitudinal axis
12	Play
13	Play

	14	Play
	15	Play
	16	Screw shaft
	17	Compensating bushing
5	18	Separating flange
	19	Washer
	20	Nut
	21	Distance disc
	22	Oblong indentation
10	23	Bushing head
	24	Collar of distance sleeve
	25	Flange
	26	Counter-nut
	27	Adjusting ring
15	28	Grub screw
	29	Thread
	30	O-rings
	31	Screw head of clamp screw
	32	Threaded bush
20	Arrow Z	Direction of axis
	F	Fixed bearing
	V	Vertical bearing
	L	Movable bearing
	X	Direction
25	Y	Direction

Patent Claims

1. A clamping fitting for the attachment of glass panes comprising an exterior and an interior clamping element clamping the glass pane between them, and a clamp screw connectable to a substructure, which screw is in a restricted way elastically supported at the interior clamping element via a bushing embracing the clamp screw, characterised in that the interior clamping element (6) at the side oriented towards the substructure presents a cylindrical locating space (10) to accommodate a bearing (3, 4, 5) supporting the clamp screw (8) in axial direction (arrow Z), whereby the clamp screw (8) can be supported in the bearing (3, 4, 5) as an option in axial direction (arrow Z) without play (fixed bearing), in a plane intersecting a center longitudinal axis (11) and in axial direction (arrow Z) with play (12, 13) (friction bearing 4), or with axial play (14) and polydirectional circumferential play (15) (movable bearing 5).
2. A clamping fitting according to claim 1, characterised in that the bearing (3, 4, 5) presents a compensating bushing (17) embracing without play a screw shaft (16) of the clamp screw (8) and a distance sleeve (9) embracing the compensating bushing (17).
3. A clamping fitting according to the claims 1 and 2, characterised in that on its exterior

circumference the distance sleeve (9) is provided with a separating flange (18), via which the bearing (3, 4, 5) is in a restricted way elastically supported by means of resilient means (O-rings 30) at the interior clamping element (6).

4. A clamping fitting according to any of the claims 1 to 3, characterised in that the compensating bushing (17) is located in axial direction (arrow Z) at the distance sleeve (9) to realise a fixed bearing (3).

5. A clamping fitting according to claim 4, characterised in that the compensating bushing (17) is supported on the one hand at a collar (24) of the distance sleeve (9) and on the other hand at the distance sleeve (9) via a nut (20) screwed to the compensating bushing (17).

6. A clamping fitting according to the claims 4 and 5, characterised in that a distance washer (21) is arranged between the nut (20) and the distance sleeve's (9) fore-part.

7. A clamping fitting according to any of the claims 1 to 6, characterised in that the distance sleeve (9) presents in its cross section an oblong hole-like indentation or borehole, and the compensating bushing (17) is supported with a basically oval or elliptical bushing head (23) at a collar (24) of the distance sleeve (9).

8. A clamping fitting according to any of the claims 1 to 7, characterised in that for realising a friction bearing (4) an axial play (13) is provided between the nut (20) screwed to the compensating bushing (17) and the distance sleeve (9).
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9. A clamping fitting according to any of the claims 1 to 8, characterised in that for realising a movable bearing (5) the compensating bushing (17) as well as the distance sleeve (9) present concentric borings, whereby the distance sleeve (9) embraces the compensating bushing (17) with radial play (15) and is supported with axial play (14) between a screw head (31) of the clamp screw (8) and a flange (25) of the compensating bushing (17).
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10. A clamping fitting according to any of the claims 1 to 9, characterised in that the compensating bushing (17) presents a threaded bush (32) pointing towards the substructure and provided to accommodate a counter-nut (26).
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