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(54) **HINGE TO ARTICULATE A MOBILE STRUCTURE WITH RESPECT TO A FIXED STRUCTURE**

(57) Hinge to articulate a mobile structure (11) with respect to a fixed structure (12), comprising a first hinging element (13), provided with a pin and a second hinging element provided with a part in which a cylindrical cavity is made configured to receive the pin and define therewith a hinging along a common hinging axis (X). First adjustment means (20, 24, 30) are provided in one of the two hinging elements (13, 15) in order to adjust the reciprocal distance between the mobile structure (11) and the fixed structure (12) in a first direction perpendicular to the hinging axis (X). There is a second adjustment element (35) to adjust the reciprocal position of the two hinging elements (13, 15), in a second direction parallel to the hinging axis (X).

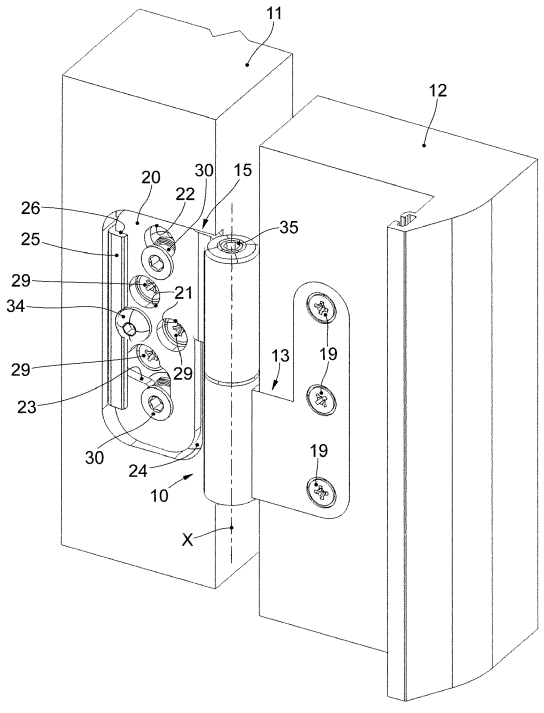

fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a hinge to articulate a mobile structure, for example a panel of a door or window, with respect to a fixed structure, for example a frame of the door or window. The hinge comprises two hinging elements, one the male type and one the female type, and adjustment members to adjust both the reciprocal distance between the mobile structure and the fixed structure, in a first direction perpendicular to the hinging axis, and also the reciprocal position of the two hinging elements in a second direction, parallel to the hinging axis.

BACKGROUND OF THE INVENTION

[0002] Among the different types of hinges to articulate a mobile structure, for example a panel of a door or window, with respect to a fixed structure, for example a frame of the door or window, the hinge described in the Italian patent of industrial invention n. 1.370.283, granted to Applicant on 02.02.2010, is known. This known hinge comprises at least two hinging elements, at least one support element, connected to a respective hinging element, and connection means configured to connect the support element to a corresponding structure, mobile or fixed. In particular, the connection means comprise first connection members, configured to attach the support element to the corresponding structure, and second connection members configured to keep the support element at a determinate distance from the corresponding structure.

[0003] Although it is functional, this known hinge has the disadvantage, however, that it comprises different components that have to be assembled during the installation of the hinge itself on the structures to be hinged.

[0004] From the US patent application US-A-2005/0193521 a hinge is known that comprises two hinging elements pivoted to each other by a central pin, in which one of the two hinging elements comprises a plate on which a leaf spring is attached. The hinge also comprises a container shaped as a parallelepiped, in which a long slit is made, much wider than the thickness of the plate, into which the plate is inserted, and the leaf spring attached to it. Adjustment means are provided to incline the plate inside the slit, against the action of the leaf spring.

[0005] From the international patent application WO-A-99/61738 a hinge is known that comprises two hinging plates pivoted to each other by a central pin, in which one of the two plates is inserted in snap-in manner into a long, very wide slit made in an adjustment block. A pair of screws are provided to adjust the inclination of the plate inside the slit.

[0006] From the US patent US-B-4.837.893 a hinge is known that comprises two hinging elements pivoted to each other by a central pin, in which one of the two hinging elements comprises a U-shaped plate that forms two parallel parts, of which one is associated with the central pin and the other can be connected to the element to be hinged. An adjustment screw is disposed between the two parts of the U-shaped plate to bring them together, against the action of a spring, also disposed between the two parts and which tends to distance them.

[0007] From the US patent US-B-5.799.370 a hinge is known that comprises two hinging plates pivoted to each other by a central pin, in which one of the two plates is inserted into a long and very wide slit made in a container shaped like a parallelepiped. An adjustment screw is provided to adjust the inclination of the plate inside the slit.

[0008] From the German patent DE-B-10 2007 019 938 a hinge is known that comprises two hinging plates pivoted to each other by a central pin, in which one of the two plates, at an end opposite the pivoting end, is provided with two teeth inserted into two corresponding apertures made on the wall of a long and very wide slit formed by two containing elements. Two adjustment screws are provided to adjust the inclination of the plate inside the slit.

[0009] One purpose of the present invention is to obtain a hinge to articulate a mobile structure with respect to a fixed structure which comprises two hinging elements, able to be coupled by a pin and a corresponding axial cavity, in which it is possible to adjust both the reciprocal distance between the mobile structure and the fixed structure in a first direction perpendicular to the hinging axis, and also the reciprocal position of the two hinging elements, in a second direction parallel to the hinging axis, and that said adjustments can be made quickly and simply, even by a user.

[0010] Another purpose of the present invention is to obtain a hinge to articulate a mobile structure with respect to a fixed structure which consists of a limited number of components, to be easily installed, and in which it is easy to make said adjustments even when the mobile structure is installed, that is, hinged to the fixed structure, and without needing to remove it from the latter.

[0011] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0012] The present invention is set forth and characterized in the main claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0013] In accordance with the above purposes, a hinge according to the present invention is configured to articulate a mobile structure with respect to a fixed structure and comprises a first hinging element, provided with a pin and configured to be attached to one of the two structures to be hinged, and a second hinging element provided with a part in which a cylindrical cavity is made and

configured to be attached to the other of the two structures to be hinged. The pin and the cylindrical cavity are configured to be hinged to each other along a common hinging axis. Moreover, first adjustment means are provided in at least one of the two hinging elements in order to adjust the reciprocal distance between the mobile structure and the fixed structure in a first direction perpendicular to the hinging axis. The first adjustment means comprise a first articulation element attached to the part in which the cylindrical cavity is made or to the pin. The first articulation element comprises a first platelet substantially shaped like a parallelepiped with a substantially rectangular base and a second articulation element configured to be attached to one of the two structures to be hinged, for example the mobile structure. Moreover the two articulation elements are articulated to each other so that the first articulation element can incline with respect to the second articulation element. The first adjustment means also comprise at least one connection member configured to be constrained to the first articulation element and screwable on the second articulation element.

[0014] According to one characteristic of the present invention, the second articulation element comprises a second platelet also substantially shaped like a parallelepiped with a substantially rectangular base and provided on one lateral edge with a bend parallel to the hinging axis and preferably a few millimeters deep, which defines a seating in which one edge of the first platelet is inserted with play, preferably by a few millimeters, one edge of the first platelet opposite the one attached to the part in which the cylindrical cavity is made.

[0015] According to another characteristic of the present invention, the connection member comprises a threaded stem screwable into a corresponding threaded hole of the second articulation element and two circular shoulders disposed at a reciprocal distance substantially equal to, or slightly greater than, the thickness of the first articulation element and engaging with the latter in correspondence with a corresponding through aperture of the first articulation element.

[0016] According to another characteristic of the present invention, the axis of the threaded stem is inclined by a few degrees with respect to a plane perpendicular to an external surface of the second articulation element.

[0017] According to another characteristic of the present invention, the hinge also comprises second adjustment means to adjust the reciprocal position of the two hinging elements in a second direction, parallel to the hinging axis.

[0018] According to another characteristic of the present invention, the second adjustment means comprise a threaded element screwable into one of the two hinging elements, coaxially to the hinging axis, in order to move the two hinging elements reciprocally closer to or away from each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These and other characteristics of the present invention will become apparent from the following description of a preferential embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a three-dimensional view of a hinge according to the present invention mounted on a fixed structure and a mobile structure;
- fig. 2 is an exploded view of the components of the hinge in fig. 1;
- fig. 3 is a cross section view of the hinge in fig. 1 in a first operating position, in which the mobile structure, when it is in a closed position, is at a minimum distance from the fixed structure;
- fig. 4 is a cross section view of the hinge in fig. 1 in a second operating position, in which the mobile structure, when it is in a closed position, is at an intermediate distance, between the minimum and a maximum, from the fixed structure;
- fig. 5 is a cross section view of the hinge in fig. 1 in a third operating position, in which the mobile structure, when it is in a closed position, is at the maximum distance from the fixed structure;
- fig. 6 is another cross section view of the hinge in fig. 1, taken in a different area than the three preceding section views, in order to highlight other details of the hinge.

[0020] We must clarify that in the present description and in the claims, the function of the terms "external", "upper" and "lower" is only to illustrate the present invention better, with reference to the drawings, and must in no way be used to limit the scope of the invention, nor the field of protection defined by the claims.

DETAILED DESCRIPTION OF ONE EMBODIMENT OF THE INVENTION

[0021] With reference to fig. 1, a hinge 10 according to the present invention is used to articulate a mobile structure 11, for example a panel of a door or window, with respect to a fixed structure 12, for example a frame of a door or window.

[0022] The hinge 10 comprises a first hinging element 13, of the male type, provided with a pin 14 (fig. 2) coaxial with a hinging axis X, and a second hinging element 15, of the female type, provided with a cylindrical cavity 16 configured to couple, with adequate play, with the pin 14.

[0023] The first hinging element 13 also comprises an attachment element 17 solid with the pin 14 and which, in the example given here, is substantially L-shaped. The attachment element 17 is provided with three through holes 18 into which attachment screws 19 are suitable to be inserted, to attach the first hinging element 13 to the fixed structure 12.

[0024] The second hinging element 15 comprises a first platelet 20 which is solid with the part in which the cylindrical cavity 16 is made, it is substantially shaped like a parallelepiped with a substantially rectangular base, rounded at the corners, and is provided with three cylindrical through holes 21, a slotted through hole 22 and a shaped slit 23.

[0025] The second hinging element 15 also comprises a second platelet 24, also shaped substantially like a parallelepiped with a substantially rectangular base, rounded at the corners and provided with a bend 25 that defines a seating 26, just slightly wider than the thickness of the second platelet 24 and only a few millimeters deep, for example from 1 mm to 7 mm, into which an edge of the first platelet 20 (the one furthest to the left in figs. 1 to 6), opposite the one attached to the part in which the cylindrical cavity 16 is made, is inserted with play, for a few millimeters. The second platelet 24 is also provided with three through holes 27 (fig. 2) and with three threaded holes 28a, 28b and 28c.

[0026] In the example given here, the front development of the substantially rectangular base of the second platelet 24 is substantially equal to that of the first platelet 20, although it remains true that for constructional requirements the two platelets 20 and 24 could also be different.

[0027] Three attachment screws 29 are provided to attach the second platelet 24 to the mobile structure 11, first passing through two of the three cylindrical through holes 21 and the upper part of the shaped slit 23 of the first platelet 20 (fig. 1), and then the three through holes 27 of the second platelet 24.

[0028] According to a new and original aspect of the present invention, the first platelet 20 is able to incline for a few degrees, for example up to 10°, preferably up to 6°, with respect to the second platelet 24, as one edge is inserted with play, for a few millimeters, into the seating 26 of the latter. In this way, it is possible to adjust the reciprocal distance D (figs. from 3 to 6) between the mobile structure 11 and the fixed structure 12 in a first direction, perpendicular to the hinging axis X.

[0029] To obtain this inclination, the hinge 10 is provided with two connection members 30 (fig. 2), each comprising a threaded stem 31 and two circular shoulders 32 and 33, the first at the head and the other internal. These are disposed at a reciprocal distance substantially equal to, or slightly greater than, the thickness of the first platelet 20, and engage with the latter in correspondence with the slotted through hole 22 and the lower part of the shaped slit 23.

[0030] The two threaded stems 31 can be screwed into the threaded holes 28a and 28b of the second platelet 24. The axis of each of the two threaded stems 31 (figs. 3 to 5) is inclined by a few degrees, for example from 2° to 5°, with respect to a plane perpendicular to the external surface of the second platelet 24.

[0031] A clamping screw 34 (figs. 1, 2 and 6) is provided to pass through one of the through holes 21 of the first platelet 20 (the one with the smallest diameter in fig. 2) and to be screwed into the threaded hole 28c of the second platelet 24.

[0032] The second hinging element 15 also comprises a threaded worm screw 35 (fig. 2) able to be selectively screwed on the upper part of the cylindrical cavity 16 to adjust the reciprocal position of the two hinging elements 13 and 15 in a second direction, parallel to the hinging axis X.

[0033] The hinge 10 as described heretofore is assembled as follows, before being installed.

[0034] First of all, the components of the second hinging element 15 are assembled.

[0035] In the first operation, the two connection members 30 are screwed into the threaded holes 28a and 28b of the second platelet 24.

[0036] Then, the two platelets 20 and 24 are coupled, so that the two connection members 30 are housed one in the slotted through hole 22 and the other in the shaped slit 23 of the first platelet 20, with the circular shoulders 32 and 33 disposed on opposite sides with respect to the latter, and so that the edge of the first platelet 20, opposite the one attached to the part where the cylindrical cavity 16 is made, is inserted into the seating 26 of the second platelet 24.

[0037] The clamping screw 34 is then screwed into the corresponding threaded hole 28c of the second platelet 24, after it has been made to pass in the corresponding cylindrical through hole 21 of the first platelet 20.

[0038] Once it has been assembled, the hinge 10 is installed as follows.

[0039] The first hinging element 13 is attached to the fixed structure 12 (figs. 1 and 2) by the attachment screws 19, in a manner substantially known to the persons of skill in the art.

[0040] The second hinging element 15 is attached to the mobile structure 11 by the attachment screws 29, after the latter two have been made to pass through the cylindrical through holes 21 with the biggest diameter and one through the shaped slit 23 of the first platelet 20, and all three through the through holes 27 of the second platelet 24.

[0041] After this, the distance D (figs. 3 to 6) between the mobile structure 11 and the fixed structure 13 is adjusted.

[0042] In particular, distance D is adjusted by screwing or unscrewing the two connection members 30. Indeed, when they are completely screwed in (fig. 3), these hold the first platelet 20 flattened against the flat external surface of the second platelet 24, so that distance D between the mobile structure 11 and fixed structure 13 is reduced to a minimum, for example 2 mm. By unscrewing the two connection members 30, the inclination of the first platelet 20 with respect to the second platelet 24 is obtained, thus increasing distance D between the mobile structure 11 and fixed structure 13 (fig. 4). By further unscrewing the two connection members 30, the inclination of the first platelet 20 with respect to the second platelet 24 is in-

creased, taking the mobile structure 11 to the maximum distance D, for example 10 mm, from the fixed structure 13 (fig. 5).

[0043] The clamping screw 34 (fig. 6) is tightened when distance D is as desired by the user, who can carry out the adjustment according to his own requirements, acting on the two connection members 30, without removing the mobile structure 11 from the fixed structure 13.

[0044] Furthermore, irrespective of the adjustment of the distance D as described heretofore, it is also possible to adjust the axial distance between the two hinging elements 13 and 15, along the hinging axis X, by screwing or unscrewing the threaded worm screw 35.

[0045] It is clear that modifications and/or additions of parts may be made to the hinge 10 as described heretofore, without departing from the field and scope of the present invention.

[0046] For example, the first hinging element 13 could be the female type and comprise the cylindrical cavity 16, while the second hinging element 15 could be the male type and comprise the pin 14. In this case the first platelet 20 would be attached to the latter and not to the part where the cylindrical cavity 16 is made.

[0047] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of hinge to articulate a mobile structure with respect to a fixed structure, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Hinge to articulate a mobile structure (11) with respect to a fixed structure (12), comprising a first hinging element (13), provided with a pin (14) and configured to be attached to one of said two structures (11, 12), and a second hinging element (15), provided with a part in which a cylindrical cavity (16) is made and configured to be attached to the other of said two structures (12, 11), wherein said pin (14) and said cylindrical cavity (16) are configured to be hinged to each other along a common hinging axis (X), and wherein first adjustment means (20, 24, 30) are provided in at least one of said hinging elements (13, 15) in order to adjust the reciprocal distance (D) between said mobile structure (11) and said fixed structure (12) in a first direction perpendicular to said hinging axis (X), wherein said first adjustment means comprise a first articulation element attached to said pin (14) or to said part in which said cylindrical cavity (16) is made, and comprising a first platelet (20) substantially shaped like a parallelepiped with a substantially rectangular base and a second articulation element configured to be attached to one of said two structures (12), wherein said two articulation elements are articulated to each other so that said first articulation element can incline with respect to said second articulation element, and wherein said first adjustment means comprise at least a connection member (30) configured to be constrained to said first articulation element and screwable on said second articulation element, **characterized in that** said second articulation element comprises a second platelet (24) also substantially shaped like a parallelepiped with a substantially rectangular base and provided on a lateral edge with a bend (25) parallel to said hinging axis (X) and preferably a few millimeters deep, which defines a seating (26) in which one edge of said first platelet (20), opposite the one attached to said part in which said cylindrical cavity (16) is made, is inserted with play, preferably by a few millimeters.

2. Hinge as in claim 1, **characterized in that** said seating (26) is slightly wider than the thickness of said second platelet (24) and is from 1 mm to 7 mm deep.

3. Hinge as in claim 1 or 2, **characterized in that** said connection member (30) comprises a threaded stem (31) screwable into a corresponding threaded hole (28a, 28b) of said second platelet (24) and two circular shoulders (32, 33) disposed at a reciprocal distance substantially equal to, or slightly greater than, the thickness of said first platelet (20) and engaging with the latter in correspondence with a corresponding through aperture (22, 23) of said first platelet (20).

4. Hinge as in claim 3, **characterized in that** the axis of said threaded stem (31) is inclined by a few degrees with respect to a plane perpendicular to an external surface of said second platelet (24).

5. Hinge as in any claim hereinbefore, **characterized in that** second adjustment means (35) are provided to adjust the reciprocal position of said two hinging elements (13, 15) in a second direction, parallel to said hinging axis (X).

6. Hinge as in claim 5, **characterized in that** said second adjustment means comprise a threaded element (35) screwable into one of said two hinging elements (13, 15), coaxially to said hinging axis (X), in order to move said two hinging elements (13, 15) reciprocally closer to or away from each other.

7. Hinge as in any claim hereinbefore, **characterized in that** the front development of the substantially rectangular base of said second platelet (24) is substantially equal to that of said first platelet (20).

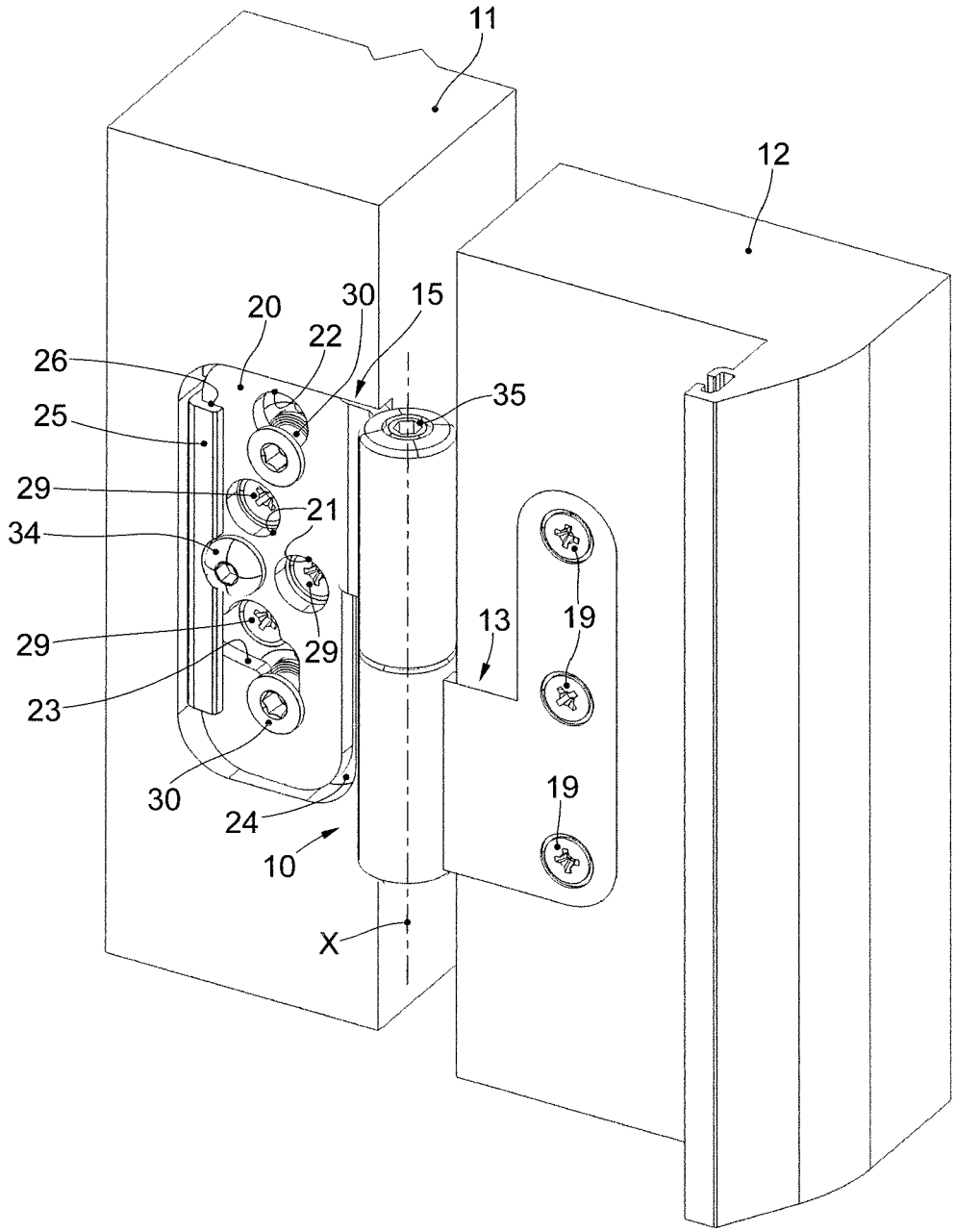

fig. 1

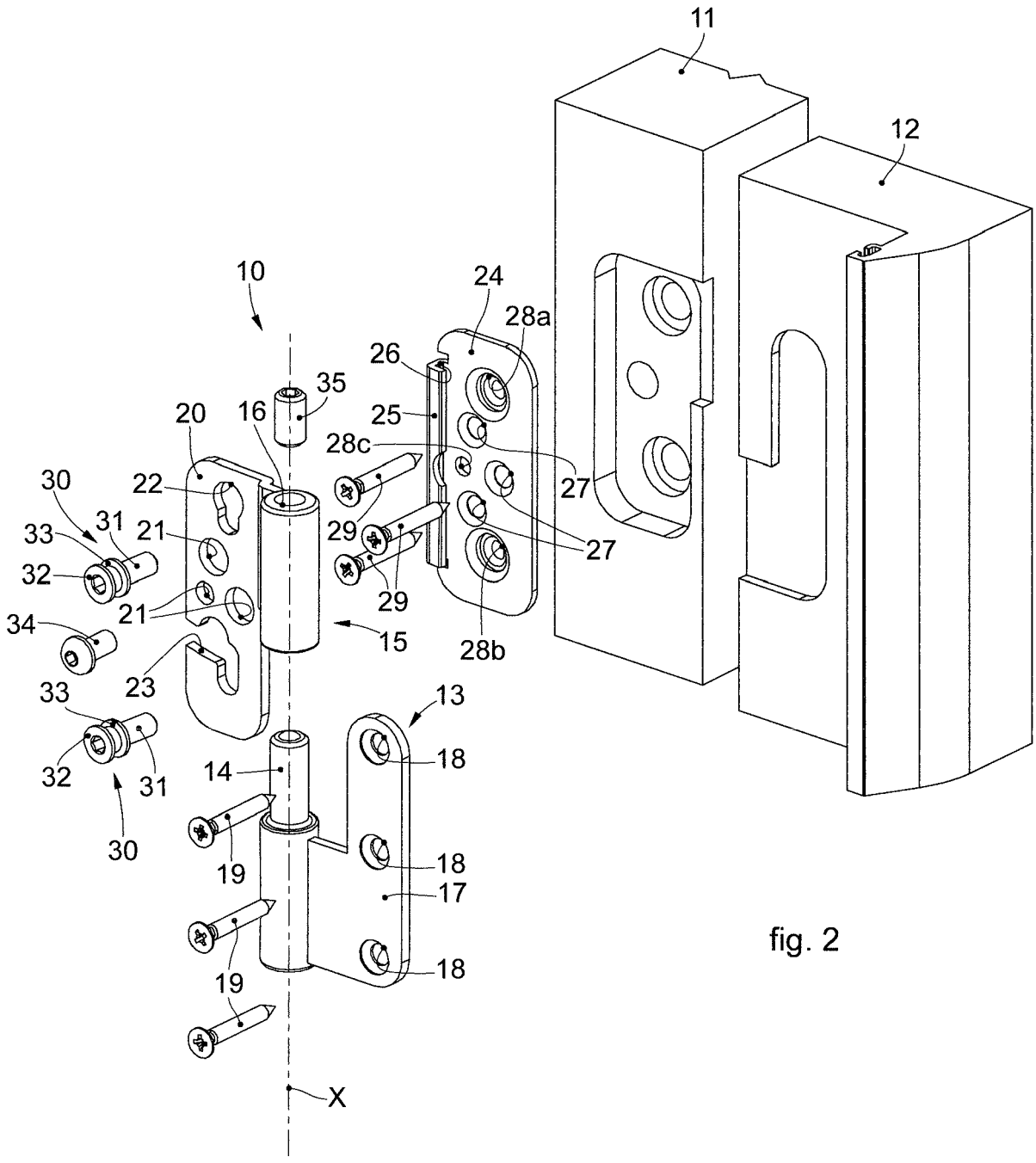
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fig. 2

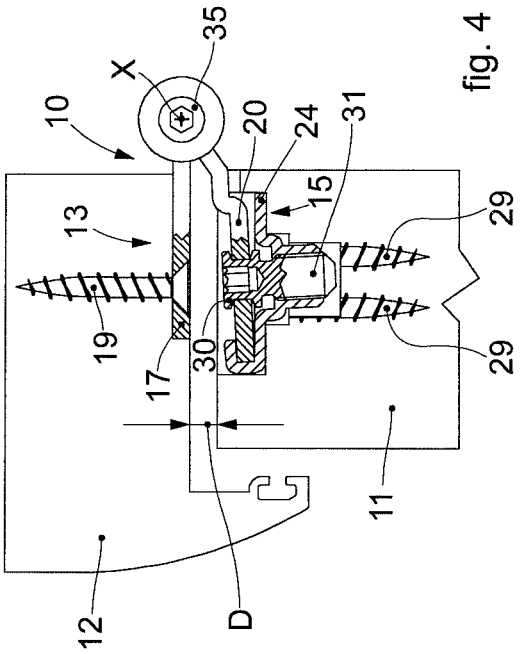

fig. 4

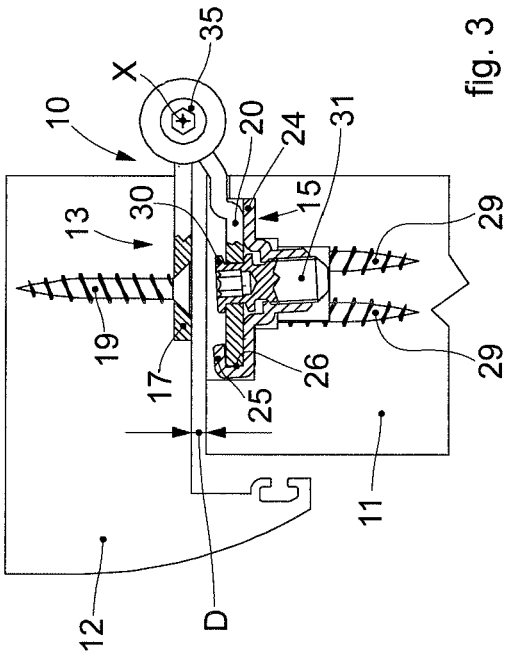

fig. 3

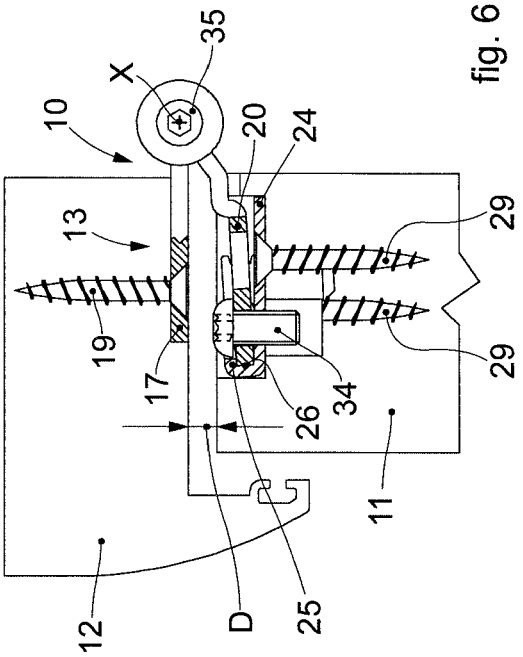

fig. 6

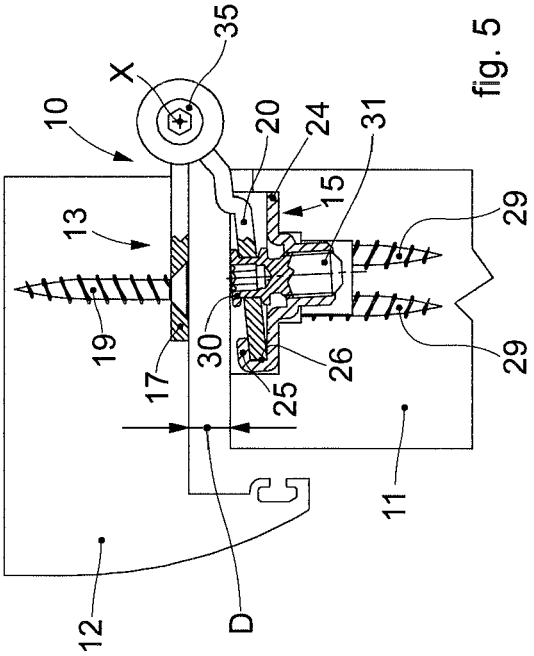

fig. 5

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 January 2017	Rémondot, Xavier

CATEGORY OF CITED DOCUMENTS

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