

## **Device for Joining a Sliding Element with a Guide Device**

The present invention concerns a device in accordance with the introductory clause of patent claim 1.

5 To close openings of rooms, sliding doors are often used that are suspended from a carriage that is guided on a track. For this purpose, a device is provided that is attached to the sliding door and connected to the carriage via a connecting bolt. From EP 0 733 766 A2, such a device is known that consists of a mounting piece that is screwed to a sliding wooden door and is intended to accommodate a connecting bolt that is screwed into the carriage. The head of the connecting bolt, which is rotatably mounted in the opened  
10 mounting piece, can be fixed in place by means of a safety cover that closes the mounting piece. Opening the safety cover allows the connecting bolt of the mounting piece (and the sliding door) to be loosened or tightened, so that the height of the sliding door can be adjusted.

15 Sliding glass elements suspended from a carriage that is guided on a track generally require two mounting pieces that enclose a glass element and are screwed to one another in such a way that at least one threaded bolt passes through an opening in the glass element, by which means said element is retained through positive attachment to the bolt. By screwing together the two mounting pieces, which are drawn against the glass element located between them, a frictional attachment is generally also produced. Between the  
20 mounting pieces, for example in a U-shaped cutout in the glass element, is rotatably mounted a screw that can be connected with a carriage and by means of which the height of the glass element can be adjusted. In order to lock the connecting bolt in position, a lock nut is provided, which is provided [sic] above the mounting pieces and thus above the glass element (this location is marked with the "pos" arrow in fig. 1). If a lock nut is to be provided  
25 at the location shown, a relatively large distance must be selected between the track and the glass element and the mounting pieces. Moreover, protrusion of fasteners is also undesirable for aesthetic reasons and safety reasons.

In principle, a safety cover could be provided by which means the connecting bolt may be locked, as in the device in EP 0 733 766 A2, which is not intended for glass  
30 elements. However, doing so would result in greater expense in the manufacture and

installation of the device.

Therefore, the task of the present invention is to create a device that can be manufactured, installed and adjusted at low cost, by means of which a sliding element, especially a glass element, can be joined via an adjustable and lockable connecting bolt to a carriage that is guided on a track.

This task is achieved through the means given in patent claim 1. Advantageous embodiments of the invention are given in additional claims.

The device in accordance with the invention, which consists simply of two, preferably cast, mounting pieces, a connecting bolt, several assembly screws, and if necessary two covers, can be manufactured at low cost. The connecting bolt is retained between the two mounting pieces and locked by means of preferably two screws that are provided between the mounting pieces and need only be loosened a few turns for adjustment of the connecting bolt. The space between the glass element or the mounting pieces and the guide track can thus be as small as a few millimeters so that no trim piece is required. In addition, the required assembly screws and locking screws are preferably only accessible from one side of the device in accordance with the invention so that the other side of the device in accordance with the invention, advantageously facing outward, offers no access for (undesired) manipulations.

The invention is described in further detail below with the aid of a drawing by way of example. Shown in:

fig. 1 is a device 2 in accordance with the invention joined to a glass element 1 and a carriage 93, consisting of two mounting pieces 31, 41 that are joined together and a connecting bolt 6

fig. 2 is a rear mounting piece 31 with the partially locked connecting bolt 6,

fig. 3 is a front mounting piece 41,

fig. 4 is the rear mounting piece 31 mounted on the underside of the glass element 1 with a guide piece 97 guided in a groove 98,

fig. 5 is a glass element 1 ready for installation of the device 2 in accordance with the invention

fig. 6 is a cross-sectional view of the glass element 1 from fig. 5 with the device 2 in accordance with the invention in place,  
fig. 7 is an elastic liner 81,  
fig. 8 is the connecting bolt 6,  
5 fig. 9 is a rear mounting piece 31a with the unlocked connecting bolt 6 and  
fig. 10 is a front mounting piece 41a corresponding to the mounting piece 31a shown in fig. 9, which has a threaded hole 46a for a locking screw 53.

Fig. 1 shows a device 2 in accordance with the invention that is joined on one side with a glass element 1 and on the other side, via a connecting bolt 6, with a carriage 93 that is guided in a track 91 and has a carriage body 94 and two wheels 95 that roll along a running surface 92 of the guide track 91. The connecting bolt 6, which permits adjustment of the distance between the glass element 1 and the guide track 91, is screwed into a thread 96 provided in the carriage body 94. Also provided in the guide track 91 is a bracket 98 with a bumper 97 that serves to cushion the carriage. The bracket 98 carries a spring element 99 that holds the carriage 93 in place as soon as it [the carriage] comes in contact with the bumper 97.

Such carriages and associated tracks are known to the expert, for example from EP 0 733 766 A2 or EP 0 305 634 A1. However, implementation of the solution in accordance with the invention is also possible with other carriages known to the expert.

20 The device 2 in accordance with the invention, in an advantageous embodiment, consists of a rear mounting piece 31 shown in fig. 2 and a front mounting piece 41 shown in fig. 3, three assembly screws 54 and two locking screws 53 (see fig. 4) or 53a (see fig. 2) intended for locking the connecting bolt 6 that advantageously have a tapered screw head. The locking screw 53a shown in fig. 2 has a screw head that is cut in such a way that the connecting bolt 6 is exposed once during each rotation of the locking screws 53a. As a result, the element 1 provided with the rear mounting piece 31 can be installed more easily. For this purpose, the connecting bolt 6 is screwed into the thread 96 provided in the carriage body 94. In addition, the two locking screws 53a are turned until the cut surfaces of the screw heads face one another and the recess 37 is exposed to accommodate the locking element 61. Then the rear mounting piece 31 can be suspended from the connecting bolt 6 without removing the locking screws. In the same way, the connection between the

connecting bolt 6 and the mounting piece 31 can be released again.

Shown in fig. 1 is the front mounting piece 41, which is joined via the assembly screws 54 to the rear mounting piece 31. The head 62 of the connecting bolt 6 that is enclosed by the mounting pieces 31, 41 is accessible through an opening 49. The locking screws 53 (see fig. 2) are accessible through holes 46 [48?] so that the installed device 2 can be adjusted easily and without temporarily removing parts of the device. During the process, a screwdriver or wrench is inserted in the holes 46, after which the locking screws 53 and thus the connecting bolt 6 are loosened. Then a wrench is inserted in the opening 49, after which the connecting bolt 6 is adjusted. Finally, the locking screws 53 are tightened again.

The mounting pieces 31 and 41 are preferably designed in such a way that the rear mounting piece 31 serves to accommodate the connecting bolt 6 as well as to carry the glass element 1, which, as shown in fig. 5, has a hole 12 for accommodating a supporting axle 35 and a cutout 11 for accommodating the interlocking mounting pieces 31, 41. A slot 13 is advantageously provided between the hole 12 and the cutout 11 to relieve stresses. The rear mounting piece 31 shown in fig. 2 thus has an outer plate 32 on which are provided the axle 35 that is to be inserted in the hole 12 and an insert 33 to be fitted into the cutout 11, which together have three threaded holes 51 to accommodate the assembly screws 54.

Fig. 8 shows the connecting bolt 6, which has a bolt head 62 and a locking element 61, which for example takes the shape of a threaded nut, on the bolt shaft 63. The insert 33 has a channel 36 for the purpose of inserting the bolt shaft 63 that is bounded by channel walls 34 which advantageously extend beyond the insert 33 by approximately one half the diameter of the bolt 6. The channel 36, which has a depth of approximately half the diameter of the bolt 6, has a recess 37 to accommodate a locking element 61 (The bolt shaft 63 is thus accommodated practically completely by the channel 36 and the channel walls 34. Adjacent to the channel 36, the insert 33 has a trough 39 to accommodate the bolt head 62. Thereby is formed by the closed channel 36 and the channel walls 34 a collar 38 upon which rests the head 62 of the connecting bolt 6. Provided in the recess 37 on both sides of the locking element 61 are threaded holes 52 into which can be screwed the locking screws 53 or 53a until the locking element 61 is locked. As already described, the locking screw 53a shown in fig. 2 has a screw head that is cut in such a way that the connecting bolt 6 or the

locking element 61 attached to the connecting bolt 6 is exposed once during each rotation of the locking screws 53a.

5 The recess 37 provided in the insert 33 and the trough 39 are delimited on the bottom by the outer plate 32, which advantageously has no openings (holes, etc.) and thus affords no access to other parts of the device 2 in accordance with the invention. The outer plate 32 of the rear mounting piece 31 is preferably provided on the outdoor side 15 of the glass element 1, which prevents undesired opening of the sliding glass door from the outside by disassembly of the device 2 in accordance with the invention.

10 The rear mounting piece 31 shown in fig. 2 is, as shown in fig. 1, closed off by the front mounting piece 41 to be mounted on the indoor side of the glass element 1, which is described in greater detail with the aid of fig. 3. The front mounting piece 41 likewise has an outer plate 42 and an insert 43 to be fitted into the cutout 11 of the glass element 1, which are provided with three holes 45 through which pass the assembly screws 54. The insert 43 also has a recess 44 for accommodating the channel walls 34, as well as an opening 49 that  
15 passes through the outer plate 42 and is located above the trough 39 and offers access to the head 62 of the connecting bolt 6. In the recess 44 are provided two holes 46 through which a screwdriver can be inserted to the locking screws 53 or 53a. So that the locking screws 53 or 53a can be loosened adequately, recesses 47 are provided that are concentric to the holes 46 and into which the heads of the locking screws 53 or 53a can be turned. The  
20 size of the recess 44 is chosen such that its upper surface closes off the channel 36 or the channel walls 34 when the mounting pieces 31, 41 are joined, whereby the shaft 63 of the connecting bolt 6 is held with only slight clearance and the collar 38 is completed. All assembly elements (screws 6, 53 and 54) of the device 2 in accordance with the invention are thus accessible only on the indoor side 14 of the glass element 1.

25 Advantageously provided between the glass element 1 and the two mounting pieces 31, 41 are elastic liners 81 (the opening 82 permits the axle 35 to pass through), which prevent the assembled device 2 from transmitting stresses to the glass element 1.

30 Provision is made during the manufacture of glass element 1 for the diameter of hole 12 to be larger than the diameter of axle 35. So that the axle 35, which is provided to carry the glass element 1, is held tightly in the hole 12, either an eccentric 85 or preferably a peg

83 with a projection 84 is provided that is pressed into the opening 12 and the slot 13 and is subsequently provided with a hole concentric to the axle 35. The projection 84 prevents the peg 83 from rotating. As a pattern for the hole, the front mounting piece 41 can be used, for example.

5            Fig 6 shows a cross-section SS through the glass element 1 with installed mounting pieces 31, 41. It can be seen here that the inserts 33, 43 extend into the cutout 11 and the outer plates 32, 42 lie against the sides 15, 14 of the glass element 1, separated from it by the liners 81. The outer plates 31, 41 are advantageously provided with retaining grooves 48 into which the covers 7 can be slid.

10           The device 2 in accordance with the invention is thus of particular advantage because, among other things, the assembly screws and locking screws are accessible from one side only (normally from the inside of the locked room). For this reason, the axle 35 provided with a threaded hole 51 is also placed on the rear mounting piece 31. Likewise, the choice of design of the connecting bolt 6 and of placement of the channel 36, the channel walls 34 and the locking screws 53 is particularly advantageous. Additional designs of the device 2 in accordance with the invention are easily possible within the scope of expert action. For example, the number and placement of the assembly screws and locking screws 51, 54 or the design of the connecting element 6 or the locking element (lock nut) 61 could be changed as desired. In addition, the positions of the recess 37 and the trough 39 with the associated opening 49 could be exchanged, causing the lock nut 61 and bolt head 62 to exchange functions. Further design possibilities also exist with regard to the placement of the locking screws 53. In fig. 9 the insert 33a of a rear mounting piece 31a has a channel 36a with channel walls 34a, which surround a recess 37a in which no threaded holes are provided for locking screws. A threaded hole 46a for a preferably countersinking locking screw 53 is provided in the outer plate 42a of the front mounting piece 41a, as shown in fig. 10. Through the outer plate 43a, the locking screw 53 can be screwed into the recess 44a of the insert 43a [sic] until it contacts the locking element 61 and fixes it in place. The device shown in fig. 9 and fig. 10 is simple to manufacture. It is potentially of advantage, however, if the connecting bolt 6 can be fixed in place before the front mounting piece is installed.

30           The device 2 in accordance with the invention serves particularly for the hanging of glass elements. Of course the device 2 in accordance with the invention can also be installed

on panels of any desired type. The device 2 can also be used particularly advantageously for hanging thin metal or wooden panels. For this purpose, use of an elastic liner 81 is preferably omitted.

5       The device 2 in accordance with the invention is preferably used to join a sliding element 1 with a carriage 93 that is guided in a track 91 provided above the element 1. However, fig. 4 shows that the device 2 in accordance with the invention is also advantageously suited for joining the element 1 with a guide piece 93a that is guided in a bottom track or groove 91a provided on the ground. The guide piece 93a consists preferably of an internally threaded cylinder that is capable of sliding vertically in the channel 36 and into  
10       which is screwed the connecting bolt 6. The cylinder preferably has axially oriented corners that are guided along the channel walls 34 and thus prevent rotation of the cylinder within the channel 36. By turning the connecting bolt 6, the guide piece 93a can therefore be lowered in the bottom guide track 91a.

## PATENT CLAIMS

1. Device for connecting a sliding element (1), in particular a glass, metal or wooden panel, with a guide device (93; 93a) that is guided in a track (91; 91a) and has a first and a second mounting piece (31; 41) having outer plates (32; 42) which can be joined together via an axle (35) and having inserts (33; 43) that are fitted in a cutout (11) on the edge of the element (1) and connected with one another, whereby the two inserts (33; 43) enclose a connecting bolt (6) to be connected to the guide device (93; 93a) and having a bolt shaft (63) with a bolt head (62), a locking element (61) and a thread, wherein the insert (33) of the first mounting piece (31) has a channel (36) with channel walls (34) intended for accommodating the bolt shaft (63), a trough (39) intended for accommodating the bolt head (62), and a recess (37) intended for accommodating the locking element (61) that can be locked by means of a locking screw (53; 53a), and the insert (43) of the second mounting piece (41) has a recess (44) for accommodating the channel walls (34) as well as an opening (49) through which the bolt head (62) is accessible.
2. Device in accordance with claim 1, wherein the recess (37) in the first mounting piece (31) is provided with at least one threaded hole (52) for the locking screw (53; 53a) that is accessible through a corresponding hole (46) in the second mounting piece (41).
3. Device in accordance with claim 1, wherein is provided in the outer plate (42a) of the second mounting piece (41a) a threaded hole (46a) into which a preferably countersinking locking screw (53, 53a) can be screwed until it contacts the locking element (61).
4. Device in accordance with claim 1 or 2, wherein the depth of the channel (36) and the height of the channel walls (34) extending above the channel are together roughly equal to the diameter of the bolt shaft (63) of the connecting bolt (6).
5. Device in accordance with claim 4, wherein the axis (35) provided for carrying the element (1) that for this purpose is passed through a hole (12) in the element (1) is located on the outer plate (32) of the first mounting piece (31) and is provided with a threaded hole (51) into which can be screwed an assembly screw (54) that is passed through a hole (45) in the second mounting piece (41).



6. Device in accordance with claim 5, wherein is provided an eccentric (85) that has an opening (86) for accommodating the axis (35), or a hole insert (83) that is inserted in the hole (12), whereby a hole intended for accommodating the axle (35) and concentric to it is inserted in the hole insert (83).
- 5 7. Device in accordance with claim 6, wherein the hole insert (83) has a projection (84) that is inserted in a slot (13) in the element (1), which connects the hole (12) and the cutout (11) with one another.
8. Device in accordance with claim 5, 6 or 7, wherein provided in the second mounting piece (41) are additional holes (45) for assembly screws (54) that are screwed into threaded holes (51) provided in the insert (33) of the first mounting piece (31).
- 10 9. Device in accordance with one of claims 1 - 8, wherein the outer plate 32 of the first mounting piece (31), which preferably is located on the outdoor side (15) of the element (1), has no openings to permit the passage of screws or tools.
10. Device in accordance with one of claims 1 - 9, wherein the device is installed on the top or bottom of the element (1) and is connected with a carriage (93) or guide piece (93a) that is guided in a track (91; 91a).
- 15 11. Device in accordance with one of claims 1 - 10, wherein the locking screws (53a) have a screw head that is cut in such a way that the connecting bolt 6 is exposed at least once during each rotation of the locking screws (53a).

