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(54) **A HINGE ARRANGEMENT WITH A BLOCKING ARRANGEMENT**

(57) The present invention relates to a hinge arrangement (1), in particular a hidden hinge arrangement, comprising a first hinge member (2), a second hinge member (3) having an inner housing (33), and a hinge lever (35) connected in an articulated manner to a first hinge member (2) and comprising a mounting protrusion (351) protruded in a direction substantially perpendicular relative to the axis (A) of the hinge arrangement (1) into the inner housing (33), and provided with at least one mounting cutout (352) on the axially outer side thereof, and a blocking arrangement (6) mounting the blocking protrusion (351) of the hinge lever (35) in the internal housing (33) and comprising a first blocking member (61) embedded in the mounting cutout (352) of the blocking protrusion (351) and provided with a threaded opening (611) into which an adjusting screw (612) is screwed in, wherein the adjusting screw (612) is embedded in a rotational manner relative to an axis substantially perpendicular relative to the axis (A) of the hinge arrangement (1) and is provided with torque application means (613) accessible from the outer side of the second hinge member (3). To facilitate unblocking the blocking arrangement when the hinge lever (35) is inserted and blocked into the inner housing (33) said blocking arrangement (6) additionally comprises a rotary blocking shaft (63) embedded in the inner housing (33) in a rotational manner relative to an axis (B) substantially perpendicular relative to the axis (A) of the hinge arrangement (1), and provided with torque application means (633) accessible from the outer side of the second hinge member (3), and provided with at least one eccentric cam (634) which is mechanically coupleable to

the second blocking member (62) that is embedded moveably relative to an axis substantially parallel relative to the axis (A) of the hinge arrangement (1), in the inner housing (33) between the blocking shaft (63) and the blocking protrusion (332), and during a rotation thereof dislocates the second blocking member (62) to a blocked position of the blocking arrangement (6) in which the second blocking member (62) is pressed against the mounting protrusion (351) of the hinge lever (35).

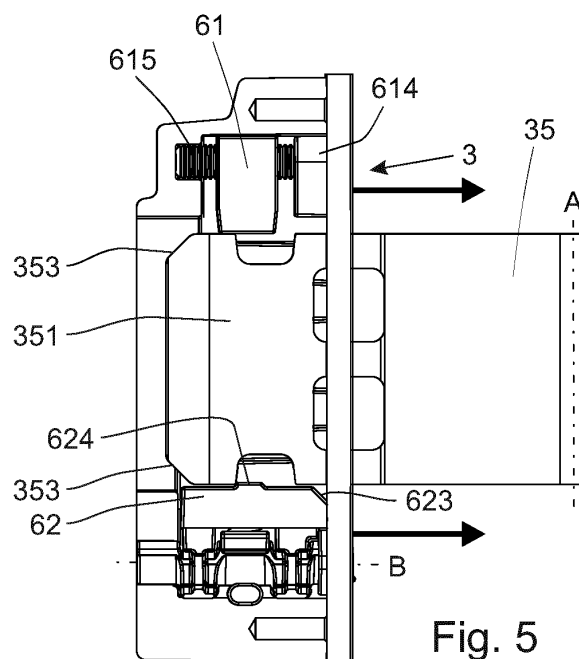


Fig. 5

Description

[0001] The present invention relates to a hinge arrangement, in particular a hidden hinge arrangement, comprising a first hinge member, a second hinge member having an inner housing, and a hinge lever connected in a hinged manner to a first hinge member and comprising a mounting protrusion protruded in a direction substantially perpendicular relative to the axis of the hinge arrangement into the inner housing, and provided with at least one mounting cutout on the axially outer side thereof, and a blocking arrangement mounting the blocking protrusion of the hinge lever in the internal housing and comprising a first blocking member embedded in the mounting cutout of the blocking protrusion and provided with a threaded opening into which an adjusting screw is screwed in, wherein the adjusting screw is embedded in a rotational manner relative to an axis substantially perpendicular relative to the axis of the hinge arrangement and is provided with torque application means accessible from the outer side of the second hinge member.

[0002] A large number of hinge arrangements with such a construction are known from the prior art. They are most often used for mounting door or window sashes made in a profile element technology in an articulated manner in frames also made in a profile element technology. In particular, such hinge arrangements are used for mounting inner or outer door sashes in an articulated manner.

[0003] An installation of such sashes in frames is often difficult, especially in a case of metal profiles with multi-chambered glazing units. In fact, a heavy sash must be supported by hand until hinge levers of all hinge arrangements used in a given connection are inserted and secured in their respective blocking arrangements.

[0004] EP3529440B1 discloses a hinge arrangement provided with a blocking arrangement with a clamping portion that is moved in a direction of an insertion of a mounting protrusion and pressed towards the first hinge member by a spring, and which comprises a guiding section and a clamping section protruded upwardly into a mounting cutout of the mounting protrusion, wherein during an insertion of the mounting protrusion, the clamping section cooperates with the free end of the mounting protrusion, and thus the clamping portion can move against the force of its spring, and when the mounting protrusion is fully inserted into its blocked position, the first blocking member engages with the mounting cutout of the mounting protrusion, the clamping portion returns to its original position and the clamping section rests against the mounting protrusion, whereby the hinge lever is fixed in its position.

[0005] The disadvantage of the known solutions consists in a difficulty of unblocking a blocking arrangement after inserting and blocking a hinge lever in an inner housing, if necessary.

[0006] The object of the present invention was to provide a hinge arrangement facilitating an installation of

door or window sashes and enabling a reliable blocking of such a sash in a frame with a possibility of its easy unblocking in order to detach it from the frame. Another object of the present invention was to provide a hinge arrangement enabling an easy adjustment of the position of a sash in relation to a frame after an installation of the sash.

[0007] The present invention provides a hinge arrangement of the kind mentioned in the outset which is characterized in that said blocking arrangement additionally comprises a rotary blocking shaft embedded in the inner housing in a rotational manner relative to an axis substantially perpendicular relative to the axis of the hinge arrangement, and provided with torque application means accessible from the outer side of the second hinge member, and provided with at least one eccentric cam which is mechanically coupleable to the second blocking member that is embedded moveably relative to an axis substantially parallel relative to the axis of the hinge arrangement, in the inner housing between the blocking shaft and the blocking protrusion, and during a rotation thereof dislocates the second blocking member to a blocked position of the blocking arrangement in which the second blocking member is pressed against the mounting protrusion of the hinge lever.

[0008] The blocking arrangement preferably comprises additionally a resilient element, preferably in a form of a compression spring, wherein the first end of the resilient element is rested against the second blocking member and the second end of the resilient element is rested against the blocking shaft.

[0009] In such a case a resisting plate is preferably arranged between the second end of the resilient element and the blocking shaft. Furthermore the blocking shaft is preferably provided with two eccentric cams, and the second blocking member is preferably provided with two positioning protrusions cooperating with the eccentric cams between which the resilient element is arranged.

[0010] The second blocking member is preferably provided with an activation wall having a surface which is non-parallel relative to the axis of the hinge arrangement for an engagement with the mounting protrusion.

[0011] The mounting protrusion preferably has an activation wall having a surface which is non-parallel relative to the axis of the hinge arrangement for an engagement with the second blocking member.

[0012] The second blocking member is preferably provided with a positioning protrusion which cooperates with the mounting cutout of the mounting protrusion.

[0013] The first hinge member has preferably a bracket connected to an inner yoke in which a hinge pin of the hinge lever is mounted.

[0014] The hinge arrangement of the present invention preferably comprises a vertical adjusting arrangement comprising a fixed adjusting bracket connectable to a frame or a sash in which an adjusting screw is embedded parallel relative to the axis of the hinge arrangement and contacts the first or second hinge member.

[0015] The first hinge member is preferably connectable to a frame, and the second hinge member is preferably connectable to a window or door sash.

[0016] The first blocking member is preferably provided with at least one wedging wall having a surface tilted away from the axis of the hinge arrangement, which cooperates with a corresponding wedging wall of the mounting cutout of the hinge lever.

[0017] The invention shall be described and explained below in reference to its preferred embodiments and in connection with the attached drawings wherein:

Fig. 1 shows an axonometric view of an embodiment of the hinge arrangement in a state after blocking and mounting a hinge lever in a blocking arrangement in an open position together with fragments of profiles of a frame and a sash;

Fig. 2 shows the first hinge member of the hinge arrangement in an axonometric exploded view;

Fig. 3 shows the second hinge member of Fig. 1 in an axonometric exploded view;

Fig. 4 shows a blocking arrangement of the hinge arrangement of Fig. 1 in a sectional view wherein the longitudinal section is made along the plane of the sash before inserting the hinge lever;

Fig. 5 shows the blocking arrangement of the hinge arrangement of Fig. 1 in a sectional view wherein the longitudinal section is made along the plane of the sash after inserting the hinge lever,

Fig. 6 shows the blocking arrangement of the hinge arrangement of Fig. 1 in a sectional view wherein the longitudinal section is made along the plane of the sash after blocking the hinge lever; and

Fig. 7 shows the hinge arrangement of Fig. 1 in a sectional view wherein the cross section is made along the plane perpendicular relative to the axis of the hinge arrangement.

[0018] Fig. 1 shows one of several hinge arrangements 1 which in the presented embodiment are used for mounting a sash 5 of an office door (not shown in the figures) in a frame 4. The hinge arrangement 1 comprises a first hinge member 2 connected in an articulated manner to a second hinge member 3. In this embodiment, the hinge members 2 and 3 have been mounted in appropriate openings formed in multi-material profiles of the frame 4 and the sash 5, in which unitary or multi-chambered panes or elements made of tempered glass, plastic, wood, etc. may be arranged.

[0019] In this embodiment, the frame 4 is comprised on first aluminum box profile 41 and a second aluminum box profile 42, which are connected to each other by means of two longitudinal shaped thermal insulation ribs 43 made of plastic. The sash 5 has in the presented embodiment an analogous structure comprising a first aluminum box profile 51 and a second aluminum box profile 52 connected to each other by means of two longitudinal shaped thermal insulation ribs 53.

[0020] The first hinge member 2, as illustrated in detail in Fig. 2, comprises a bracket 21 fixed in an opening of the frame 4 profile by means of mounting screws 22 passing through its four longitudinal mounting openings 27, oriented in parallel relative to the axis of the hinge arrangement 1, and screwed into spacer sleeves that are not shown in the figures. The bracket 21 is connected to an inner yoke 23. A cylindrical hinge pin 24 defining the axis A of the hinge arrangement 1 passes through an opening in the inner yoke 23, a spacer 241, a hinge sleeve 242 made of plastic, a shaped hinge lever 35 of the second hinge member 3, an opposite hinge sleeve 242, a spacer 241, and an opposite opening in the inner yoke 23. Walls of the hinge lever 35, which are perpendicular relative to the hinge pin 24, are almost in contact with the walls of the inner yoke 23. They are separated only by the spacers 241 and flanges of the hinge sleeves 242 with a total thickness of about 4 mm. Additionally the inner yoke 23 is provided with two threaded openings 231 oriented substantially parallel relative to the plane of the frame, wherein blocking screws 232 are passed through the openings, provided with a torque application socket and apt to block the position of the hinge pin 24 in the inner yoke 23.

[0021] Two self-supporting adjusting brackets 284 are mounted by means of mounting screws 22 under and above the bracket 21, wherein the adjusting brackets together with resisting plates 285 and adjusting screws 282 form vertical adjusting arrangements 28. In the embodiment shown in Fig. 2, two self-supporting adjusting brackets 284 are used. In the embodiment of Fig. 1, there is an upper self-supporting adjusting bracket 284 and a lower fixed adjusting bracket 281 attached to the first aluminum box profile 41 by mounting screws 283.

[0022] The second hinge member 3, as illustrated in detail in Fig. 3, also comprises a bracket 31. The bracket 31 is fixed in the opening of the sash 5 profile by means of mounting screws 32 passing through its four longitudinal mounting openings 38, oriented perpendicularly relative to the axis A of the hinge arrangement 1, and screwed in into spacer sleeves not shown in the figures. The bracket 31 is connected to the inner housing 33 by means of mounting screws 34 screwed in into threaded openings 331 formed in the inner housing 33.

[0023] Between the bracket 31 and the sash 5 there are arranged two shaped elements 36 which together with the bracket 31 form horizontal adjusting arrangements. In this embodiment, each shaped element 36 is provided with two threaded adjusting protrusions 361 into which adjusting screws 37 are screwed in and provided with torque application means 371 in the form of Allen sockets. The bracket 31 is provided with two adjusting slots 311, and adjusting protrusions 361 of the shaped elements 36 are located in the adjusting slots 311 after attaching the bracket 31 to the sash 5.

[0024] Each adjusting slot 311 ends with resisting surfaces 312 against which the ends of a given adjusting screw 37 are rested. Adjusting openings 313 are formed

in the resisting surfaces and provide an access to torque application means 371 in a form of a socket for an appropriate tool.

[0025] A blocking arrangement 6 is arranged in the inner housing 33 of the second hinge member 3 for mounting the hinge lever 35.

[0026] The blocking arrangement 6 as illustrated in detail in Figs. 3-7 comprises a first blocking member 61 and a second blocking member 62. The hinge lever 35 is provided with a flat mounting protrusion 351 that can be inserted through an access slot 314 formed in the bracket 31 into the inner housing 33, and is provided with two mounting cutouts 352 on the axially outer sides thereof.

[0027] In this embodiment, the first blocking member 61 is in the form of a monolithic block and, after an insertion of the blocking protrusion 351 into the inner housing 33, the first blocking member 61 is embedded in the first upper mounting cutout 352 of the mounting protrusion 351 of the hinge lever 35. The first blocking member 61 is provided with a threaded opening 611, into which the adjusting screw 612 is screwed in. The adjusting screw 612 is embedded in a rotational manner in an inner seat 615 defined in the inner housing 33 and in an outer seat 614 defined in the bracket 31. The adjusting screw 612 has torque application means 613, which in this embodiment are in the form of Allen socket and are accessible from the outer side of the bracket 31 through the adjusting hole 39. Rotation of the adjusting screw 612 results in a dislocation of the first blocking member 61, and thus enables an adjustment of the hinge arrangement 1.

[0028] Moreover, the first blocking member 61 is provided with two wedging walls 616 provided with surfaces tilted away from the axis A of the hinge arrangement 1 and forming a trapezoidal tip in the plane of the sash 5. The wedging walls cooperate with the corresponding wedging walls 3521 of the mounting cutout 352 of the hinge lever 35, as shall be described below.

[0029] The second blocking member 62 has a form of a monolithic block provided with two positioning protrusions 621. A blocking shaft 63 is mounted in a rotatable manner in the inner seat 631 defined in the inner housing 33 and in the outer seat 632 defined in the bracket 31, and is rotatable about the axis B and has torque application means 633, which in this embodiment have the form of an Allen socket and are accessible from the outer side of the bracket 31. The blocking shaft 63 is provided with two cylindrical eccentric cams 634 with the axis C which is equidistant from the axis B, wherein an intermediary seat 635 is located between the cams 634. The eccentric cams 634 cooperate with the positioning protrusions 621 of the second blocking member 62, as it shall be explained below in the further part in the description. A resilient element in the form of a compression spring 64 is arranged between the positioning protrusions 621, wherein the first end of the resilient element is embedded in the seat 622 of the second blocking member 62 and the other end of the resilient element is embedded in the seat 651 of the resisting plate 65 adjacent to the

blocking shaft 63 between the eccentric cams 634. The compression spring 64 pushes the second blocking member 62 toward the blocking protrusions 332 of the inner housing 33.

[0030] An installation of the sash 5 in the frame 4 which is embedded and fixed in any known manner in an appropriate door or window opening is illustrated in Figs. 4-6. In the first step, the first hinge members 2 are mounted by means of screws 22 in the corresponding openings of the frame 4 profiles, and the second hinge members 3 are mounted by means of screws 32 in the corresponding openings of the sash 32 profiles. However, the screws 22 and 32 are not completely screwed in to ensure a possibility of an adjustment of the hinge arrangement 1 after mounting the sash 5.

[0031] As shown in Fig. 4, the blocking arrangement 6 is in an unblocked position in which the eccentric cams 634 of the blocking shaft 63 are in the lower position. In this configuration, the second blocking member 62 is free to slide between the blocking protrusions 332 of the inner housing 33 and the eccentric cams 634.

[0032] As shown in Figure 5, the installer has lifted the sash 5 with the second hinge members 3 and subsequently slides the mounting protrusions 351 of the hinge levers 35 through the access slots 314 in the brackets 31 into the inner housings 33 as indicated by arrows. The first blocking members 61 slide over the top walls of the blocking protrusions 351 until they take stable positions in the blocking cutouts 352. At the beginning of this dislocation, the chamfered activation walls 353 of the blocking protrusions 351 are rested against the chamfered activation walls 623 of the second blocking members 62, thus generating a vertical component the force that has caused the second blocking members 62 to move downwardly against the slight pressure of the compression springs 64. Achievement of the proper dislocation of the mounting protrusions 351 shall be audibly indicated to an installer when the positioning protrusions 624 of the second blocking members 62 are pushed out by means of the compression springs 64 into the lower mounting cutouts 352. When the first blocking members 61 shall fall down into the mounting cutouts 352 then the wedging walls 616 shall be rested against the wedging walls 3521 of the mounting cutouts 352 of the hinge lever 35, thus wedging the blocking members 61 in the mounting cutouts 352 and ensuring an elimination of any assembly and technological play as well as the stiffness of the created connection. In this position, the sash 5 shall be stably mounted in the frame 4 in a result of the action of entropic gravity, and the sash 5 shall have to be first unloaded in order to dismount it.

[0033] Fig. 6 shows the blocking arrangement 6 in the blocked position. In order to obtain this position, the installer inserts an Allen key to the socket 633 of the blocking shaft 63, turns the key by 180 degrees so that the eccentric cams 634 are in the upper position resting against the positioning protrusions 621 of the second blocking member 62. In this position, the second blocking

member 62 presses against the mounting protrusion 351 and is stationary mounted. A rotation of the eccentric cams 634 is enabled by guiding cutouts 636 formed in the inner housing 33.

[0034] The hinge arrangement 1 according to the present invention also enable to adjust the position of the sash 5 in relation to the frame 4 in an easy manner after an installation of the sash 5.

[0035] Vertical adjustment is possible by means of the vertical adjusting arrangement 28 of the first hinge member 2, which comprises adjusting brackets 281, 284 attached to the frame 4, in which adjusting bolts 282 are embedded parallel relative to the axis A of the hinge arrangement resting against the resisting surfaces 211 of the brackets 21. After loosening the mounting screws 22 of all brackets 21 attached to the frame 4, the sash 5 shall rest on the uppermost adjusting screw 282 under an influence of its weight. Screwing in or out the adjusting screw 282 up or down on the adjusting bracket 281 either pushes the bracket 21 and the entire sash 5 upwards or allows it to fall downwards by gravity.

[0036] A horizontal adjustment is possible by means of the adjusting screws 37 embedded in the adjusting slots 311 of the brackets 31 perpendicularly relative to the axis A of the hinge arrangement. Screwing in or out the adjusting screw 37 exerts a pressure on the resisting surface 312 of a given bracket 31, and thus causes a corresponding displacement of the bracket 31 relative to the stationary shaped element 36.

[0037] An adjustment of the hinge arrangement around the axis perpendicular to the plane of the sash 5 is possible by means of the adjusting screw 612 of the given hinge arrangement 1, the rotation of which causes a displacement of the first blocking member 61 in the mounting cutout 352 of the mounting protrusion 351 of the hinge lever 35, and thus a deflection of the axis A of the given hinge pin 24 from the vertical direction.

[0038] In order to better illustrate the present invention the figures are not necessarily to scale and some features may be exaggerated or minimized. The above embodiments of the present invention are therefore merely exemplary. These and other factors however should not be considered as limiting the spirit of the invention, the intended scope of protection of which is indicated in appended claims.

List of reference numerals

[0039]

1. hinge arrangement
2. first hinge member
 21. bracket
 211. resisting surface
 22. mounting screw
 23. inner yoke
 231. threaded opening
 232. blocking screw

24. hinge pin
241. spacer
242. hinge sleeve
27. longitudinal mounting opening
28. vertical adjusting arrangement
281. fixed adjusting bracket
282. adjusting screw
283. mounting screw
284. self-supporting bracket
285. resisting plate
3. second hinge member
 31. bracket
 311. adjusting slot
 312. resisting surface
 313. adjusting opening
 314. access gap
 32. mounting screw
 33. outer housing
 331. threaded opening
 332. mounting cutout
 34. mounting screw
 35. hinge lever
 351. mounting protrusion
 352. mounting cutout
 3521. wedging wall
 353. activation wall
 36. shaped element
 361. threaded adjusting protrusion
 37. adjusting screw
 371. torque application means
 38. longitudinal mounting opening
 39. adjusting opening
4. frame
 41. first box profile
 42. second box profile
 43. thermal insulation rib
5. sash
 51. first box profile
 52. second box profile
 53. thermal insulation rib
6. blocking arrangement
 61. first blocking member
 611. threaded opening
 612. adjusting screw
 613. torque application means
 614. outer seat (of the adjusting screw)
 615. inner seat (of the adjusting screw)
 616. wedging wall
 62. second blocking member
 621. positioning protrusion
 622. seat of the resilient element
 623. activation wall
 624. positioning protrusion
 63. blocking shaft
 631. inner seat
 632. outer seat
 633. torque application means
 634. eccentric cam

635. intermediary seat
 636. guiding cutout
 64. resilient element
 65. resisting plate
 651. seat of the resilient element

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Claims

1. A hinge arrangement (1), in particular a hidden hinge arrangement, comprising a first hinge member (2),

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a second hinge member (3) having an inner housing (33), and a hinge lever (35) connected in an articulated manner to a first hinge member (2) and comprising a mounting protrusion (351) protruded in a direction substantially perpendicular relative to the axis (A) of the hinge arrangement (1) into the inner housing (33), and provided with at least one mounting cutout (352) on the axially outer side thereof, and

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a blocking arrangement (6) mounting the blocking protrusion (351) of the hinge lever (35) in the internal housing (33) and comprising a first blocking member (61) embedded in the mounting cutout (352) of the blocking protrusion (351) and provided with a threaded opening (611) into which an adjusting screw (612) is screwed in, wherein the adjusting screw (612) is embedded in a rotational manner relative to an axis substantially perpendicular relative to the axis (A) of the hinge arrangement (1) and is provided with torque application means (613) accessible from the outer side of the second hinge member (3),

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characterized in that said blocking arrangement (6) additionally comprises

a rotary blocking shaft (63) embedded in the inner housing (33) in a rotational manner relative to an axis (B) substantially perpendicular relative to the axis (A) of the hinge arrangement (1), and provided with torque application means (633) accessible from the outer side of the second hinge member (3), and provided with at least one eccentric cam (634) which is mechanically coupleable to the second blocking member (62) that is embedded moveably relative to an axis substantially parallel relative to the axis (A) of the hinge arrangement (1), in the inner housing (33) between the blocking shaft (63) and the blocking protrusion (332), and during a rotation thereof dislocates the second blocking member (62) to a blocked position of the blocking arrangement (6) in which the second blocking member (62) is pressed against the mounting protrusion (351) of the hinge lever (35).

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2. A hinge arrangement according to Claim 1, **characterized in that**

terized in that the blocking arrangement (6) comprises additionally a resilient element (64), preferably in a form of a compression spring, wherein the first end of the resilient element (64) is rested against the second blocking member (62) and the second end of the resilient element (64) is rested against the blocking shaft (63).

3. A hinge arrangement according to Claim 2, **characterized in that** a resisting plate (65) is arranged between the second end of the resilient element (64) and the blocking shaft (63).

4. A hinge arrangement according to Claim 2 or 3, **characterized in that** the blocking shaft (63) is provided with two eccentric cams (634), and the second blocking member (62) is provided with two positioning protrusions (621) cooperating with the eccentric cams (634) between which the resilient element (64) is arranged.

5. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the second blocking member (62) is provided with an activation wall (623) having a surface which is non-parallel relative to the axis (A) of the hinge arrangement (1) for an engagement with the mounting protrusion (351).

6. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the mounting protrusion (351) has an activation wall (353) having a surface which is non-parallel relative to the axis (A) of the hinge arrangement (1) for an engagement with the second blocking member (62).

7. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the second blocking member (62) is provided with a positioning protrusion (624) which cooperates with the mounting cutout (352) of the mounting protrusion (351).

8. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the first hinge member (2) has a bracket (21) connected to an inner yoke (23) in which a hinge pin (24) of the hinge lever (35) is mounted.

9. A hinge arrangement according to any one of the preceding Claims, **characterized in that** it comprises a vertical adjusting arrangement (28) comprising a fixed adjusting bracket (281, 284) connectable to a frame (4) or a sash (5) in which an adjusting screw (282) is embedded parallel relative to the axis (A) of the hinge arrangement (1) and contacts the first or second hinge member (2, 3).

10. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the first

hinge member (2) is connectable to a frame (4), and the second hinge member (3) is connectable to a window or door sash (5).

11. A hinge arrangement according to any one of the preceding Claims, **characterized in that** the first blocking member (61) is provided with at least one wedging wall (616) having a surface tilted away from the axis (A) of the hinge arrangement (1), which co-operates with a corresponding wedging wall (3521) of the mounting cutout (352) of the hinge lever (35).

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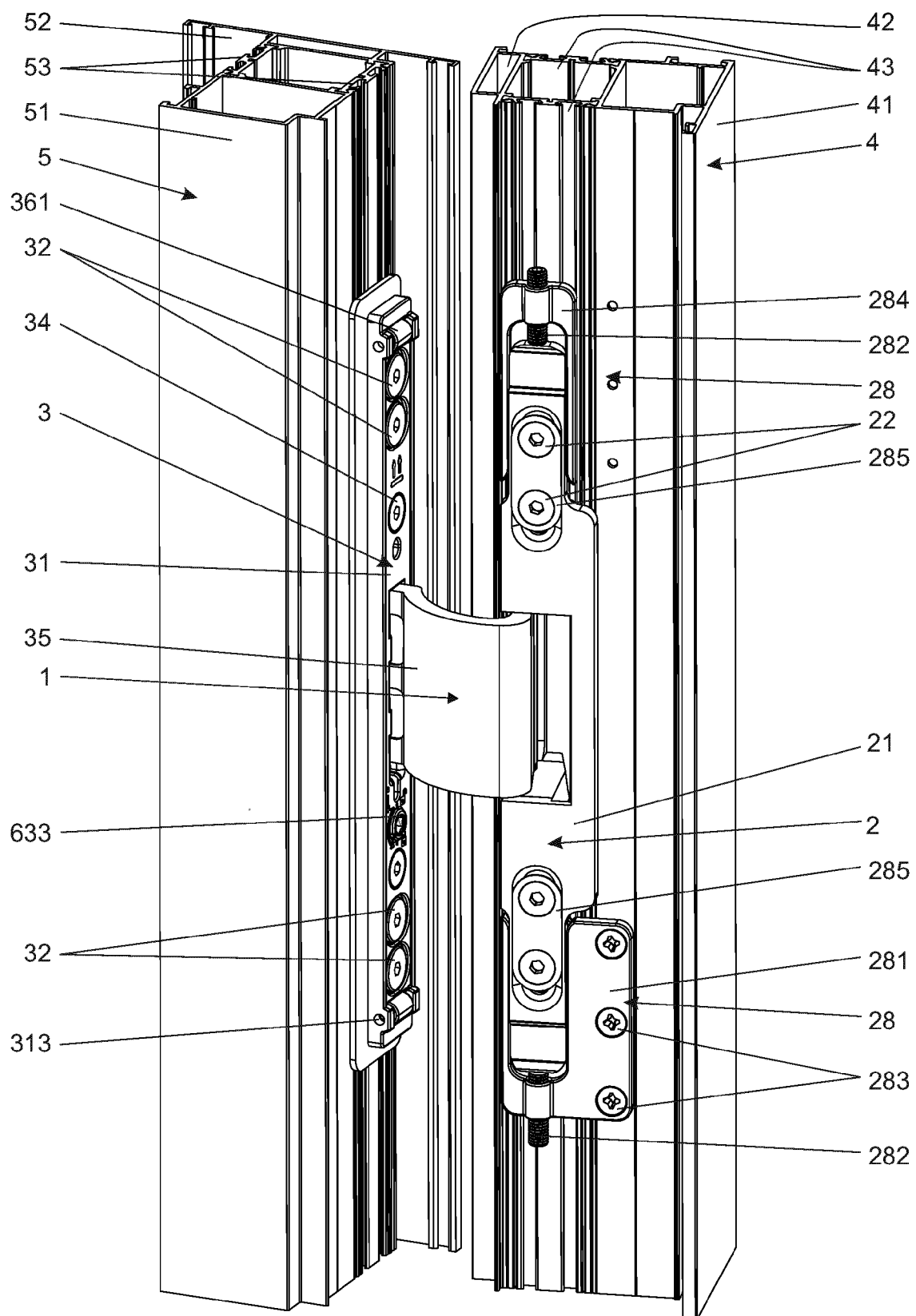


Fig. 1

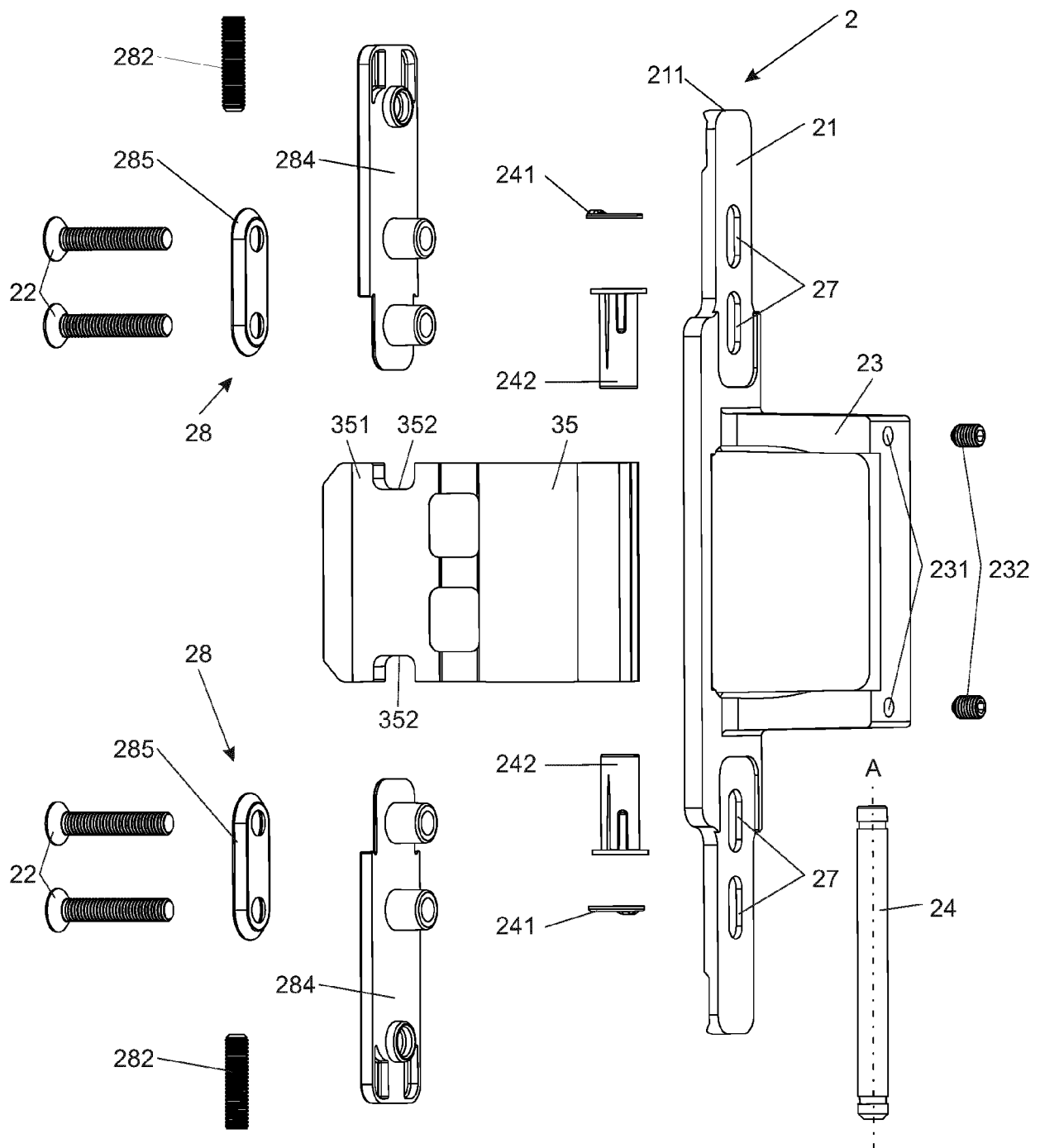


Fig. 2

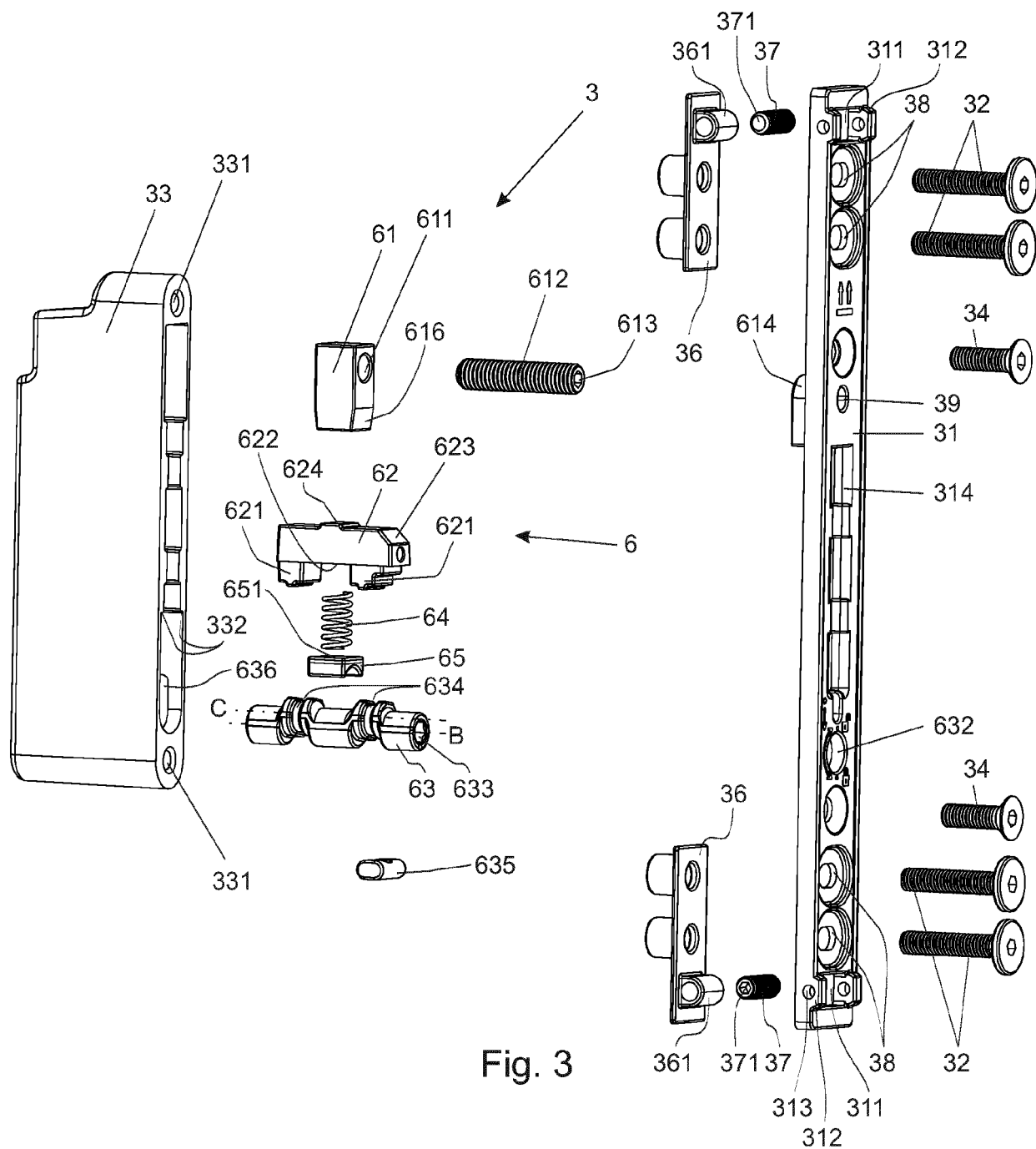


Fig. 3

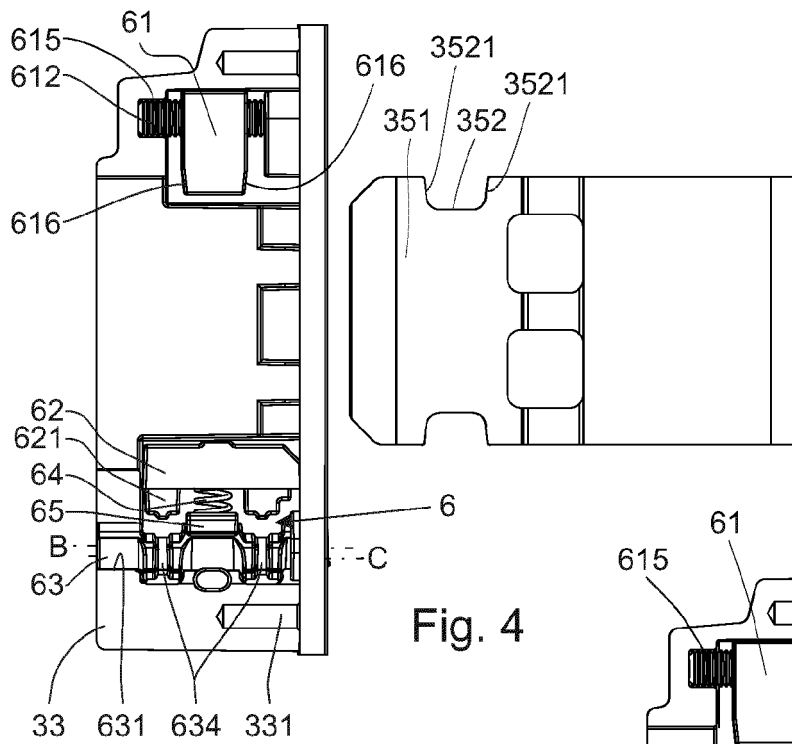


Fig. 4

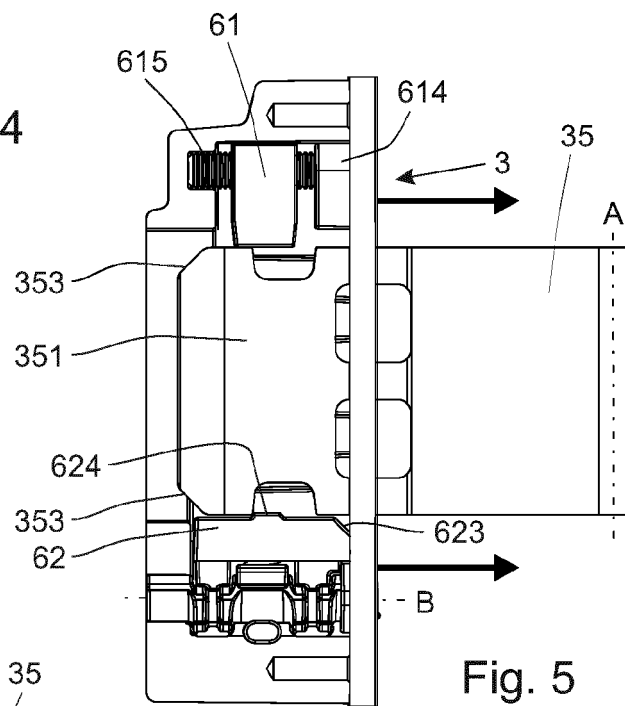


Fig. 5

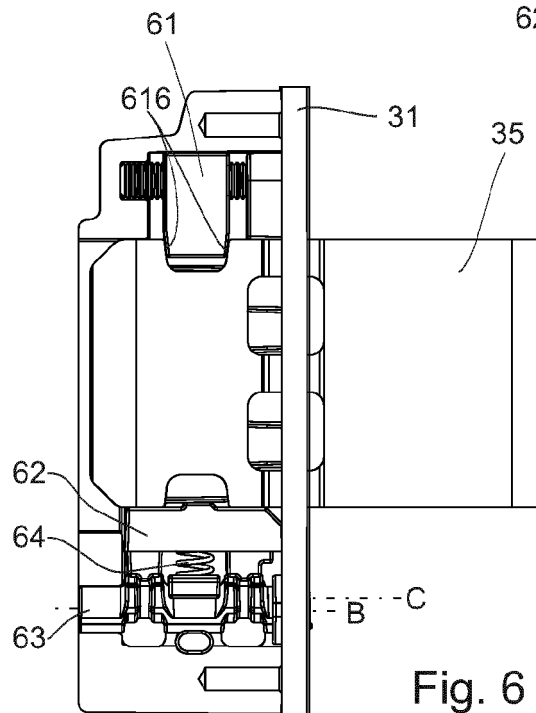
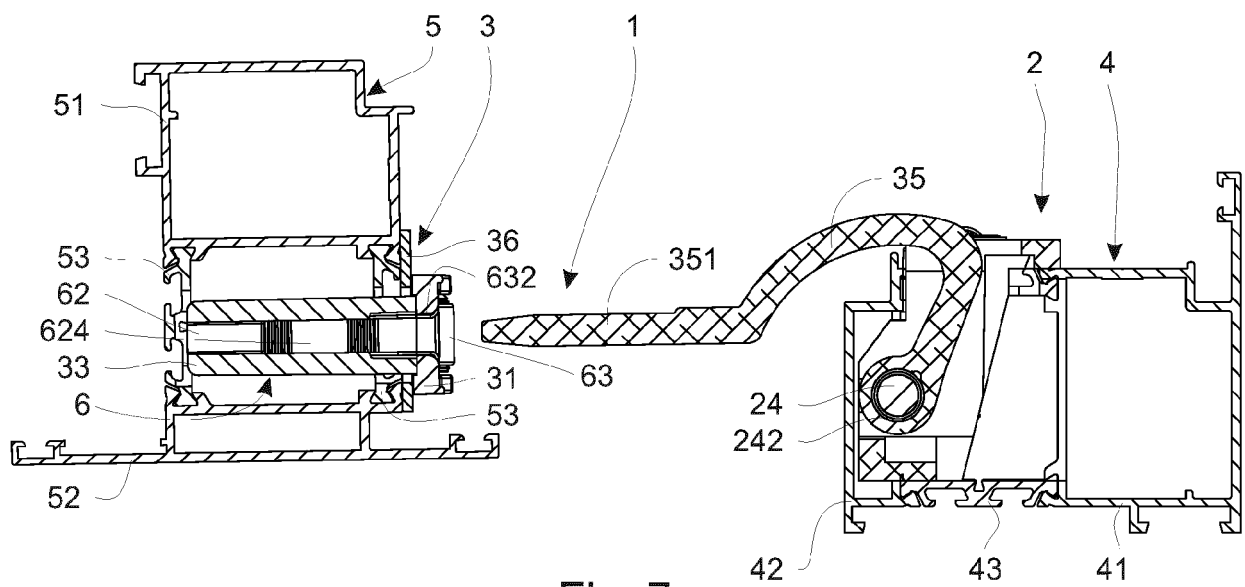


Fig. 6





EUROPEAN SEARCH REPORT

Application Number

EP 23 16 2010

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	* figures 1-9 *	2-4, 7, 9	

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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 August 2023	Examiner Berote, Marc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 16 2010

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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