

**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, mountable with its screw shank in or at a carrier structure, which clamp screw presents a screw head and a screw shank both conceived as individual components, and whereby the screw head is vertically movable with regard to the screw shank's axis in four degrees of freedom while locatable at a screw shank's holding flange, whereby the screw head furthermore possesses a female threaded cone nut arranged inside the bore hole in the glass pane according to patent DE 196 52 773.

The connection of glass panes with each other to build complete 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 attachment 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 bore hole in the glass pane and the attachment device's or clamping fitting's axis. This problem is solved with the teaching according to the main patent application. In further development of this teaching, it is profitable to not only compensating production tolerances in the glass pane's plane, but finding moreover an adaptation possibility to several distances of the glass pane with regard to the proper attachment point, for example a wall. This is not only valid for mounting a single glass pane bending moment-free and tension-free with regard to a wall or the kind, but especially with regard to the true alignment of several adjoining glass panes with regard to each other. It is

commonly accepted that due to construction tolerances, the true aligned and tension-free mounting of glass panes imperatively necessitates varying distances of the individual bore holes in the glass pane with regard to the attachment point at the wall or the kind. The distance between the bore hole in the glass pane and the attachment point at the wall, or a connecting rod assembly or the kind, must consequently be conceived in a variable manner.

EP 0 617 190 A1 reveals a connection of adjoining glass panes realised by means of a clamping rail bridging the butt joint between the adjoining glass panes at the panes back front. Fixing the clamping rail at the glass pane takes place via a cone nut inserted into the glass pane's bore hole, which cone nut presents a female thread directed towards the clamping rail, into which thread a fixing rod arranged between the cone nut and the clamping rail is distance variably locatable by means of a locknut. Adjustment, in order to achieve a true aligned and tension-free attachment of glass panes, is done in the glass pane's back front area that is to say the back front must either be accessible or other accessories to adjust the position of the adjoining locknuts must be available as they determine the aligned placement of the glass pane respectively of the adjoining glass panes. In practical operation this means that the individual glass panes and the locknuts have to be readjusted several times, representing a huge time investment. Tolerance compensation of adjoining bore holes in the glass pane's plane is performed by a ball-type headed bearing of the connecting rod in the clamping rail. Altogether, with regard to construction as well as to assembly this is an expensive solution.

Similar problems result from the mounting for a punctiform, bending moment-free support of multi-layer insulation glass panes according to the German utility model 93 18 862 U1. The there

employed mounting bolt determines by its screw-in depth into the associated mounting case the glass pane's distance with regard to a wall or the kind, whereby this distance is only modifiable when manipulating the mounting bolt in the glass pane's back front area.

5 Tolerance compensation is performed in the glass pane's plane between adjoining bore holes in the glass pane by means of bore holes presenting a relatively important diameter in the glass panes which bore holes are filled in with cast resin during assembly. On the one side, such important bore holes are not wanted for  
10 aesthetic reasons and on the other side the use of cast resin is correspondingly expensive.

The DE 44 36 483 A1 discloses an attachment device to attach sheet facings; at a reference level a holding device or carrier structure is solidly linked into which female thread a male threaded  
15 bolt is distance variably screwable. The bolt's free end on the side opposite to the reference level presents a tapered bolt end at which an internal clamping jaw is supported revolving movable, but axially stationary. Between the before-mentioned internal clamping jaw and an external clamping jaw that may be clamped  
20 with the internal clamping jaw a sheet facing or the kind is clamped in a way that the sheet facing together with the clamping jaws may pivot in a limited angle around the tapered bolt end. The clamping jaws together with the tapered bolt end form a ball-and-socket joint that allows the sheet facing along with the clamping jaws rotating  
25 around a swivel point.

The disadvantage of this solution is that the distances are invariable between several attachment devices for one sheet facing, so that mechanical shearing forces or transverse strains are only largely avoided, if the ball-and-socket joint swivel point of  
30 all attachment devices is located in the sheet facing's thickness-center. A clamp screw of that species which screw head is fixable

at a screw shank's holding flange while vertically movable with regard to the screw shank's axis in four degrees of freedom, has not been realised.

DE 33 28 338 C2 furthermore divulges a device to adjust a first component with regard to a second component, where a distance liner is rotatably fixed at one of both components which liner's male thread corresponds with the second component's female thread, so that, when rotating the distance liner, the distance between both components is changeable. An apparent motion of both components in four degrees of freedom is not provided for in this connection.

The objective of the invention is to conceive the clamping fitting in further development of the patent's DE 196 52 773 teaching in that a true aligned, tension-free and bending moment-free assembly is made possible of a single or several glass panes, without having to access adjustment or adaptation elements at the back front of the glass pane or without necessitating repeated removal and placement of the individual glass pane for true alignment purpose.

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

According to this, the screw head consists of a support flange presenting a male thread sitting close to a carrier structure (wall or the kind), of a cone nut penetrating the glass pane's bore hole and of a locating flange sitting close to the glass pane arranged between the support flange and the cone nut, which locating flange is screwable by means of a male thread with the cone nut's female thread while fastening the glass pane, whereby the locating flange is distance variably adjustable with regard to the support flange by means of a female thread corresponding to the support flange's male thread. The locating flange engaging into the glass pane's bore hole and thus fastening the glass pane from the

pane's rear side is consequently invented, distance variable with regard to the proper attachment point at a wall or the kind, whereby this distance control may be realised passing through the glass pane's bore hole. As a result, just a rough adjustment is  
5 needed prior to placing the glass pane on the locating flange fixed to the wall mounting, and after placing the glass pane on the locating flange, the locating flange is adjusted in the direction of the glass pane or in opposite direction until it is correctly sitting close to the glass pane. Therefore no access in the area between  
10 the glass pane and the wall nor repeated glass pane placement and removal is required.

Further inventional characteristics are characterised by the sub-claims.

Adjusting the locating flange with the support flange is functionally  
15 realised by means of a thread between these two components, whereby the support flange presents an oblong hole penetrated by the screw shank to allow the screw head's shifting with regard to the screw shank's axis in four degrees of freedom, and to respect bore hole tolerances in the glass pane's plane. For connecting  
20 purpose with the locating flange, the support flange is provided with a screwed flange corresponding to an appropriate thread in the locating flange.

In further development of the invention, on the side opposite to the support flange the locating flange itself is equipped with a screwed  
25 flange presenting a hexagon socket or the kind. Instead of a hexagon socket whatever wrench shapes or the kind may be provided for that are suitable to receive a tool executing a positive screw movement on the locating flange.

A rotation protection preferably in form of a locknut setscrew is  
30 realised between the locating flange and the support flange which allows fixing the locating flange with regard to the screw head in

whatever wanted adjusted position, that means at the right distance for the exact adjustment. This is significant to avoid the locating flange's turning with the cone nut when placing the cone nut, which seals the glass pane's front, on the locating flange's screwed flange.

The support flange itself is fixed by means of a clamp screw at a wall or the kind, for this purpose the clamp screw's screw shank penetrates the before-described oblong hole and presents at its free end a holding flange between which holding flange and the wall or the kind the support flange is fastened. The before-mentioned holding flange is therefore equipped with a hexagon socket or with another suitable wrench shape with which the clamp screw may be screwed into the wall or the kind. For the before-described clamping fitting's assembly procedure, it is advantageous the holding flange's hexagon socket diameter be smaller with regard to the diameter of the screwed flange locating flange's hexagon socket.

Generally the invention proposes the possibility for a true aligned bending moment-free and tension-free attachment of individual or several glass panes with regard to a wall or the kind, representing very simple technical layout and manipulation, whereby for a simplified mounting, the distance control of the proper components fastening the glass pane may be realised by passing through the bore hole in the glass pane.

Hereinafter the invention is explained on the basis of one possible execution example represented by a diagram.

Figure 1 shows: a sectional exploded view of the clamping fitting

Figure 2 shows: the clamping fitting according to figure 1 partially assembled

Figures 3 + 4 show: the clamping fitting according to figure 1 completely assembled with different distances between the wall and the glass pane.

5 In figure 1, a wall mounting with reference 2 is fixed to a wall 1, composed of a clamp screw 4 with a screw shank 6 presenting a holding flange 8 on its end. A clamp screw's 4 screw head with reference 5 basically consists of a locating flange 10 arranged between a support flange 14 and a cone nut 21. The support  
10 flange 14 is fastened between the wall 1 and the holding flange 8. The support flange 14 is provided with an oblong hole 13 so that prior to fastening the support flange 14, the support flange 14 may be adjusted with regard to the screw shank's axis 7 in four  
15 degrees of freedom – by rotating and simultaneously shifting the support flange 14 with regard to the screw shank's axis 7. Fastening the support flange 14 is realised by screwing the screw shank 6 into the wall 1 by means of a hexagon socket 24 in the holding flange 8.

Moreover figure 1 shows that the support flange 14 presents a  
20 screwed flange 15 with a male thread 11, onto which a locating flange 10 is screwable with its assigned female thread 12. The locating flange 10 also presents a screwed flange 17, onto which male thread 16 a cone nut 21 is screwable by means of a suitable female thread.

25 The screwed flange's 17 side is at least provided with one boring 20 receiving the locknut setscrew 19.

A glass protection, that may be slipped on the locating flange's 10  
screwed flange 17, is referenced with 22 and 23 refers to a  
clamping ring slipping on the cone nut 21. After completed  
30 assembly, the glass protection 22 and the clamping ring 23 cover the bore hole 9 in the glass pane 3.

Figure 2 displays that while adjusting the glass pane 3, the locating flange 10 is only partially screwed onto the support flange's 14 screwed flange 15, resulting in the distance  $a$  between the support flange 14 and the locating flange 10. According to the representation in figure 2, after finishing the glass pane's 3 adjustment, a locknut setscrew 19 is firmly screwed against the screwed flange 15, so that finally the cone nut 21 may be screwed on with inserted clamping ring 23.

The cone nut 21 is mounted according to figures 3 and 4; while adjusting according to figure 3, the locating flange 10 is screwed as far as against the support flange 14, whereas in the other extreme position, according to figure 4 between those two components, the distance with reference  $a'$  is established.

The clamping fitting's assembly is explained hereinafter on the basis of figure 1:

First, the wall mounting with reference 2 is realised by screwing the clamp screw 4 by means of the hexagon socket 24 only so far into the wall that the support flange 14 may be dislocated with regard to the holding flange 8. Then, the locating flange 10 is screwed onto the support flange's 14 male thread 11 according to a rough estimation as of the true aligned position.

After partially screwing the locknut setscrew 19 and slipping on the glass protection 22, the glass pane 3 is put in place; by adjusting the support flange 14 with regard to the clamp screw's 4 screw shank 6, bore hole tolerances are compensated in the glass pane's 3 plane. After finishing compensation, the support flange 14 is solidly fastened to the wall 1 via the clamp screw 4. After adjusting different distances of the individual bore holes between the wall 1 and the glass pane 3 by turning the locating flange 10 with regard to the support flange 14, the locknut setscrew 19 is tightened against the screwed flange 15 (see figure 2), in order to

avoid the locating flange's 10 turning with the cone nut when placing the cone nut 21. After having placed the clamping ring 23 on the cone nut 21 according to figure 3 and 4, the latter may be screwed with the male threaded 16 screwed flange 17 of the  
5 locating flange 10.

It is obvious that operating the clamp screw 4 via the hexagon socket 24, as well as operating the locating flange 10 via the hexagon socket 18, may be realised through the bore hole in the glass pane 3. This means that adjusting the whole clamping fitting  
10 is realised in the glass pane's 3 plane as well as vertically with regard to it, that means changing the distance with regard to a wall or the kind is accomplished all through the bore hole 9 in the glass pane 3.

## References

- 1 Wall
- 2 Wall mounting
- 3 Glass pane
- 5 4 Clamp screw
- 5 Screw head
- 6 Screw shank
- 7 Screw shank axis
- 8 Holding flange
- 10 9 Bore hole in the glass pane
- 10 Locating flange
- 11 Support flange's male thread
- 12 Locating flange's female thread
- 13 Oblong hole
- 15 14 Support flange
- 15 Screwed flange
- 16 Locating flange's male thread
- 17 Locating flange's screwed flange
- 18 Locating flange's hexagon socket
- 20 19 Locknut setscrew
- 20 Bore hole in the screwed flange
- 21 Cone nut
- 22 Glass protection
- 23 Clamping ring
- 25 24 Holding flange's hexagon socket
- 25 Cone nut's female thread
- a Distance
- a' Distance



THIS SHEET HAS BEEN  
REPLACED

## Claims

- 1) Clamping fitting to attach glass panes with a clamp screw penetrating a bore hole in the glass pane, mountable with its screw shank in or at a carrier structure, which clamp screw presents a screw head and a screw shank realised as individual components, and whereby the screw head is fixable at a screw shank's support flange while displaceable vertically with regard to the screw shank's axis in four degrees of freedom, whereby the screw head moreover presents a female threaded cone nut arranged inside the bore hole in the glass pane according to patent DE 196 52 773, characterised in that the screw head (5) consists of a male threaded (16) support flange (14) sitting close to the carrier structure (wall 1 or the kind), of the cone nut (21) penetrating the glass pane's (3) bore hole (9) and of a locating flange (10) arranged between the support flange (14) and the cone nut (21) sitting close to the glass pane (3), which locating flange is screwable via a male thread (16) with the female threaded (25) cone nut (21) while fastening the glass pane (3), and in that the locating flange (10) is distance variably adjustable with regard to the support flange (14) via a female thread (12) corresponding to the male threaded (11) support flange (14)
- 2) Clamping fitting according to claim 1, characterised in that the support flange (14) presents an oblong hole (13) penetrated by the screw shank (6) and a male threaded (11) screwed flange (15).
- 3) Clamping fitting according to claims 1 and 2, characterised in that the locating flange (10) presents a male threaded (16) screwed flange (17) on its side opposite to the support flange (14).

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- 12 -

- 4) Clamping fitting according to claim 3, characterised in that the locating flange's (10) screwed flange (17) presents a hexagon socket (18) or the kind.
- 5) Clamping fitting according to one of the claims 1 to 4, characterised in that the screw shank's (6) holding flange (8) displays a hexagon socket (24) or the kind.
- 6) Clamping fitting according to claim 5, characterised in that the holding flange's (8) hexagon socket (24) has a smaller diameter compared to the hexagon socket (18) of the locating flange's (10) screwed flange (17).