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(54) **A HINGE ARRANGEMENT, IN PARTICULAR A HIDDEN HINGE ARRANGEMENT**

(57) The present invention relates to a hinge arrangement (1), preferably a hidden hinge arrangement, comprising a first hinge member (2) connected in a hinged manner to a second hinge member (3) provided with a hinge lever (35) and a clamping member (33) with a slot (331) into which said hinge lever (35) is inserted in the direction substantially perpendicular relative to the axis (A) of the hinge arrangement (1), and mounting means (335) for mounting said hinge lever (35) in the clamping member (33) of the second hinge member (3). In order to enable an ease adjustment of a sash (5) position relative to a frame (4) after fastening the sash (5), the clamping member (33) has at least one recess (334) open on the side of the hinge lever (35) insertion, and the hinge lever (35) has at least one locking projection (353) located in said recess (334) of the clamping member (33), wherein the second hinge member (3) has additionally at least one locking member (34) provided with a retaining surface (342) for said locking projection (353) of the hinge lever (35), and the locking element (34) and/or the clamping member (33) is/are provided with locking means (344, 336) blocking a displacement of the locking element (34) along the direction of the hinge lever (35) insertion.

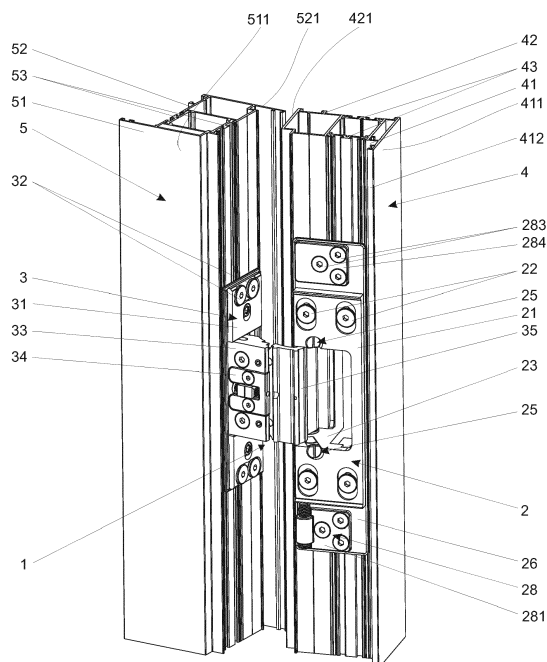


Fig. 1

Description

[0001] The present invention relates to a hinge arrangement, in particular a hidden hinge arrangement, comprising a first hinge member connected in a hinged manner to a second hinge member provided with a hinge lever and a clamping member with a slot into which said hinge lever is inserted in the direction substantially perpendicular relative to the axis of the hinge arrangement, and mounting means for mounting said hinge lever in the clamping member of the second hinge member.

Background of the Invention

[0002] A great number of hinge arrangements is known from the prior art. Hinge arrangements are most often used for mounting door sashes or window sashes produced in a profile design technology in a hinged manner in the frames also of a profile design. In particular such hinge arrangements are used for mounting in a hinged manner internal or external door sashes, in particular on escape routes.

[0003] An installation of such sashes in frames is often difficult, in particular in a case of metal profiles with multi-chamber glass panes, because usually a heavy sash has to be held in hands before hinge levers of all hinge arrangements employed in a given connection are inserted and fastened in corresponding clamping members.

[0004] Patent publication EP1223276 discloses a hinge arrangement for doors, windows and similar door/window joinery, in which at least one hinge member is provided with a hinge lever having a tongue cooperating with a slot in a hinge member. The slot is open at the top and at the bottom and has an area of an increased diameter provided with a thread, which area may be closed by screws. The tongue of the hinge lever may be vertically adjusted within the slot.

[0005] An object of the present invention has been to provide a hinge arrangement facilitating an installation of door or window sashes. A further object of the present invention has been to provide a hinge arrangement enabling for an ease adjustment of a sash position relative to a frame after fastening the sash.

Summary of the Invention

[0006] According to the present invention there is provided a hinge arrangement of the kind mentioned in the outset which is characterized in that the clamping member has at least one recess open on the side of the hinge lever insertion, and the hinge lever has at least one locking projection located in said recess of the clamping member, wherein said second hinge member has additionally at least one locking member provided with a retaining surface for said locking projection of the clamping member, and the locking element and/or the clamping member is/are provided with locking means blocking a displacement of the locking element along the direction

of the hinge lever insertion.

[0007] Said locking means have preferably a form of recessions or projections of the locking element cooperating with corresponding projections or recessions of the clamping member. Such a solution ensures constructional simplicity.

[0008] Said clamping member has preferably a recess matched to the shape of the locking element. This recess enables for hiding the locking element within the clamping member, and the surface of the locking element may lay flush to the surface of the clamping member.

[0009] Said locking member has preferably a form of a C-shaped locking plate provided with two arms wherein said retaining surface is located between the arms.

[0010] Preferably the width of the recess of the clamping member along the direction perpendicular relative to the axis of the hinge arrangement is greater than the width of the locking projection of the hinge lever. Such a solution enables for displacing hinge levers in clamping members to a limited extent, for example in order to take out from a door sash supporting elements used for displacing the door sash.

[0011] Preferably in the vicinity of at least one hinge lever surface perpendicular relative to the axis of the hinge bolt a locking arrangement is located, said locking arrangement comprising at least one rotatable element situated in a bore chamber oriented substantially perpendicularly relative to the axis of the hinge bolt, the rotation thereof enabling for blocking a hinged movement of the hinge lever on the hinge bolt.

[0012] The locking arrangement enables for a vertical adjustment of the sash on only one hinge arrangement of a given set of frame and sash, what constitutes a significant facilitation for assembly technicians because it is not necessary to relieve the whole door sash and a necessity of a concurrent regulation of each hinge arrangement does not exist.

[0013] The first hinge member preferably comprises a bracket under which a vertical adjustment arrangement is located comprising a stationary adjusting bracket in which an adjusting screw is installed oriented in parallel relative to the axis of the hinge arrangement and abutted with the bracket.

[0014] In such embodiments, it is further preferable that said bracket is mounted on a slide underlay, preferably made of a plastic. Plastic underlays of this type facilitate a displacement of the bracket, and form an additional thermal insulation and cover any mechanical workings carried out for purposes of a settlement thereof.

[0015] The locking projection of the hinge lever is preferably provided with an adjusting screw installed rotationally and substantially perpendicularly relative to the axis of the hinge arrangement between the retaining surface of the locking element and the retaining surface of the clamping member.

[0016] In such embodiments, it is further preferable that the locking projection and the locking member are provided with indicators of the mutual positioning of these

elements.

[0017] Said first hinge member is preferably fastened to a frame, and the second hinge member is fastened to a sash of door or window.

Brief description of drawings

[0018] 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 a hinge arrangement according to the present invention after its assemblage and in an opened position together with fragments of profiles of a frame and a sash;

Fig. 2 shows the embodiment of a hinge arrangement before its assemblage respectively as seen in the direction parallel to the plane surface of the frame (Fig. 2b) and in a cross-sectional view in the plane surface B-B from Fig. 2b (Fig. 2a);

Fig. 3 shows the embodiment of the hinge arrangement after its assemblage in an opened position respectively as seen in the direction parallel to the plane surface of the frame (Fig. 3b) and in a cross-sectional view in the plane surface B-B from Fig. 3b (Fig. 3a);

Fig. 4 shows the embodiment of the hinge arrangement after its assemblage in a closed position and in a cross-sectional view in the plane surface B-B from Fig. 3b;

Fig. 5 shows essential mounting elements of the embodiment of the hinge arrangement depicted in Figs. 1-3 before its assemblage and in an axonometric view;

Fig. 6 shows essential mounting elements of a further embodiment of a hinge arrangement of the present invention before its assemblage and in an axonometric view; and

Fig. 7 shows an embodiment of the bracket of the first hinge member.

[0019] Fig. 1 shows an embodiment of a hinge arrangement 1, which in this example serves for mounting a sash 5 (of an office door not shown in the drawing) in a frame 4. The hinge arrangement 1 comprises a first hinge member 2 connected in a hinged manner with a second hinge member 3. In this example the hinge members 2 and 3 are fixed in appropriate multi-material profiles of the frame 4 and the sash 5, in which uniform integral panels or multi-chamber panes (not shown in the drawing) made of tempered glass, plastic material, wood, etc. may be installed.

[0020] In this embodiment, the frame profile 4 comprises a first aluminium box profile 41 and a second aluminium box profile 42 that are connected with each other by means of two longitudinal profiled heat-insulating ribs 43 made of a plastic. In this example the profile of the sash

5 has an analogical construction comprising a first aluminium box profile 51 and a second aluminium box profile 52 that are connected with each other by means of two longitudinal heat-insulating ribs 53.

[0021] The first hinge member 2 comprises a bracket 21 depicted in detail in Fig. 7. The bracket 21 is fastened in an opening of a profile of the frame 4 by means of screws 22 running through four longitudinal mounting openings 27 and screwed into appropriate spacing sleeves not shown in the drawing. The bracket 21 is in turn connected to an internal yoke 23 to which a bolt 24 is fastened in the vicinity of the external surface 421 of the second box profile 42. A profiled hinge lever 35 of the second hinge member 3 is mounted in a hinged manner on the bolt 24.

[0022] An underlay 26 made of a plastic is located between the bracket 21 and the frame 4. Brackets 281 and 284 are mounted by means of mounting screws 283 respectively below and under the bracket 21, wherein the lower bracket is an element of the vertical adjustment arrangement 28 as shall be explained below.

[0023] The hinge lever 35 surfaces perpendicular relative to the hinge bolt 24 almost adhere to the walls of the internal yoke 23. They are distanced only by plastic washers (not shown in the drawing) having a thickness of about 1 mm. Furthermore the internal yoke 23 comprises two cylindrical bore chambers 252 oriented substantially perpendicularly relative to the axis (A) of the hinge bolt 24, wherein cylindrical rotatable elements 251 are located in the bore chambers 252 and are secured therein by means of locking pins 253 embedded in openings of the internal yoke 23 which are perpendicular to the axis of the cylindrical bore chambers 252. Each cylindrical rotatable element 251 is truncated along the surface running through a chord of its cross-section and enables for blocking a hinged movement of the hinge lever 35 on the hinge bolt 24, in particular during assembling the hinge arrangement (cf. Fig. 2b).

[0024] The second hinge member 3 also comprises a bracket 31 mounted by means of screws 32 and spacing sleeves 36 in an opening of the profile of the sash 5. The bracket 31 is connected to a clamping member 33 mounted to the bracket 31 in parallel relative to the plane surface of the sash 5 by means of screws (not shown in the drawing).

[0025] As depicted in detail in Fig. 5, the clamping member 33 has a first wall 332 and a second wall 333, wherein between these walls a slot 331 is located. A tongue 352 of the hinge lever 35 matched to the shape of the slot 331 has been inserted therein in direction perpendicular relative to the axis (A) of the bolt 24 of the hinge arrangement 1. Furthermore the first wall 332 of the clamping member 33 has a recess 334 opened at the side of the hinge lever 35 insertion. A locking projection 353 of the hinge lever 35 and a locking plate 34 are located in this recess 334, wherein the construction and functionality of the locking plate 34 are described in detail hereinafter with reference to Fig. 2 and Fig. 3. The clamp-

ing member 33, the hinge lever 35 and the locking member 34 are screw-connected with each other by means of mounting screws 335 and 341 running through longitudinal mounting openings 354 of the hinge lever 35. Whereas the mounting screws 335 run through through-out openings 339' in the first wall 332 of the clamping member 33 and are screwed into the second wall 333 threaded openings corresponding thereto. The mounting screws 341 run through mounting openings 347 in the locking element 34 and are screwed into threaded openings 339" corresponding thereto and formed in the first wall 332 of the clamping member 33 in the area of the recess 337. Thanks to that the mounting screws 341 do not have to be unscrewed while a horizontal adjustment of the hinge arrangement is performed, as is explained in detail hereinafter.

[0026] In Fig. 2 the hinge arrangement 1 is depicted in an opened position directly before its assemblage. Obviously the frame 4 has been previously embedded and fixed in an appropriate door aperture in any arbitrary known manner.

[0027] As shown, the rotatable elements 251 of the first hinge member 2 have been rotated by an assembly technician into the interior of the internal yoke 23 by about 90° and in this position they rest against the hinge lever 35. In such a positioning of the rotatable elements 251 a hinged movement of the hinge lever 35 on the hinge lever 24 is blocked. This in turn prevents against an uncontrolled automatic closure of the door sash 5, and thus it protects an assembly technician manipulating in this area protecting his or her fingers and tools against an accidental jamming. This blockage also facilitates inserting the hinge lever 35 into the clamping member 33. Finally, such a blockage makes the construction stiff during, while a vertical adjustment of the sash is performed, as shall be described hereinafter.

[0028] Subsequently, the sash 5 is drawn onto the blocked hinge levers 35 of the hinge arrangements 1 of the frame 4 that was prepared in the manner described above so that the tongues 352 of the hinge levers 35 are inserted in the corresponding slots 331 of the clamping members 33. The slots 331 may have obviously any arbitrary profiles and curvatures in the plane surface perpendicular relative to the direction of insertion of the tongues 352.

[0029] In this position, the locking projections 353 of the hinge levers 35 are positioned in the recesses 334 of the clamping members 33. As the vertical width of the recess 334 is greater than the width of the locking projection 353, a limited shift of the hinge levers 35 in the clamping members 33 is possible for example in order to take the supporting elements used for dislocating the sash 5 out from the sash 5.

[0030] The position of each hinge lever 35 in its corresponding clamping member 33 is then blocked in a simple manner by means of the locking element 34, as shown in Fig. 3.

[0031] The locking element 34 has in this embodiment

a form of a C-shaped plate provided with two arms 343 and a retaining surface 342. Each of the arms 343 is provided with a locking projection 344 in a form of a sleeve matched to a locking recession 336 formed in the first wall 332 of the clamping member 33. Thanks to that, after inserting the locking plate 34 into the clamping member 33 and settling the locking projections 344 in the locking recessions 336, it is not further possible to shift the plate 34 in the direction of the hinge lever 35 insertion. From the other side, the locking projection 353 of the hinge lever 35 rests against and presses the retaining surface 342 of the locking plate 34 under the influence of the weight of the sash 5, thus providing an additional stabilisation of the locking plate 34 position.

[0032] In this embodiment, the clamping member 33 is provided with an additional recess 337 matched to the locking element 34 so that after an insertion thereof into the clamping member 33, the external surface of the locking plate 34 is flushed with the external surface of the first wall 332.

[0033] A definitive protection of the hinge lever 35 in the clamping member 33 is achieved after an insertion of mounting screws 335 into openings 339 formed in the first wall 332 of the clamping member 33, into longitudinal mounting openings 354 of the hinge lever 35, and screwing them down in the threaded openings 339 in the second wall 333.

[0034] Fig.4 depicts the hinge arrangement 1 in its closed position. As shown, the external surfaces 411 and 511 of the first box profiles 41 and 51, and the external surfaces 421 and 521 of the second box profiles 42 and 52, lay flush with each other, whereas the yoke 23 of the bracket 21 ensures a space, enabling for hiding the hinge lever 35 in its interior. It has an advantageous influence on aesthetic of the whole partition along with the door. Moreover, in this position the frontal surfaces of the clamping members 2 and 3 are parallel relative to each other, wherein an additional elastomeric sealing strip 412 of the first box profile 41 of the sash 4 adheres the corresponding surface of the first box profile 51 of the sash 5, thus providing heat-insulation and soundproof properties for the sash 5 closed in this manner onto the frame 4.

[0035] The hinge arrangement of the present invention enables also for an easy adjustment of a position of the sash 5 relative to the frame 4 after mounting the sash.

[0036] A vertical adjustment is enabled by a vertical adjusting arrangement 28 of the first hinge member 2, which comprises an adjusting bracket 281 fastened to the frame 4, wherein an adjusting screw 282 is settled in the adjusting bracket 281 in parallel relative to the axis (A) of the hinge arrangement 1.

[0037] After opening the door, the position of the sash 5 should be blocked by means of the rotatable elements 251 of the locking arrangements 25 in order to make the arrangement of the frame 4 and the sash 5 stiff in the vertical plane.

[0038] Subsequently, the mounting screws 22 of all brackets 21 mounted to the frame 4 should be loosened.

Then the sash 5 under the influence of its weight shall rest on the adjusting screw 282 that is projected upwards at the farthest. Screwing in or screwing out the adjusting screw 282 upwards or downwards on the adjusting bracket 281 results in either pushing the bracket 21 and the whole sash 5 upwards or enabling for its gravitational movement downwards. The blockage of a rotation of the door sash 5 by means of the locking arrangements 25 advantageously enables for an upward vertical adjustment solely on one hinge arrangement 1 of the given set comprising the frame 4 and the sash 5.

[0039] The sliding underlays 26 arranged between the bracket 21 and the frame 4 are in this embodiment made of polyamide PA6 with 30% addition of glass fibres. They facilitate a dislocation of the sash 5, constitute an additional thermal insulation and cover all mechanical workings and openings made in the profiled elements 41, 42 and 43 of the frame 4 that have been carried out for purposes of a settlement the bracket 21.

[0040] After adjusting the position of the sash 5 in relation to the frame 4, the mounting screws 22 of all the brackets 21 of the set of the frame 4 and the sash 5 should obviously be screwed in again.

[0041] A horizontal adjustment is possible to be effected using an adjusting screw 351 installed in the locking projection 353 of the hinge lever 35 perpendicularly relative to the axis (A) of the hinge arrangement, wherein an access to this adjusting screw 351 is provided by the adjusting opening 345 in the locking element 34. Screwing in or screwing out the adjusting screw 351 generates a pressure on the retaining surface 338 of the clamping member 33 or on the retaining surface 342 of the locking element 34, and thus induces an appropriate displacement of the tongue 352 along the mounting openings 354 in the slot 331 of the clamping member 33. The mounting screws 335 have to be obviously slightly loosened in order to enable for displacing the hinge lever 35 in the slot 331. But the mounting screws 341 may remain screwed into the mounting openings 339".

[0042] An indicating mark 355 marked on the locking projection 353 of the hinge lever 35 and a scale 346 marked on the arms 343 of the locking plate 34 enable for a precise determination of the length of the shift of the hinge lever 35 relative to the clamping member 33.

[0043] Fig. 6 presents another embodiment of the hinge arrangement according to the present invention. Numerical references of elements performing the same functions remain the same in the drawings, wherein suffixes (a, b, ...) were added, where appropriate, to additionally distinct elements having different construction.

[0044] In this embodiment, the clamping member 33a is a two-piece element and comprises a body performing a function of the first wall 332a and the second wall 333a.

[0045] A slot 331 boundless along the direction transverse relative to the direction of the hinge lever 35a insertion is located between these elements 332a and 333a, each of which is individually mounted to the bracket 31 of the second hinge member 3. In the embodiment

depicted in Figs. 1-5 the width of the locking projection 353 of the hinge lever 35a is in turn smaller than a corresponding width. Such a solution facilitates an insertion of the hinge levers 35a into the clamping members 33a.

[0046] In this embodiment the locking member 34a has cylindrical locking projections 344a that serve as mounting openings 347 for the mounting screws 341 and are matched to cuboidal locking recessions 336a of the clamping member 33a. The clamping member 33a has in turn locking projections 336b matched to locking recessions or keys 344b of the locking element 34a.

[0047] The figures are not necessarily to scale, and some features may be exaggerated or minimized, in order to provide better an invention illustration. 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 the appended claims. Therefore the presented embodiments should not be regarded as limiting the scope of protection defined in the patent claims.

List of reference numerals

[0048]

1. hinge arrangement
2. first hinge member
 - 21 bracket
 - 22 mounting screw
 - 23 internal yoke
 - 24 hinge bolt
 - 25 locking arrangement
 - 251 rotatable element
 - 252 bore chamber
 - 253 locking pin
 - 26 underlay (made of a plastic material)
 - 27 longitudinal mounting opening
 - 28 vertical adjusting arrangement
 - 281 adjusting bracket
 - 282 adjusting screw
 - 283 mounting screw
 - 284 bracket
3. second hinge member
 - 31 bracket
 - 32 mounting screw
 - 33 clamping member
 - 331 slot
 - 332 first wall
 - 333 second wall
 - 334 recess
 - 335 mounting screw
 - 336 locking means (recessions/projections)
 - 337 recess (of the locking element)
 - 338 retaining surface
 - 339 mounting opening (339', 339")
 - 34 locking element (locking plate)
 - 341 mounting screw
 - 342 retaining surface

- 343 arm
- 344 locking means (recessions/projections)
- 345 adjusting opening
- 346 scale
- 347 mounting opening
- 35 hinge lever
- 351 adjusting screw
- 352 tongue
- 353 locking projection
- 354 longitudinal mounting opening
- 355 indicating mark
- 36 spacing sleeve
- 4. frame
- 41 first box profile
- 411 external surface
- 412 sealing strip
- 42 second box profile
- 421 external surface
- 43 heat-insulating rib
- 5. sash
- 51 first box profile
- 511 external surface
- 52 second box profile
- 521 external surface
- 53 heat-insulating rib

Claims

1. A hinge arrangement (1), preferably a hidden hinge arrangement, comprising a first hinge member (2) connected in a hinged manner to a second hinge member (3) provided with a hinge lever (35) and a clamping member (33) with a slot (331) into which said hinge lever (35) is inserted in the direction substantially perpendicular relative to the axis (A) of the hinge arrangement (1), and mounting means (335) for mounting said hinge lever (35) in the clamping member (33) of the second hinge member (3),
characterized in that
the clamping member (33) has at least one recess (334) open on the side of the hinge lever (35) insertion, and
the hinge lever (35) has at least one locking projection (353) located in said recess (334) of the clamping member (33),
wherein said second hinge member (3) has additionally at least one locking member (34) provided with a retaining surface (342) for said locking projection (353) of the hinge lever (35), and
the locking element (34) and/or the clamping member (33) is/are provided with locking means (344, 336) blocking a displacement of the locking element (34) along the direction of the hinge lever (35) insertion.
2. The hinge arrangement according to Claim 1, **characterized in that** the locking means (344, 336) have a form of recessions (344b) or projections (344, 344a) of the locking element (34) cooperating with corresponding projections (336b) or recessions (336, 336a) of the clamping member (33).
3. The hinge arrangement according to Claim 1 or 2, **characterized in that** the clamping member (33) has a recess (337) matched to the shape of the locking element (34).
4. The hinge arrangement according to Claim 1 or 2 or 3, **characterized in that** the locking member (34) has a form of a C-shaped locking plate provided with two arms (343) wherein said retaining surface (342) is located between the arms (343).
5. The hinge arrangement according to any one of the preceding Claims, **characterized in that** the width of the recess (334) of the clamping member (33) along the direction perpendicular relative to the axis (A) of the hinge arrangement (1) is greater than the width of the locking projection (353) of the hinge lever (35).
6. The hinge arrangement according to any one of the preceding Claims, **characterized in that** in the vicinity of at least one hinge lever (35) surface perpendicular relative to the axis (A) of the hinge bolt (24) a locking arrangement (25) is located, said locking arrangement (25) comprising at least one rotatable element (251) situated in a bore chamber (252) oriented substantially perpendicularly relative to the axis (A) of the hinge bolt (24), the rotation thereof enabling for blocking a hinged movement of the hinge lever (35) on the hinge bolt (24).
7. The hinge arrangement according to any one of the preceding Claims, **characterized in that** the first hinge member (2) comprises a bracket (21) under which a vertical adjustment arrangement (28) is located comprising a stationary adjusting bracket (281) in which an adjusting screw (282) is installed oriented in parallel relative to the axis (A) of the hinge arrangement (1) and abutted with the bracket (21).
8. The hinge arrangement according to Claim 7, **characterized in that** the bracket (21) is mounted on a slide underlay (26), preferably made of a plastic.
9. The hinge arrangement according to any one of the preceding Claims, **characterized in that** the locking projection (353) of the hinge lever (35) is provided with an adjusting screw (351) installed rotationally and substantially perpendicularly relative to the axis (A) of the hinge arrangement (1) between the retaining surface (342) of the locking element (34) and the retaining surface (338) of the clamping member.

10. The hinge arrangement according to Claim 9, **characterized in that** the locking projection (353) and the locking member (34) are provided with indicators (355, 346) of the mutual positioning of these elements.

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11. The hinge arrangement according to any one of the preceding Claims, **characterized in that** the first hinge member (2) is fastened to a frame (4), and the second hinge member (3) is fastened to a sash (5) of door or window.

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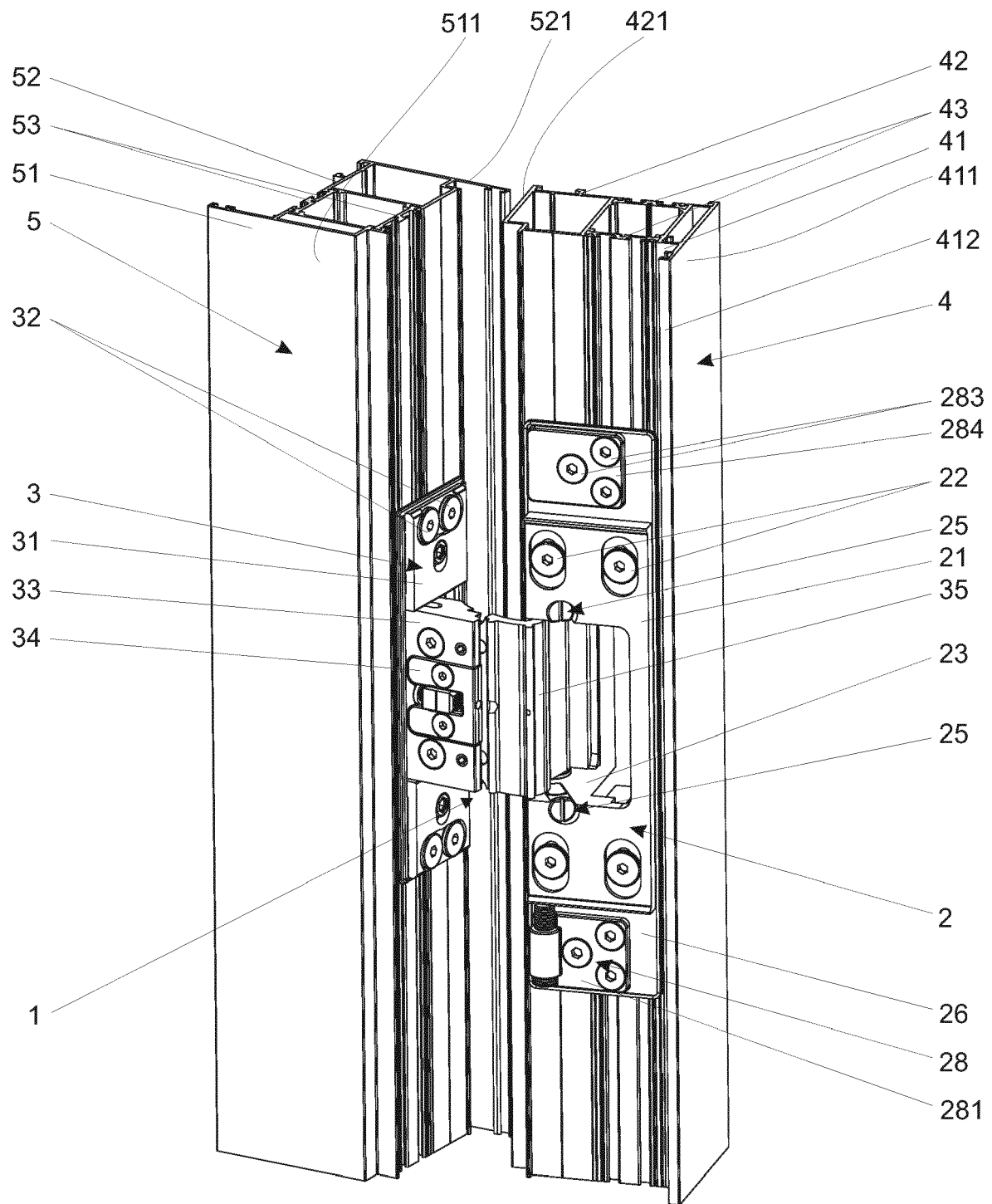


Fig. 1

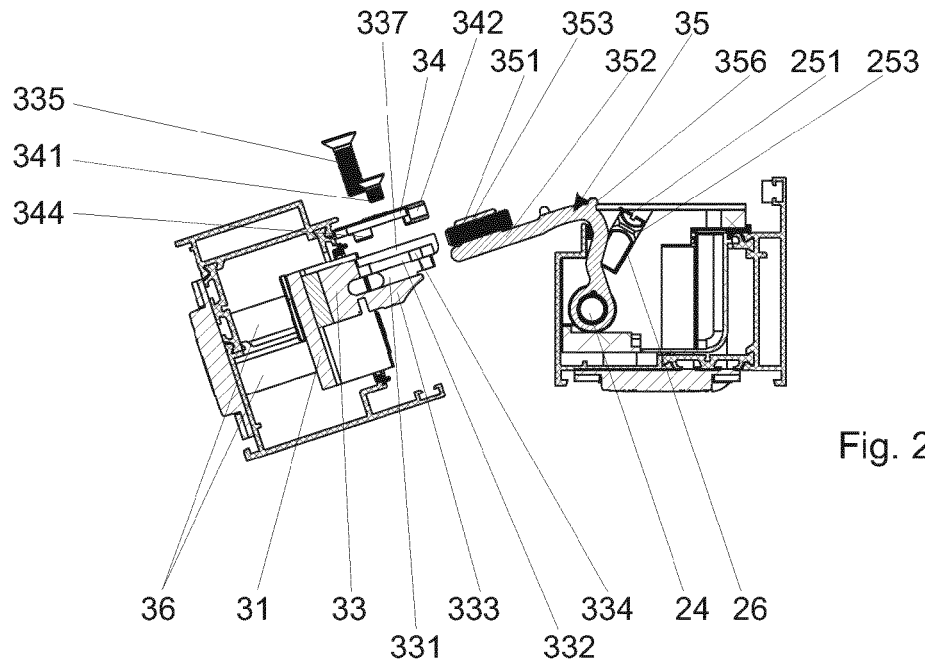


Fig. 2a

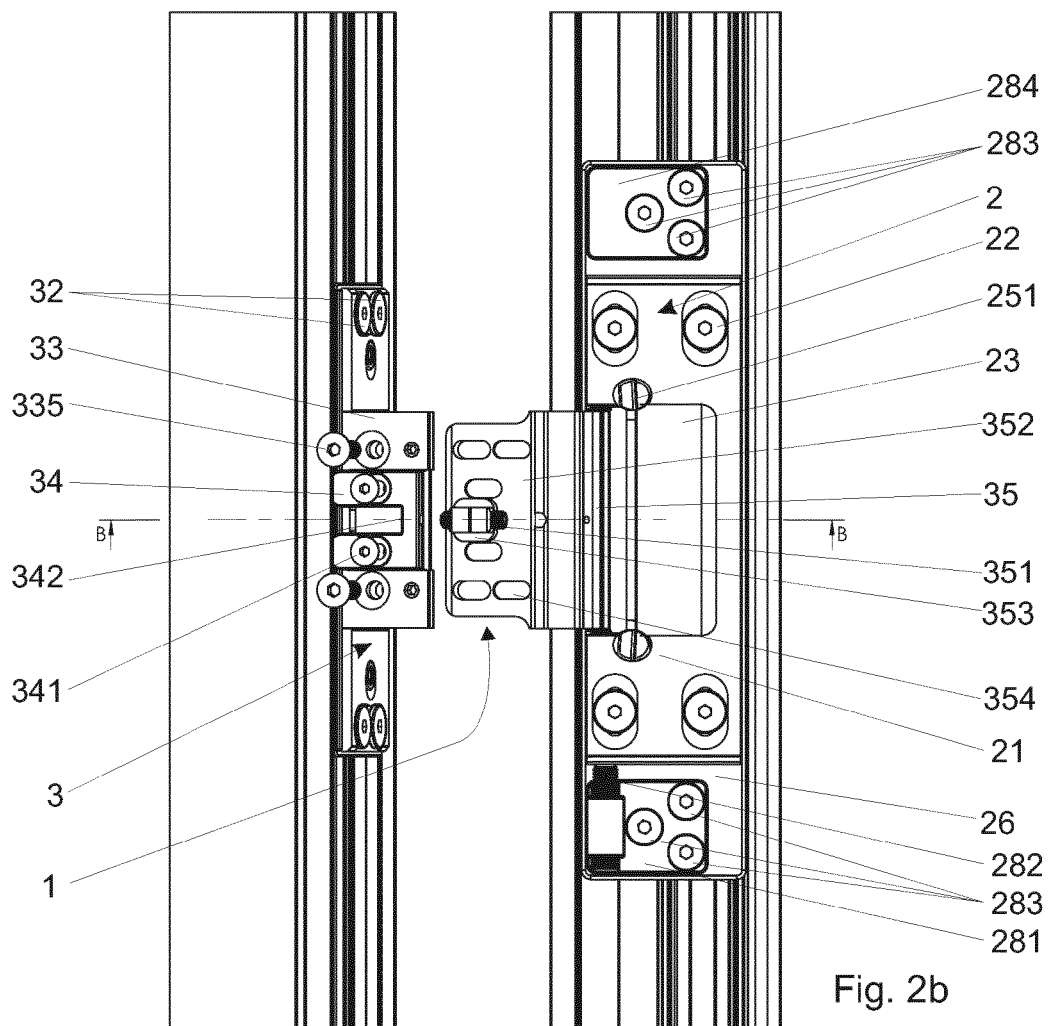


Fig. 2b

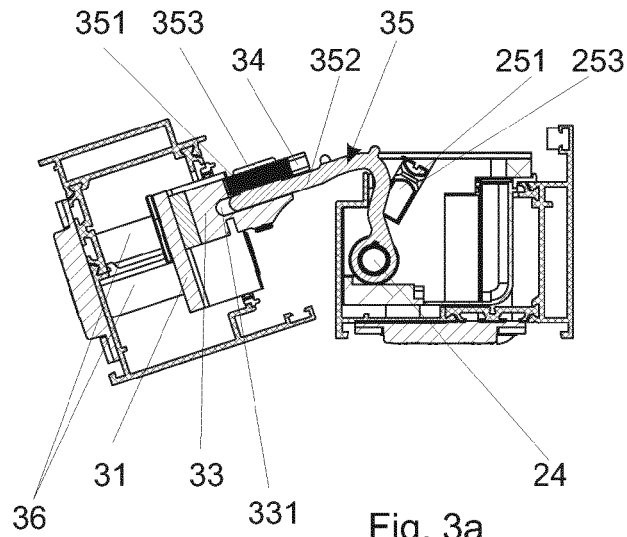


Fig. 3a

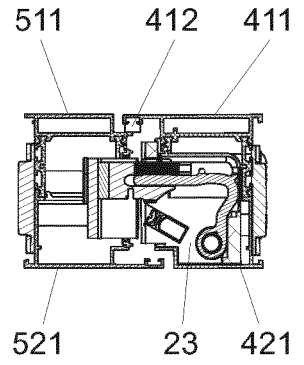


Fig. 4

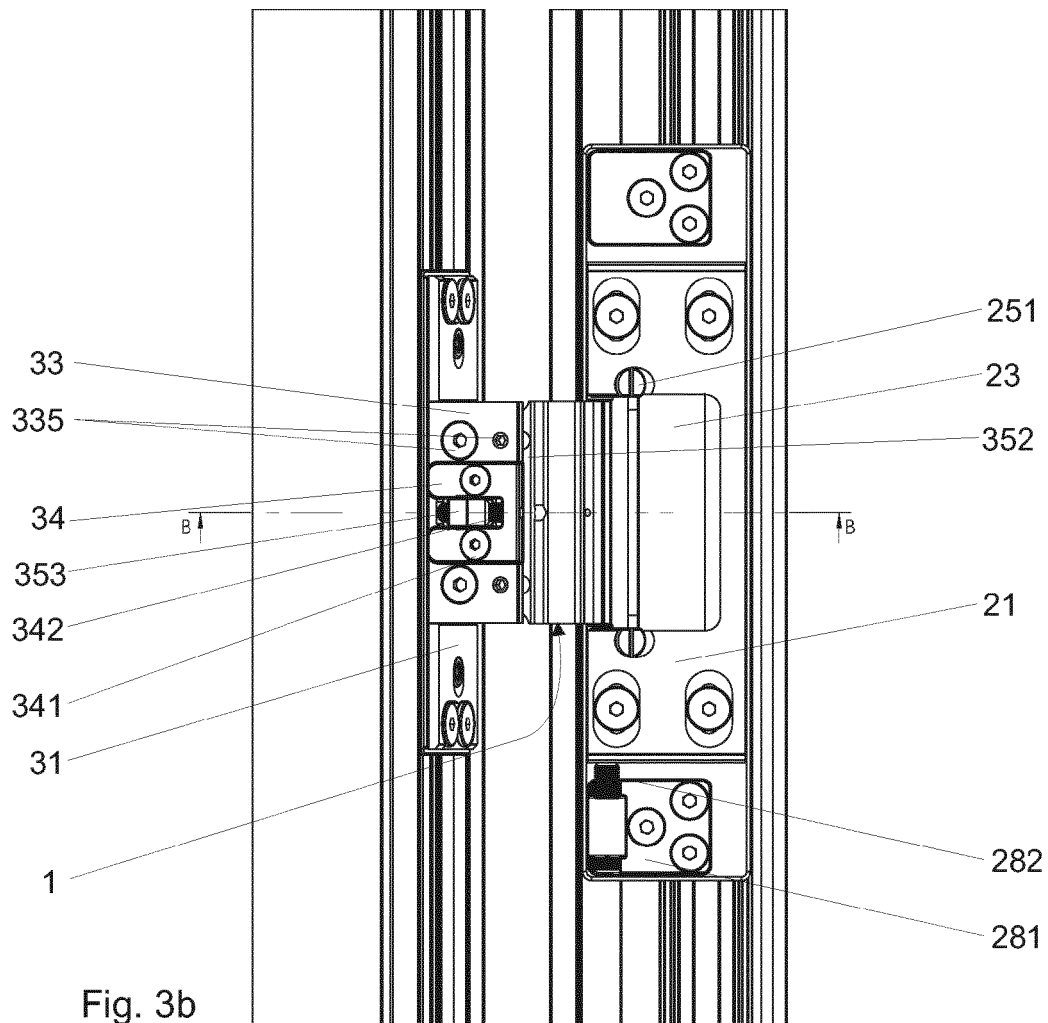
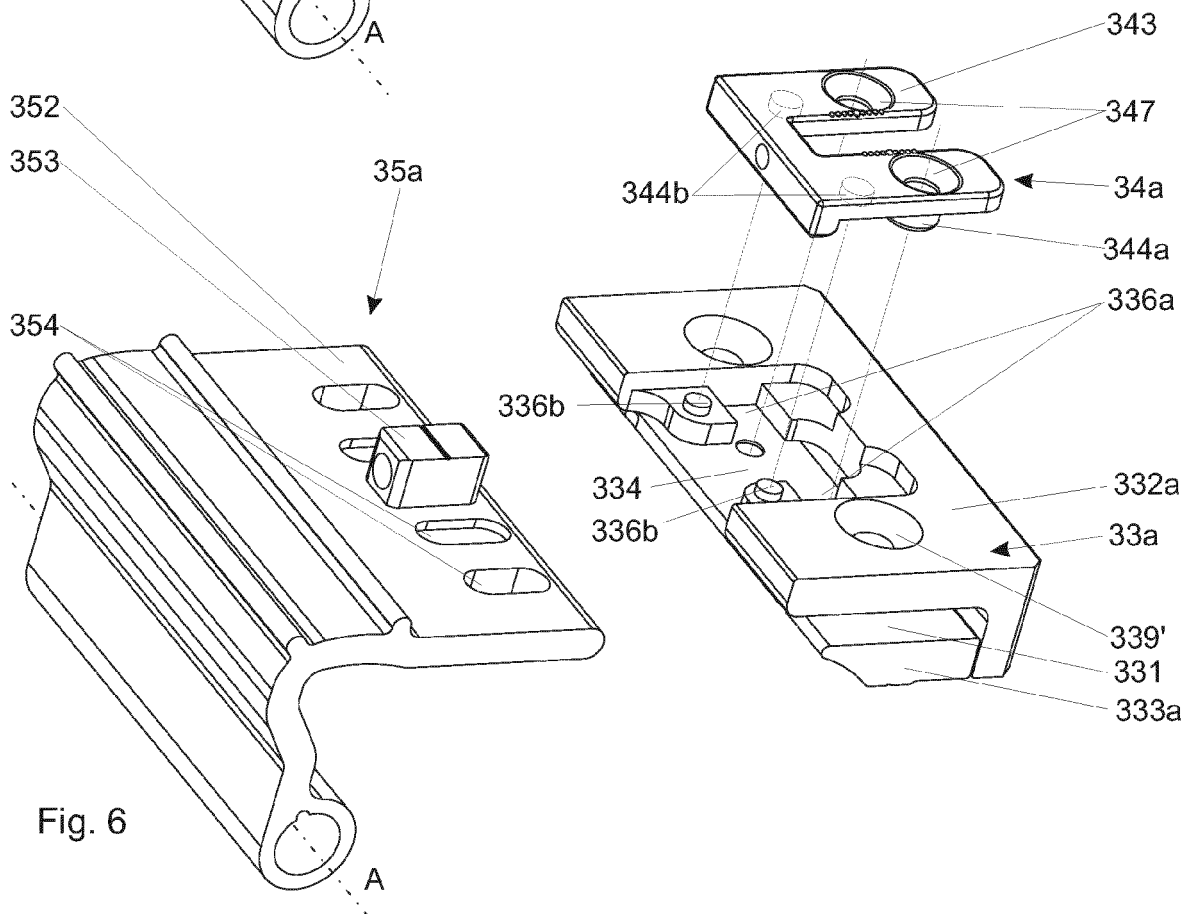
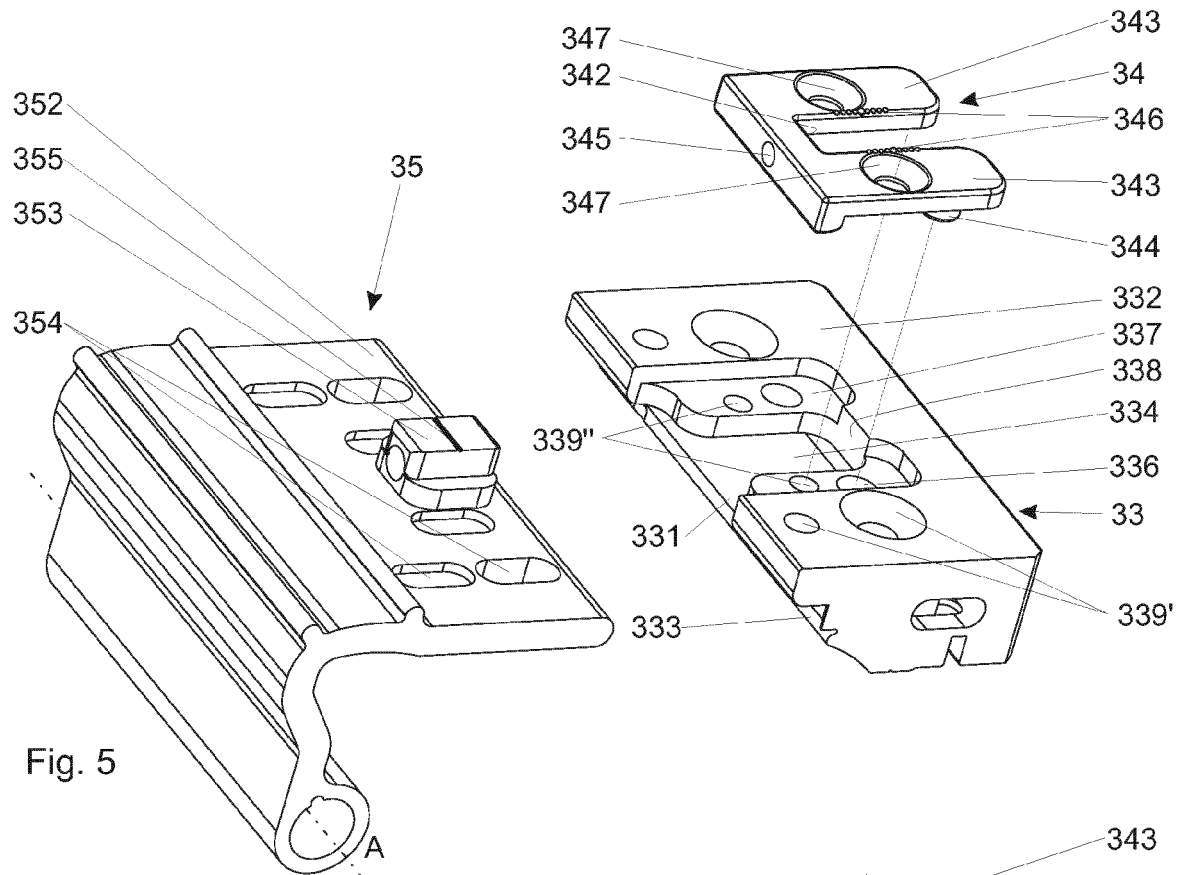


Fig. 3b



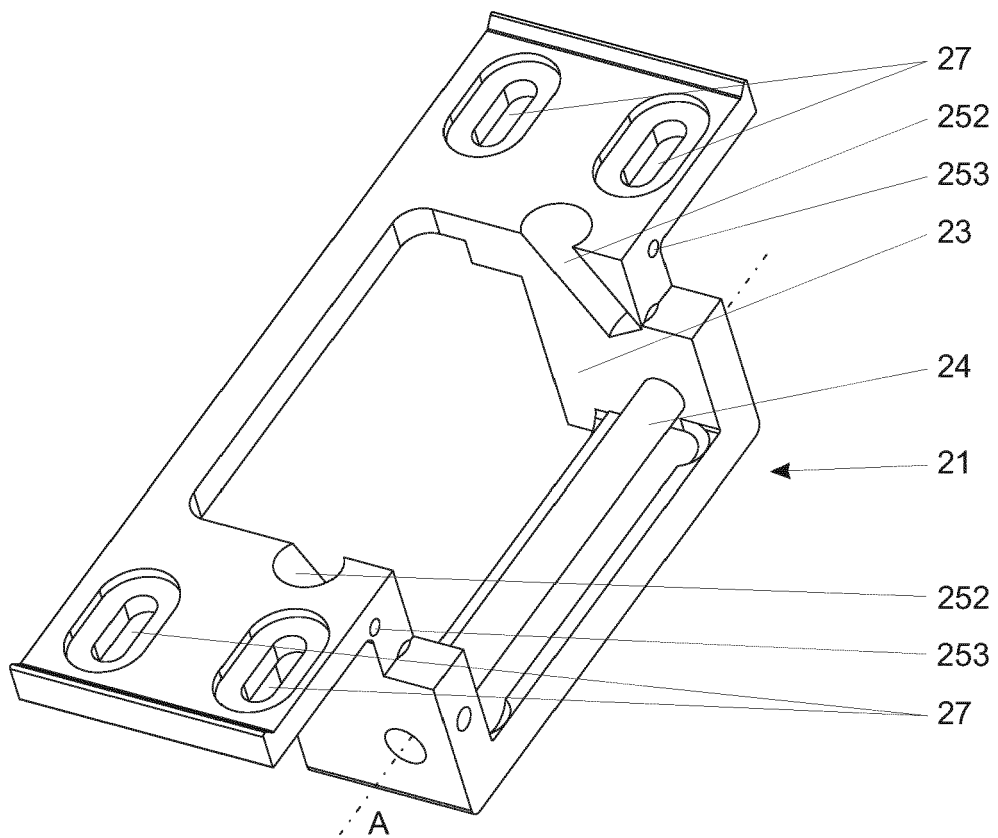


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 17 20 0140

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 132 559 A1 (HAHN GMBH & CO KG DR [DE]) 12 September 2001 (2001-09-12)	1-3,5,11	INV. E05D5/06
Y	* paragraphs [0022], [0025] - [0028];	7,8	
A	figures 1-5 *	4,6,9,10	ADD. E05D7/04
Y	DE 20 2010 013011 U1 (SIMONSWERK GMBH [DE]) 24 February 2011 (2011-02-24) * paragraphs [0022], [0024], [0030], [0034] - [0037]; figure 2 *	7,8	
			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 26 March 2018	Examiner Klemke, Beate
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			

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EPO FORM 1503 03.02 (P04C01)

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

EP 17 20 0140

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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
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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