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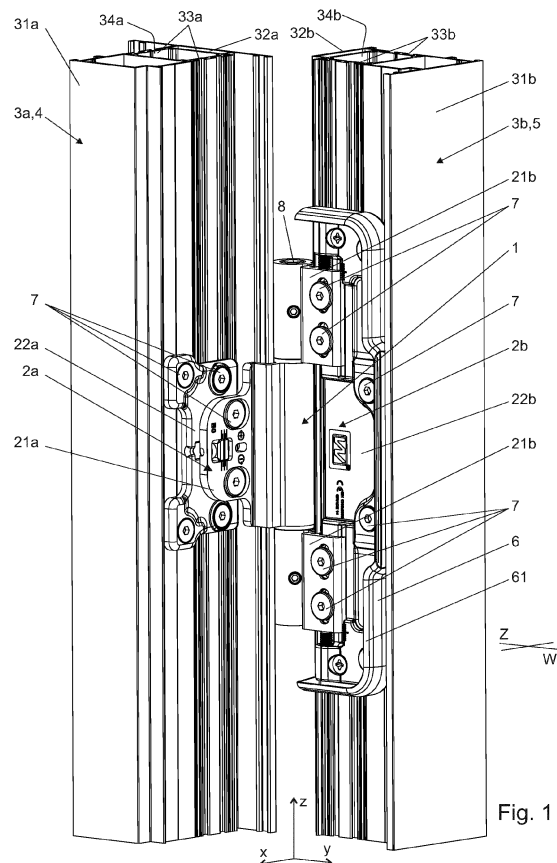
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(54) THERMALLY INSULATED HINGE ARRANGEMENT

(57) The invention relates to a thermally insulated hinge arrangement (1) and in particular a door or window hinge arrangement, comprising at least two hinge members (2) connected to each other in an articulated manner by means of a common hinge pin (8) and fastened to thermal insulating profile element (3) of a frame (4) and a sash (5), wherein the frame (4) defines an interior side (W) and an exterior side (Z) of the hinge arrangement (1) and in the closed position of the hinge arrangement (1) a gap of a non-zero width (h) is defined between adjacent thermal insulating profile elements (3). In order to increase a thermal insulation of such a hinge arrangement (1) and to prevent a formation of a thermal bridge in the area thereof, the hinge arrangement (1) comprises at least one sealing element (6) made of plastic and arranged between at least one hinge member (2b) and a thermal insulating profile element (3) corresponding to the at least one hinge member (2b) and surrounding this hinge member (2b) from the interior side (W) and from the sides by which the straight lines parallel to the axis (z) of the hinge pin (8) are passed through, wherein the height (H) of the at least one sealing element (6) is greater than the width (h) of the gap, and wherein an edge (61) of the at least one sealing element (6) that is distant from the hinge member (2b) is pressed in the closed position of the hinge arrangement (1).



Description

[0001] The invention relates to a thermally insulated hinge arrangement, and in particular a door or window hinge arrangement, comprising at least two hinge members connected to each other in an articulated manner by means of a common hinge pin and fastened to thermal insulating profile elements of a frame and a sash, wherein the frame defines an interior side and an exterior side of the hinge arrangement and in the closed position of the hinge arrangement a gap of a non-zero width is defined between adjacent thermal insulating profile elements.

[0002] Hinge arrangements of this type are commonly used, in particular in metal joinery, and usually have a form of hidden or pin hinges. Their use is however associated with a formation of thermal bridges within the hinge arrangements.

[0003] Publication CN205531880 discloses a hinge sealing element and a hinge arrangement with a sealing element. The sealing element is made of a deformable thermal insulating material and has a shape of a sheet, strip or block.

[0004] Publication EP1022425B1 discloses a hinge arrangement provided with a sealing strip parallel to the hinge axis and pressed against a frame in the closed state of a window/door. In the closed position, the hinge seal is flush with each end of the fixed seal, thus forming a continuous seal around the frame. In the case of double hinges, two hinge sealing strips are installed.

[0005] Thermally insulated hinge arrangements are also known, inter alia, from the following publications WO2006128549, EP1582674, DE29712633, CN106522753, or KR20170114716.

[0006] It has been the object of the present invention to provide a hinge arrangement that prevents a formation of a thermal bridge within the hinge arrangement.

[0007] The present invention provides a hinge arrangement of the kind mentioned in the outset which is characterized in that the hinge arrangement comprises at least one sealing element made of plastic and arranged between at least one hinge member and a thermal insulating profile element corresponding to the at least one hinge member and surrounding this hinge member from the interior side and from the sides by which the straight lines parallel to the axis of the hinge pin are passed through, wherein the height of the at least one sealing element is greater than the width of the gap, and wherein an edge of the at least one sealing element that is distant from the hinge member is pressed in the closed position of the hinge arrangement.

[0008] The hinge arrangement according to the present invention minimizes an untightness of joinery caused by a mounting process of the hinge arrangement, features an increased noise attenuation coefficient, and shifts the water condensation point to the exterior side of a building partition in a result of a temperature difference.

[0009] The distant edge of the sealing element is preferably bent in the direction of the hinge member surrounded by this sealing element.

erably bent in the direction of the hinge member surrounded by this sealing element.

[0010] The distant edge of the sealing element is preferably pressed in the closed position of the hinge arrangement by the thermal insulating profile element that is adjacent relative to the thermal insulating profile element to which the sealing element is fastened.

[0011] An outer edge of the sealing element is preferably flush with the surfaces of the thermal insulating profile elements from the exterior side.

[0012] The sealing element has preferably a form of a circumferential element.

[0013] The sealing element is preferably made of an elastomer plastic.

[0014] The sealing element of the present invention may be made in a process of an injection or extrusion moulding from an elastomer material, such as rubber or neoprene foam, or highly flexible plastics. This enables a more precise adjustment of the sealing element in the gap between adjacent thermal insulation profile elements.

[0015] The invention is described and explained and illustrated in a preferred embodiment and in a connection with the attached drawings in which:

Fig. 1 shows a hinge arrangement in an open position depicting fragments of the profiles of a frame and sash in an axonometric view;

Fig. 2 shows a method of fastening a hinge member to a profile frame element in an axonometric exploded view;

Fig. 3 shows the hinge arrangement in an open position depicting fragments of profiles of a frame and sash in a cross-section along the plane perpendicular relative to the axis of the hinge; and

Fig. 4 shows the hinge arrangement in the closed position depicting fragments of profiles of a frame and sash in a cross-section along the plane perpendicular relative to the axis of the hinge.

[0016] Figs. 1-4 show one of a number of hinge arrangements 1 that in this embodiment serve to hinge multi-chamber thermal insulating profile elements 3a of a sash 4 of an external door of a building construction partition, wherein the door are not shown on the drawings, on multi-chamber thermal insulating profile elements 3b of a frame 5. Uniform or multi-chamber glazing units, panes or elements made of tempered glass, plastic, wood, etc., that are not shown in the drawing, can be embedded within the contour defined by the joined profile elements 3a of the sash 4. In this embodiment, the hinge arrangement 1 has a form of a pin hinge and comprises a hinge member 2b on the side of the frame 5 connected in a hinged manner via a hinge pin 8 to a hinge member 2a on the side of the sash 4. Where appropriate, numerical references of elements having the same functionality but slightly different constructions were provided with the suffix "a" in the case of the sash 4 or "b" in the case of

the frame 5.

[0017] As shown in Fig. 1, the orientation of the coordinate system used in this description relates to the profile element 3b of the frame 5 and the profile element 3a of the sash 4 in the closed position of the hinge arrangement 1. The axis z is parallel to the profile element 3 and it constitutes the axis of the hinge pin 8, the axis y is perpendicular to the plane of the building partition, and the axis x is perpendicular to the axes y and z. The terms "exterior" side (Z) and "interior" side (W) of a building partition relate to the side of a lower temperature (Z) and to the side of a greater temperature (W) respectively. In the presented embodiment, the hinge pin 8 is located on the exterior side (Z).

[0018] In this embodiment, the profile element 3a of the sash 5 comprises an inner aluminum box profile 31a and an outer aluminum box profile 32a, which are connected to each other by means of two longitudinal shaped thermal insulating ribs 33a made of polyamide PA66 comprising 50% of a glass fiber addition. The thermal insulating ribs 33a define a thermal insulating space 34a between them. The profile element 3b of the frame 4 has in this embodiment an analogous structure defined by an inner first aluminum box profile 31b and an outer aluminum box profile 32b, connected by thermal insulating ribs 33b defining a thermal insulating space 34b. The low thermal conductivity (of less than 0.1 W/(m·K)) of the thermal insulating ribs 33 ensures a thermal separation of the box profiles 31, 32 (whose thermal conductivity amounts about 200 W/(m·K)) in the area of the inner thermal insulating space 34. Thus, the total thermal resistance of the profile elements 3 is relatively high.

[0019] The hinge member 2a on the side of the sash 4 comprises a hinge lever 21a and an adjusting element 22a fastened by means of four mounting screws 7 to the profile element 3a of the sash 4. The hinge lever 21a is fastened by means of two mounting screws 7 passed through the adjusting element 22a into the profile element 3a of the sash 4. The hinge member 2b on the side of the frame 5 comprises two hinge levers 21b and an adjusting element 22b fastened by means of four mounting screws 7 passed through mounting openings 35 into the profile element 3b of the frame 5. Each of the hinge levers 21b is fastened by means of two mounting screws 7 passed through the adjusting element 22b and the mounting openings 35 into the profile element 3b of the frame 5.

[0020] As shown in Fig. 2, the hinge member 2b is in this embodiment surrounded from the interior side W and from the axis z of the hinge pin 8 by a shaped sealing element 6 made of plastic. The sealing element 6 is a C-shaped strip made of neoprene foam with a substantially U-shaped form and is fastened between the adjusting element 22b and the profile element 3b of the frame 4. For this purpose, the sealing element 6 is provided with a plurality of mounting protrusions 62 arranged around its periphery and inserted into the mounting recesses 23 (cf. Fig. 4) in the adjusting element 22b.

[0021] As shown in Figs. 3 and 4, the height H of the sealing element 6 is greater than the width h of the gap 36 between adjacent thermal insulating profile elements 3a and 3b. Thanks to this, in the closed position of the hinge arrangement 1 (Fig. 4), the sealing element 6 is pressed by the thermal insulating element 3a of the sash 4.

[0022] The edge 61 of the sealing element 6 that is distant from the hinge member 2b, is bent towards the exterior side Z and towards the axis of the hinge pin 8. The bent edge 61 generates the preload and ensures that in the closed position of the hinge arrangement 1, the pressure of the air blowing from the exterior side Z into the gap 36 between the thermal insulating elements 3a and 3b, as visualized by the arrow, is faced against the resistance of this bent edge 61 and this air is unable to flow further.

[0023] Furthermore, the outer edge 63 of the sealing element 6 is flush with the surface of the outer box profiles 32a, 32b from the outer side Z.

[0024] In other embodiments of the invention that are not presented on the drawings, both hinge members 2a, 2b could be provided with sealing elements 6, the outer edges 61 of which would be pressed in the closed position of the hinge arrangement 1.

[0025] The figures are not necessarily to scale and some features may be exaggerated or minimized in order to better illustrate the present invention. 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.

35 List of reference numerals

[0026]

1. hinge arrangement
2. hinge member 2a, 2b)
 21. hinge lever (21a, 21b)
 22. adjusting element (22a, 22b)
 23. mounting recess
3. thermal insulating profile element
 31. inner box profile
 32. outer box profile
 33. thermal insulating rib
 34. thermal insulating space
 35. mounting opening
 36. gap
4. frame
5. sash
6. sealing element
 61. distant edge
 62. mounting protrusion
 63. outer edge
7. mounting screw
8. hinge pin

Claims

1. Thermally insulated hinge arrangement (1), and in particular a door or window hinge arrangement, comprising at least two hinge members (2) connected to each other in an articulated manner by means of a common hinge pin (8) and fastened to thermal insulating profile elements (3) of a frame (4) and a sash (5), wherein the frame (4) defines an interior side (W) and an exterior side (Z) of the hinge arrangement (1) and in the closed position of the hinge arrangement (1) a gap of a non-zero width (h) is defined between adjacent thermal insulating profile elements (3), **characterized in that**, the hinge arrangement (1) comprises at least one sealing element (6) made of plastic and arranged between at least one hinge member (2b) and a thermal insulating profile element (3) corresponding to the at least one hinge member (2b) and surrounding this hinge member (2b) from the interior side (W) and from the sides by which the straight lines parallel to the axis (z) of the hinge pin (8) are passed through, wherein the height (H) of the at least one sealing element (6) is greater than the width (h) of the gap, and wherein an edge (61) of the at least one sealing element (6) that is distant from the hinge member (2b) is pressed in the closed position of the hinge arrangement (1).

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2. A hinge arrangement (1) according to Claim 1, **characterized in that**, the distant edge (61) of the sealing element (6) is bent in the direction of the hinge member (2b) surrounded by this sealing element (6).

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3. A hinge arrangement (1) according to Claim 1 or 2, **characterized in that**, the distant edge (61) of the sealing element (6) is pressed in the closed position of the hinge arrangement (1) by the thermal insulating profile element (3) that is adjacent relative to the thermal insulating profile element (3) to which the sealing element (6) is fastened.

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4. A hinge arrangement (1) according to any one of the preceding Claims, **characterized in that**, an outer edge (63) of the sealing element (6) is flush with the surfaces of the thermal insulating profile elements (3) from the exterior side (Z).

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5. A hinge arrangement (1) according to any one of the preceding Claims, **characterized in that**, the sealing element (6) has a form of a circumferential element.

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6. A hinge arrangement (1) according to any one of the preceding Claims, **characterized in that**, the sealing element (6) is made of an elastomer plastic.

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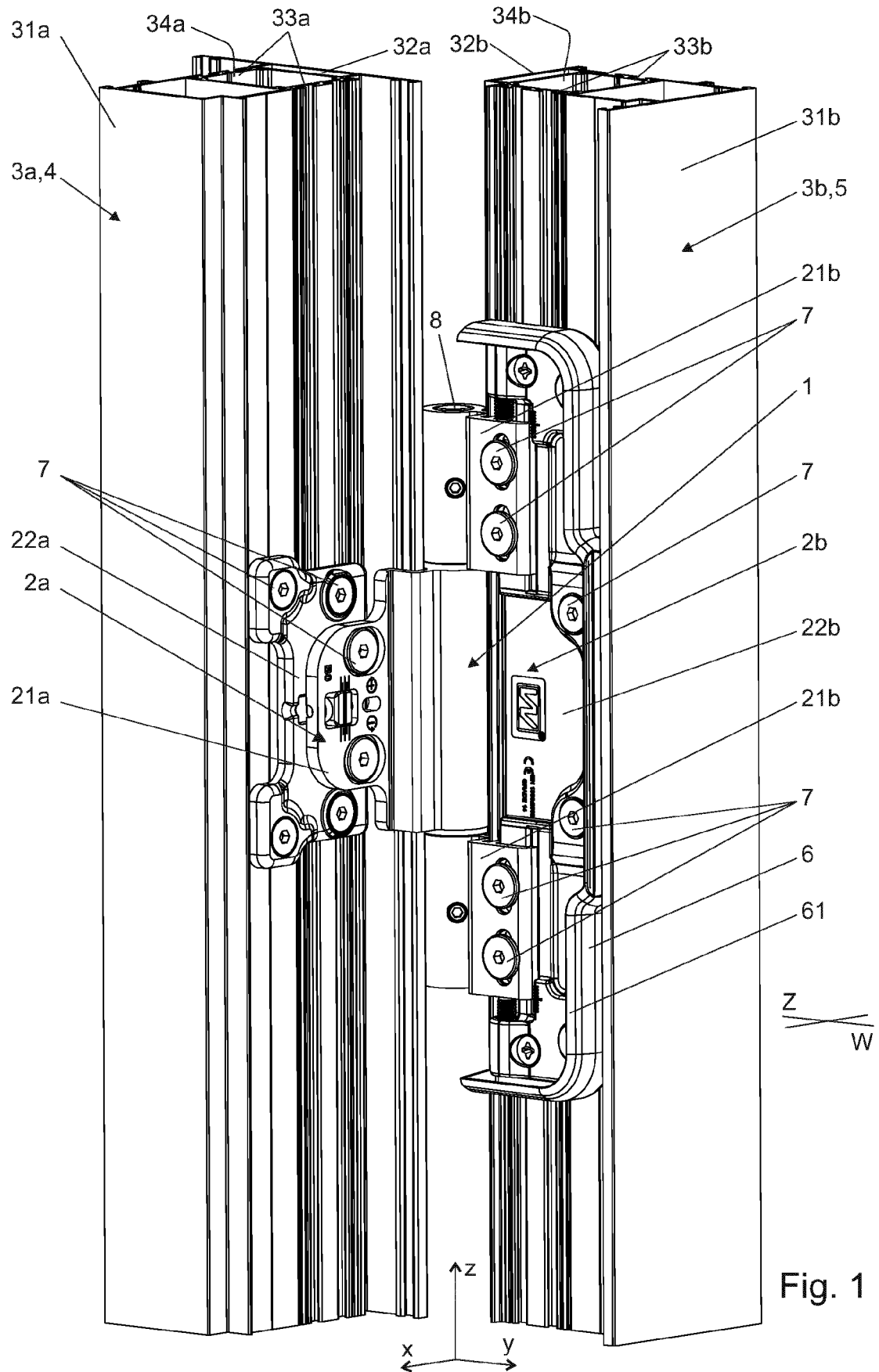


Fig. 1

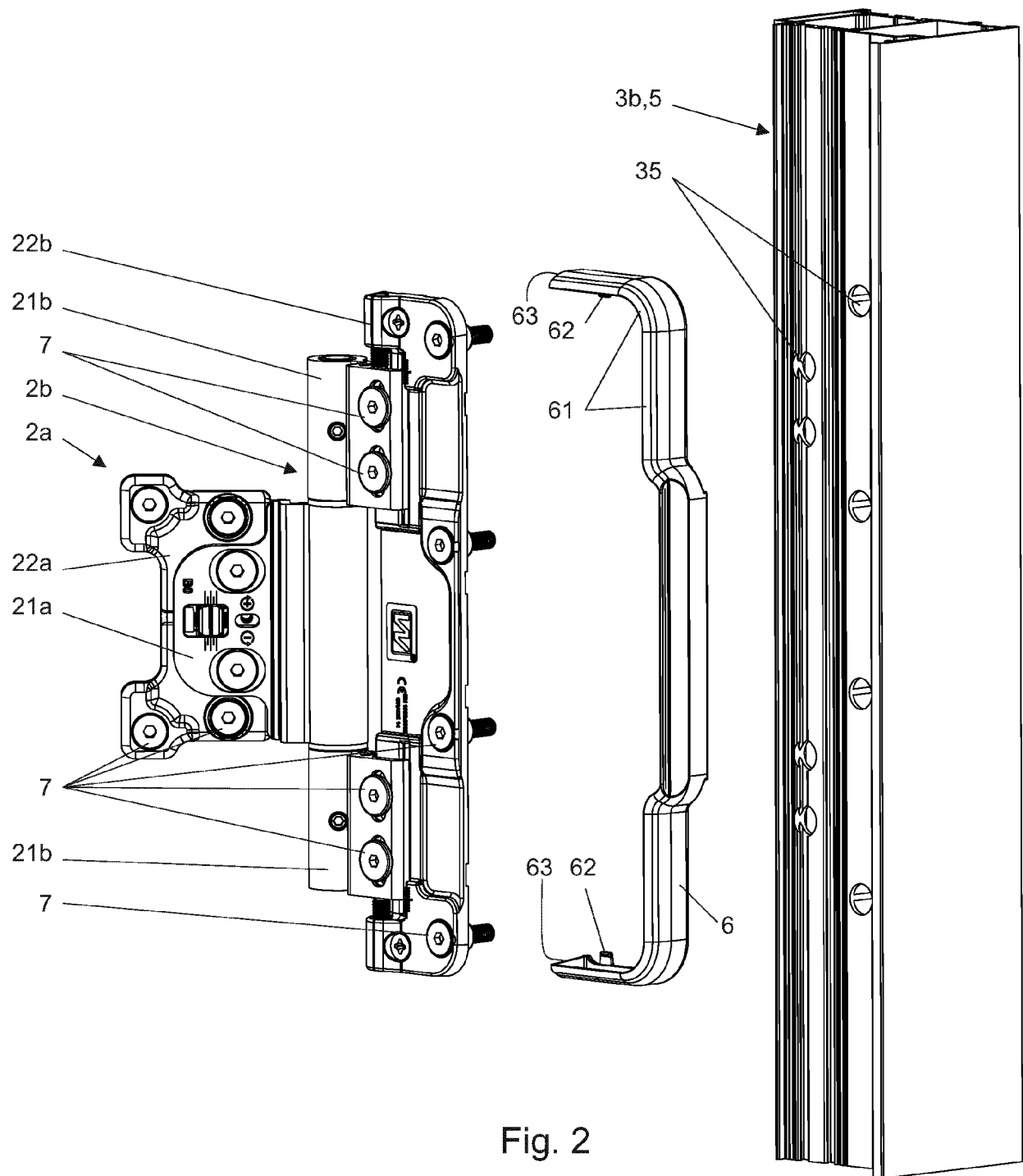


Fig. 2

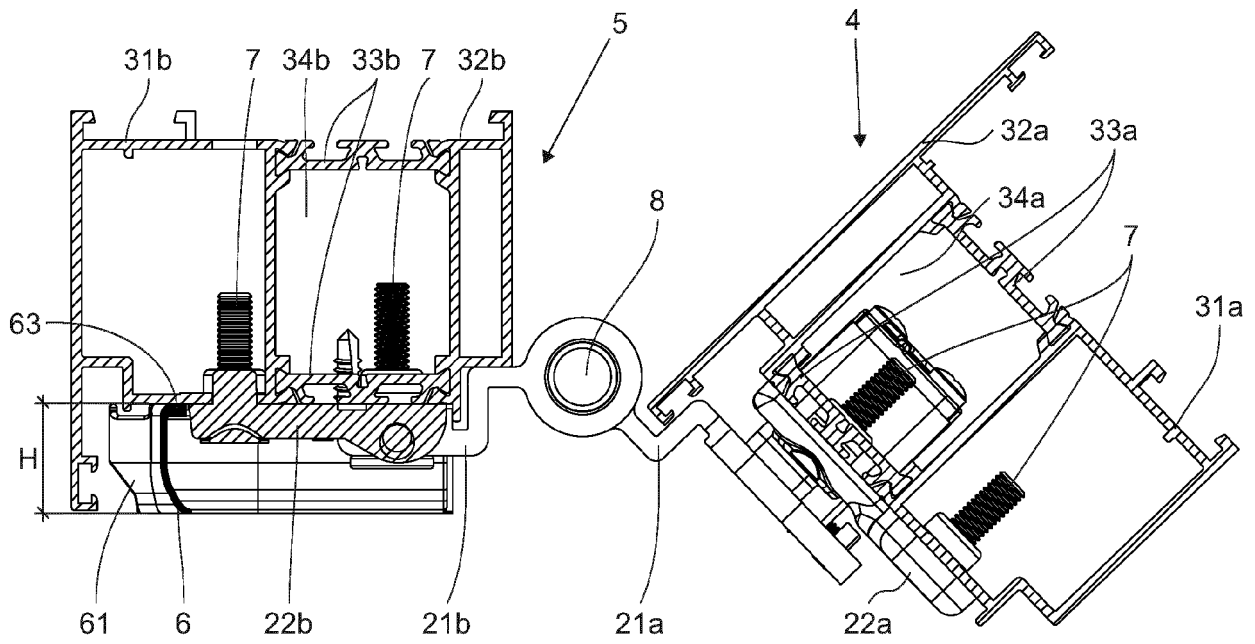


Fig. 3

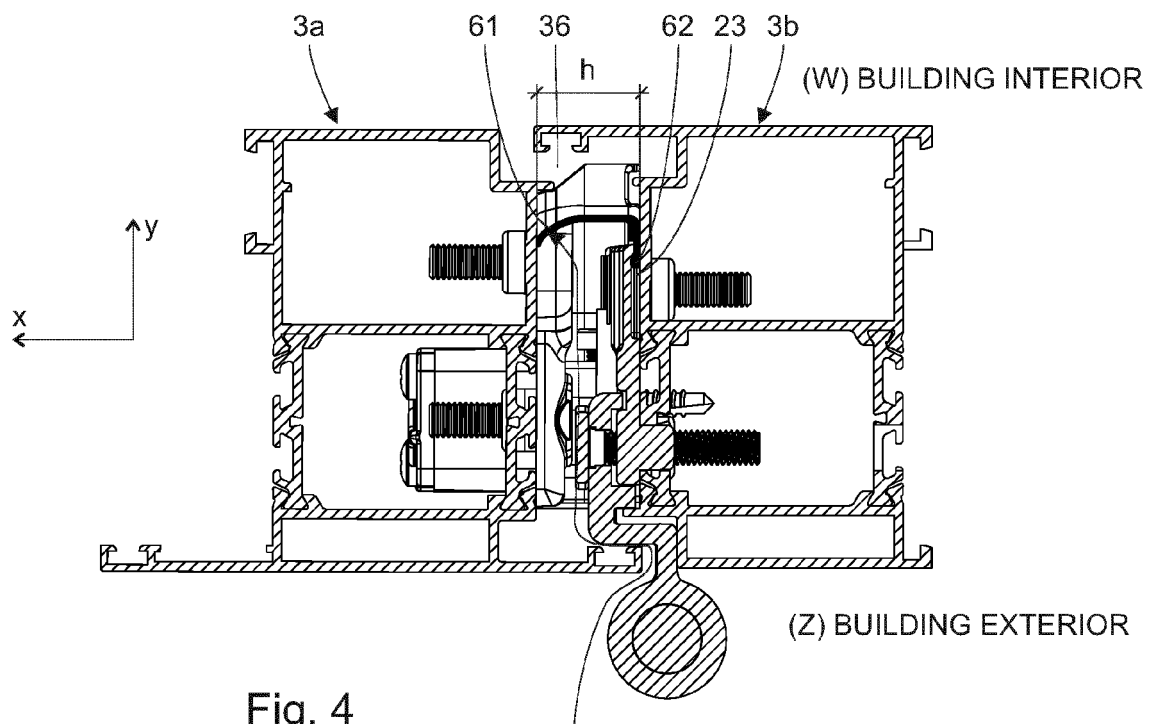


Fig. 4



EUROPEAN SEARCH REPORT

Application Number

EP 23 18 0631

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	JP H10 54173 A (GOAL KK) 24 February 1998 (1998-02-24) * paragraphs [0007] - [0009]; figures * -----	1, 3, 4, 6	INV. E05D3/02 E05D5/02 E05D11/00
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			

1

EPO FORM 1503 03.82 (P04C01)

Place of search	Date of completion of the search	Examiner
The Hague	24 October 2023	Witasse-Moreau, C
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 18 0631

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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