

Title: Clamping fitting to attach glass panes**Description**

The invention relates to a clamping fitting to attach glass panes with a clamp screw penetrating a bore hole in the glass pane which clamp screw presents a screw head and a screw shank.

The connection of glass panes to each other to build completes glass curtains or the attachment of glass panes to suitable carrier elements is systematically realised by bore holes in the glass pane. As the before-mentioned bore holes as well as the attaching elements or connection devices engaging or penetrating the bore holes are subject to certain production tolerances, the normally encountered difficulty consists in realising the true alignment of the glass pane's bore hole and the attaching or clamping fitting's axis. As long as the individual connection between the glass pane and the attaching or carrier element allows it, the attaching or carrier element is chosen, that means the tolerance compensation is to be performed by the attaching or carrier element.

A clamping fitting for all-glass constructions is known from the German utility model 77 05 090 which connects adjoining glass panes by means of a clamping rail, whereby the tolerance compensation is realised in that the clamping rail is provided with adequate important bore holes so that sufficient lateral clearance is available to the nut assigned to the clamp screw.

The European patent application 0 617 190 A1 reveals a connection between two adjoining glass panes in which the clamping rail is distantly arranged from the glass pane and the clamp screw's shank is bedded with a crowned head in the clamping rail.

The US patent 4,689,928 solves the tolerance compensation difficulty in a similar way; in this case however, the crowned

bearing has been transferred directly into the glass pane's bore hole. In order to achieve an efficient tolerance compensation it is absolutely necessary to develop the carrier elements linked to the crowned bearing in a corresponding expensive manner with joints flexible towards each other.

A bore hole tolerance compensation between the multi-layer insulation glass pane's spaced plates is disclosed by the German utility model 93 18 862. In this case the exterior as well as the interior glass pane present bore holes with a relative great diameter, whereby during assembly the bore space surrounding the proper clamp screw is filled in with cast resin. On the one hand such big bore holes are not desired for aesthetic reasons, and on the other hand assembly is relatively excessive because of the required use of cast resin.

The European patent application 0 506 522 B1 reveals moreover how to achieve the tolerance compensation inside the glass pane's bore hole by eccentric rings rotatable against each other and covering partially the bore hole. In this case too, assembly is almost complicated, as the rings have to be inserted in the bore hole free from backlash.

The DE 33 28 338 C2 describes a device to adjust a first component with regard to a second component, which device should be employed for example to connect adjoining components for exterior door coverings in vehicles. Adjusting the adjoining components is performed by screwing a distance liner into the second component, which distance liner is gripping the first component, whereby a nut element provided with thread is arranged on the second component or the second component builds itself a corresponding flange in which the distance liner is screwable. As at least the second component must present a flange-like projection such device is not suitable to connect glass panes to each other or to attach glass panes to appropriate carrier elements.

Finally DE 44 36 483 A1 disclosed an attaching device to attach sheet facings, whereby the bolt serving to attach the sheet facings is supported by a ball socket joint in the sheet facing's passage bore hole. The ball and socket bearing is realised by clamping jaws sitting closely on both sides at the sheet facing and being screwable against each other, presenting moreover dome-shaped supporting surfaces on which the bolt is indirectly supported by means of a head screw screwable into the bolt. Due to the ball and socket joint-type bolt bearing, respectively its connecting parts in the sheet facing's passage bore hole, the bolt may complete pivoting movements of several angular degrees with regard to the sheet facing. It is obvious that the required pivoting movements are accomplished inside the sheet facing's passage bore hole and that a corresponding important great passage bore hole is required. In case of a passage bore hole off-set in the sheet facing with regard to the connecting bore hole in the wall or similar device due to construction tolerances, the bolt has to be inclined with regard to the wall or similar device – and in this case especially the bolt foot – so that the bolt foot's plane sitting at the supporting construction can not be guaranteed.

*pivot by
ball socket joint*

EP 112 ...

*by flexible
joint*

The problem of the invention is to create the possibility to eccentrically support a clamp screw penetrating a glass pane's bore hole, whereby a precise clamp screw shank adjustment to the adjoining carrier or attaching element should be performed with simple construction means and little assembly effort. The invention is particularly intended for such connections that do not offer any or only restricted possibilities to compensate tolerances.

This is not only the case with hanging glass door supports but also with attaching such glass doors to stationary walls or similar device, that is to say in all cases where a clamp screw's shank has to be screwed into a pocket bore hole, a dowel or similar device without possible tolerance compensation.

Furthermore however, it is to guarantee that the tolerance compensation is possible inside the glass pane's bore hole, in all planes vertically towards the screw shank's axis. It is to renounce to use additional loose parts like eccentric clamping rings or similar devices.

The invention solves the given problem according to the teaching of claim 1.

The clamping fitting according to the main patent presents a screw head with a pot-formed cut-out to receive the screw shank with a female thread in which female thread is screwable an adjustable lock nut fixing the screw shank in a way that between the pot bottom, the pot formed cut-out and the adjustable lock nut a screw shank's holding flange is axially fixable.

According to the main patent the invention develops this teaching to the point that the adjustable lock nut, at the front orientated to the screw head's pot bottom, is provided with an oblong hole-formed groove receiving the clamp screw's holding flange, whose groove bottom presents an oblong hole for the penetration and the guidance of the clamp screw's shank while building a supporting flange for the holding flange. This inventional solution dispenses from arranging additional grooves at the holding flange being the screw shank's main component. The holding flange guidance in the adjustable lock nut's oblong hole-formed groove allows to laterally move the adjustable lock nut and by this the screw head screwed to the adjustable lock nut while turning the adjustable lock nut in the direction of the possible four degrees of freedom, such that on the one hand an adaptation is always possible to the bore hole in the glass pane and on the other hand to the position given by the screw shank, in case for example the screw shank has to be screwed into a dowel in a wall or into a thread in a plate. In this case, the screw shank's holding flange may be guided such in the adjustable lock nut's oblong hole-formed groove that even when the glass pane is closely tightened between the adjustable

lock nut and the screw head, the screw shank may move in the direction of the four degrees of freedom.

More inventional features are characterised by the sub-claims.

5 As characterised in sub-claim 2, it is advantageous to form the adjustable lock nut on its side opposite to the oblong hole-formed groove such that it presents devices to distance variably position the clamping fitting with regard to the wall or similar device. Doing so facilitates the glass pane's adjustment during assembly, especially the true alignment of several adjoining panes.

10 In detail, this may be realised in one execution possibility according to claim 3 in that the adjustable lock nut presents a female thread on its side opposite to the oblong hole-formed groove in which female thread is screwable a spacing screw presenting a corresponding male thread equipped with a support
15 plate; this solution is advantageously employed when the distance between the glass pane and a carrier element, for example a wall, is relatively short.

As alternative is proposed with the teaching according to claim 4 that the adjustable lock nut presents a male thread on its side
20 opposite to the oblong hole-formed groove on which thread is screwable a spacing nut presenting a corresponding female thread and a support flange for a distance liner; this solution is preferably employed when the distance between the glass pane and the carrier element, for example a wall or similar device, is relatively
25 important.

According to the teaching of claim 3 as well as according to claim 4, the adjustable lock nut has got a double function. On the one hand it provides the support for the clamp screw's holding flange and the connection with the screw head, and on the other hand it
30 provides the connection with a spacing screw or spacing nut distance variable with regard to the adjustable lock nut.

Hereinafter the invention is explained in detail on the basis of two possible execution examples.

Figure 1 to figure 4 show: the first execution example;
whereby figure 1 represents a
completed profile according to the
line A-A in figure 2 and
figures 2 to 4 show a view in the
direction of arrow Y according to
figure 1 without showing the screw
head in the different assembly
situations.

Figure 5 to figure 8 show: a second execution example;
whereby in a sectional view through
the glass pane figure 5 shows a
lateral view of the clamping fitting;
figure 6 shows a view in the direction
of arrow X according to figure 5 and
figures 7 and 8 represent two
different assembly situations in a
view in the direction of arrow X
without showing the screw head.

As far as required identical components are identified by identical references in both execution examples.

According to figure 1, the generally with 1 referenced clamping
fitting serves to fix a glass pane 2 and to attach it to a wall 3. For
this purpose the glass pane 2 presents a bore hole 4 receiving the
clamp screw's 5 screw head 6, whereas a clamping ring 17 is
arranged between the bore hole 4 and the screw head 6. The
screw head 6 possesses a pot-formed cut-out 8 with a female
thread 9 in which thread is screwable an adjustable lock nut 10.
At its end looking to the pot-formed cut-out 8 pot bottom 14, that is
to say in its front area 13, the adjustable lock nut 10 possesses an
oblong hole-formed groove 15 (cf. also figures 2 to 4). The oblong

hole-formed groove 15 is provided in the area of a groove bottom 16 with an oblong hole 25, which is penetrated by the clamp screw's 5 screw shank 7. A support flange 21, on which props up the clamp screw 5 shank's 7 holding flange 11, limits the oblong hole 25 on its circumference. Especially figures 2 to 4 reveal that the screw shank 7 is guided in the oblong hole 25 with the play referenced with 12.

On the glass pane's 2 side turned to the wall 3, the adjustable lock nut 10 possesses a locating flange 18 which is supported by means of a glass protection 19 on the glass pane 2.

According to figure 1, a male thread 32 is provided on the adjustable lock nut 10 at the adjustable lock nut's 10 side opposite 27 to the oblong hole 25 on which thread is screwable a spacing nut 36 presenting a corresponding female thread 33. The spacing nut 36 possesses a support flange 34 on which is supported a distance liner 35 that on the other side is supported on the wall 3. By means of a spacing nut 36 and by corresponding screwing with the adjustable lock nut 10 the distance "a" between the spacing nut 36 and the adjustable lock nut 10 and by this the distance "b", with regard to the wall 3 may be changed.

In the drawing according to figure 2, the clamp screw's 5 axis 20 is in true alignment with the adjustable lock nut's 10 axis 23 and consequently with the screw head 6. A vertical divergence of both axes 20 and 23 is represented in figure 3, that means the screw head 6 and the adjustable lock nut 10 are arranged vertically axially shifted with regard to the screw shank's axis.

Figure 4 shows a corresponding diagonal offset.

The execution example according to figure 5 is essentially different from the execution example according to figure 1 in the way that the adjustable lock nut 10 presents a female thread 28 on its side opposite to the oblong hole-formed groove 15 (figure 1), in which female thread is screwable a spacing screw 31 provided with a male thread 29 presenting a support plate 30 on its free end. The

clamping fitting 1 may be supported directly via the support plate 30 on a carrier element, for example a wall 3. In this case the distance "b" is also variable between the adjustable lock nut 10 and the spacing screw 31.

- 5 The assigned figures 7 and 8 show different assembly situations comparable to figures 2 to 4.

The clamping fitting's assembly according to figure 1 is realised as follows:

- 10 After slipping the adjustable lock nut 10 screwed with the spacing nut 36 and the distance liner 35 on the clamp screw's 5 shank 7, the latter one is screwed into a wall, in this execution example, first of all via a thread 22, a dowel or similar device by means of the hexagon socket 37. After slipping on the glass protection 19, the adjustable lock nut 10 with its assigned components (spacing nut
- 15 36, distance liner 35) is displaced while moving the oblong hole-formed groove 15 towards the clamp screw's 5 shank 7 until the adjustable lock nut's 10 axis 23 and thus the screw head's 6 axis are in true alignment with the bore hole's 4 axis in the glass pane 2. Then the clamp screw 5 may be tightened to the wall 3 as
- 20 desired that means also with the desired distance by means of the spacing nut 36. Adjusting the glass pane 2 is realised on the one hand by changing the clamp screw's 5 screw-in depth and on the other hand by tightening the holding flange 11 with the adjustable lock nut 10 via the spacing nut 36 while supporting the distance
- 25 liner 35 on the wall 3. Positioning the glass pane 2 is then done by screwing the screw head 6 with the adjustable lock nut 10 with intermediate arrangement of the clamping ring 17. In this case, the clamp screw's 5 holding flange 11 stays on the oblong hole-formed groove's 15 supporting flange 21.
- 30 The assembly of the clamping fitting according to figure 5 is realised in a similar way.

References

	1	clamping fitting
	2	glass pane
	3	wall
5	4	bore hole
	5	clamp screw
	6	screw head
	7	screw shank
	8	pot-formed cut-out
10	9	female thread
	10	adjustable lock nut
	11	holding flange
	12	play
	13	adjustable lock nut's front
15	14	pot bottom
	15	oblong hole-formed groove
	16	groove bottom
	17	clamping ring
	18	locating flange
20	19	glass protection
	20	axis
	21	support flange
	22	thread
	23	axis
25	25	oblong hole
	26	clamping ring
	27	adjustable lock nut's side
	28	female thread
	29	male thread
30	30	support plate
	31	spacing screw
	32	male thread
	33	female thread
	34	support flange
35	35	distance liner
	36	spacing nut
	37	hexagon socket
	X	direction of arrow
	Y	direction of arrow
40	a	distance
	b	distance

**Claims**

- 1) Clamping fitting to attach glass panes with a clamp screw penetrating a bore hole in the glass pane, which clamp screw presents a screw head and a screw shank, whereby the screw shank and the screw head are designed as different components and with regard to the screw shank's axis the screw shank is vertically locatable in four degrees of freedom and movable at the screw head, whereby the screw head consists furthermore of a cone nut arranged inside the glass pane's bore hole and of an adjustable lock nut screwable into a female thread in the cone nut, and the screw head forms a pot-formed cut-out to receive the screw shank which at its end penetrating into the pot-formed cut-out presents a holding flange arranged between the adjustable lock nut and a cone nut's pot bottom, characterised in that the adjustable lock nut (10), at the front (13) orientated to the screw head's (6) pot bottom (14), is equipped with an oblong hole-formed groove (15) receiving the clamp screw's (5) holding flange (11) which groove bottom (16) presents an oblong hole (25) for the penetration and guidance of the clamp screw's (5) shank (7) while building a supporting flange (21) for the holding flange (11).
- 2) Clamping fitting according to claim 1, characterised in that the adjustable lock nut (10), on its side (27) opposite to the oblong hole-formed groove (15), presents devices to distance variably fix the clamping fitting (1) with regard to a wall (3) or similar device.
- 3) Clamping fitting according to claim 2, characterised in that the adjustable lock nut (10) presents a female thread (28) on its side (27) opposite to the oblong hole-formed groove (15) in which thread is screwable a spacing screw



(31) presenting a corresponding male thread (29) and being equipped with a support plate (30).

- 4) Clamping fitting according to claim 2, characterised in that the adjustable lock nut (10) presents a male thread (32) on its side (27) opposite to the oblong hole-formed groove (15) on which thread is screwable a spacing nut (36) presenting a corresponding female thread (33) and a supporting flange (34) for a distance liner (35).