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(54) **HINGE, FRAME-PANEL ASSEMBLY FOR CLOSING AN OPENING AND PROCESS FOR ADJUSTING A FRAME-PANEL ASSEMBLY**

(57) Hinge (1) comprising two hinge elements (2, 3), each of which provided with a main extension along an extension axis (T, T'). In addition, each hinge element (2, 3) is embedded in a containment space (120, 130) respectively of a panel (12) and of a frame (13) and is perimetrically delimited by a peripheral edge (21, 31). In particular, the hinge (1) comprises at least one eccentric adjustment body (71, 72), which is mechanically connected to at least one of the hinge elements (2, 3) and is susceptible of being moved between at least one retracted position and at least one extended position, and in such positions the eccentric adjustment body (71, 72) projects from the corresponding peripheral edge (21, 31) to a different extent in order to adjust the position of the hinge elements (2, 3) with respect to the respective containment spaces (120, 130).

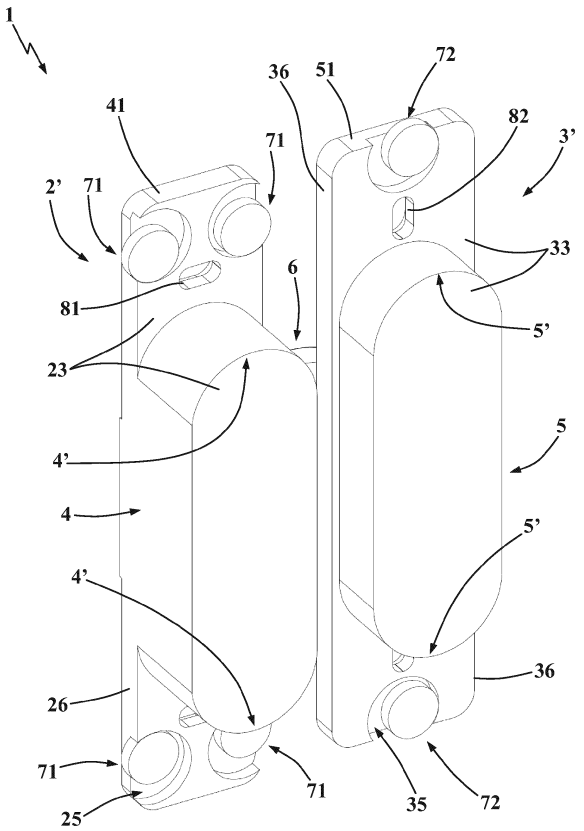

Fig. 2

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Description

Field of application

[0001] The present invention regards a hinge, in particular for windows/doors/shutters or furniture pieces, a frame-panel assembly for closing a space or a wall opening and a process for adjusting a frame-panel assembly according to the preamble of the respective independent claims.

[0002] The present hinge is advantageously intended to be employed for rotatably associating with each other a panel of a window/door/shutter or a furniture piece, such as for example a door, a window or the panel of a wardrobe, and a fixture, i.e. a frame, of a frame-panel assembly for closing a space or a wall opening, for example for closing an opening defined by the frame itself.

[0003] The hinge, object of the present invention, is advantageously but not exclusively of the type termed in the jargon of the field "concealed" or even "invisible", since it is not visible from the outside once the panel is placed in a closed position, since all the elements that constitute the hinge come to be situated substantially completely embedded within the panel and the frame.

[0004] The hinge and the assembly, object of the present invention, are therefore inserted in the field of windows/doors/shutters, in the field of production and mounting of accessories for windows/doors/shutters and more generally in the field of interior furnishing and of production of windows/doors/shutters and furniture pieces.

[0005] In addition, the process, object of the invention, is intended to be used in order to adjust the position of the aforesaid hinge and consequently advantageously the relative position between the components of an assembly for closing a space or a wall opening, for example of the panel with respect to the frame.

State of the art

[0006] As is known, in the field of windows/doors/shutters the hinges usually consist of two hinge elements, of which one is fixed to the frame of a window/door/shutter or of a furniture piece (such as for example the jam of a door) and one is fixed to the panel, such as for example a door, which are mechanically connected to each other by one or multiple articulation arms in order to allow a rotation of the panel with respect to the frame, usually of about 180° around a central hinging axis. In the case of the present invention, reference will preferably, even if not exclusively, be made to a hinge of concealed (or invisible) type, in which the bodies of the same hinge are embedded within cavities of the structure of the panel and of the frame such that only portions of the articulation arms, between the two bodies of the hinge itself, protrude beyond the shape thereof.

[0007] More in detail, each hinge body comprises a hull, which is intended to be embedded in a cavity made in the panel or in the frame and delimits a seat in which the articulation arms are at least partially housed. In addition, the hull is generally provided with two fixing wings which are extended towards the exterior of the seat along its main extension axis, for fixing to the panel or to the frame, for example with screws.

[0008] In the field of windows/doors/shutters, numerous type of hinges are known, which differ from each other due to the different technical selections employed in the levers that make up the articulation arms, and which can employ rotation-only pins or also slidable elements, or elements provided with rotation-translation, as well as due to the different sizes of the hulls that can allow housing articulations that are more complex but at the same time may involve limitations in the selection of the panels and of the frames.

[0009] The main drawback of the simpler, low-cost hinges lies in the fact that their fixing position on the frame is not adjustable and is substantially determined by the cavity made in the panel intended to receive the hull of the hinge.

[0010] Therefore, if during the step of mounting the window/door/shutter or the furniture piece it is necessary to adjust the mutual distance between panel and frame, it is not possible to move the hinge along the frame itself.

[0011] In order to at least partially overcome the aforesaid drawback, several adjustable hinges are known on the market which allow varying the relative position between panel and frame during the step of mounting the window/door/shutter or of the furniture piece, with respect to three axes that are orthogonal to each other.

[0012] In particular adjustable hinges are known which provide that the hull of one of the hinge elements carries, slidably mounted thereon, an intermediate adjustment body, which in turn contains an internal adjustment body. On the internal adjustment body, the articulation arms are pivoted which rotatably connect the hinge elements respectively mounted on the panel and on the frame.

[0013] In particular, the position of the intermediate adjustment body is vertically adjustable with respect to the hull and the position of the internal adjustment body is horizontally adjustable with respect to the intermediate adjustment body, in a manner such to be able to adjust the position of the panel with respect to the frame.

[0014] Several examples of the latter hinges of known type are described in the documents EP 1308592 A2, DE 202010010645 U1 and EP 3271538 A1.

[0015] Also the hinge of known type described in brief up to now has in practice demonstrated that it does not lack drawbacks.

[0016] The main drawback lies in the fact that the adjustment of the position of the panel is decidedly inconvenient. Indeed, in order to execute such adjustment, the operator must apply wedges below the panel in order to place it in the desired position and then fix the internal body to the intermediate body by means of fixing means such as screws or grub screws. In addition, the operator must complete a force in order to lift the panel and exe-

cute the adjustment, rendering such operation even more difficult.

[0017] A further drawback lies in the fact that the hinge of known type does not allow a precise adjustment, since the movement of the intermediate body occurs manually and it is impossible for the operator to accurately adjust the position of the intermediate body.

[0018] A further drawback lies in the fact that such hinges are structurally complex and costly, since it is necessary to arrange three bodies that are slidably associated with each other, as well as fixing means of the hull to the frame or to the panel, and of the intermediate adjustment body to the hull of the hinge itself, as well as of the intermediate adjustment body to the internal adjustment body. Such costs are not justified in all cases, but generally only for armored/reinforced windows/doors/shutters and for particular applications.

[0019] In accordance with other known, structurally simpler solutions, the hinge is not provided with intermediate or internal bodies. In this case, the cavity made in the panel or in the frame is provided with clearance with respect to the hull of the hinge. During the mounting step, therefore, the hull is fixed in the respective cavity closer or less close to the walls of the cavity itself based on the desired adjustment.

[0020] Also in this case, the described solution has the same drawbacks indicated for the hinge described above, i.e. the difficulty of a precise adjustment, the inconvenience of using edges and the need to complete forces in order to lift the panel.

Presentation of the invention

[0021] Therefore, in this situation, the problem underlying the present invention is to overcome the drawbacks of the abovementioned prior art, by providing a hinge, in particular for windows/doors/shutters or furniture pieces, a frame-panel assembly for closing a space or a wall opening and a process for adjusting a frame-panel assembly, which allow an adjustment of the relative position of the components of the window/door/shutter or of the furniture piece, e.g. panel and frame, in a convenient manner for the operator assigned for mounting the hinge.

[0022] A further object of the present invention is to provide a hinge, a frame-panel assembly and an adjustment process, which allow an adjustment of the relative position of the panel with respect to the frame that is precise and accurate.

[0023] A further object of the present invention is to provide a hinge and a frame-panel assembly, which are structurally simple to attain.

[0024] A further object of the present invention is to provide an adjustment process, which is simple and quick to actuate.

[0025] A further object of the present invention is to provide an adjustment process, which does not require excessive physical force of the operator.

[0026] A further object of the present invention is to provide a hinge and a frame-panel assembly, which is inexpensive to attain.

[0027] A further object of the present invention is to provide a hinge, which is safe and entirely reliable in operation.

Brief description of the drawings

[0028] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen in the contents of the enclosed claims and the advantage thereof will be more evident in the following detail description, made with reference to the enclosed drawings, which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 shows a perspective front view of a first embodiment of a concealed hinge, object of the present invention;
- figure 2 shows a perspective rear view of the hinge of figure 1;
- figure 3 shows a partially exploded view of a detail of the frame-panel assembly, object of the present invention, mounting the aforesaid concealed hinge of figure 1;
- figure 4 shows a front view of the concealed hinge of figure 1 according to the invention;
- figure 5 shows a sectional view of a second hinge element of the concealed hinge of figure 1, object of the present invention, attained along the trace V-V of figure 4;
- figure 6 shows a sectional view of a first hinge element of the concealed hinge of figure 1, object of the present invention, attained along the trace VI-VI of figure 4;
- figure 7 shows a front view of a detail of the frame-panel assembly, object of the present invention, in accordance with a first adjustment position and mounting the aforesaid concealed hinge of figure 1;
- figure 8 shows a perspective view of the detail of the frame-panel assembly according to the invention illustrated in figure 7;
- figure 9 shows a front view of a detail of the frame-panel assembly, object of the present invention, in accordance with a second adjustment position and mounting the aforesaid concealed hinge of figure 1;
- figure 10 shows a perspective view of the detail of the frame-panel assembly according to the invention illustrated in figure 9 and mounting the aforesaid concealed hinge of figure 1;
- figure 11 shows a perspective front view of a second embodiment of a hinge, object of the present invention;
- figure 12 shows a front view of the hinge of figure 11 according to the invention;
- figure 13 shows a front view of a detail of the frame-panel assembly, object of the present invention, in accordance with a first adjustment position and

mounting the aforesaid hinge of figure 11;

- figure 14 shows a perspective view of the detail of the frame-panel assembly according to the invention illustrated in figure 13.

Detailed description

[0029] With reference to the enclosed drawings, reference number 1 indicates the hinge, object of the present invention, in its entirety.

[0030] The hinge 1 according to the invention is intended to be employed, in particular for windows/doors/shutters or furniture pieces, for rotatably connecting a panel 12, for example a movable member of a window/door/shutter such as a door, a window or the panel of a furniture piece, and a frame 13, for example a frame of a door or a structure for supporting a furniture piece. Advantageously, the hinge 1, which the present invention refers to and as described in the enclosed figures 1-10, is of concealed type, i.e. it is not visible from the outside once the panel 12 is placed in a closed position, since all the elements that constitute the concealed hinge 1 are substantially embedded within the same panel 12 and the same frame 13. Without departing from the protective scope of the present finding, the hinge 1 can nevertheless be of more conventional type with articulation means 6 (described hereinbelow) that remain visible even with the panel placed closed, as illustrated in the embodiment of figures 11-14.

[0031] The hinge 1 comprises a first hinge element 2 and a second hinge element 3, each of which provided with a main extension along an extension axis T, T' and advantageously provided with two lateral wings 40, 50 extended along the corresponding extension axis T, T'.

[0032] In addition, each first hinge element 2 and second hinge element 3 is embedded in a containment space 120, 130 respectively of a panel 12 and of a frame 13 and is perimetrically delimited by a peripheral edge 21, 31.

[0033] More in detail, each hinge element 2, 3 is advantageously provided with an external face 22, 32 and with an opposite internal face 23, 33 intended to be placed in the respective containment space 120, 130.

[0034] In particular, with the expressions "external face" and "internal face", these are to be intended as all the surface areas of the hinge 1 intended to be directed respectively towards the exterior, i.e. visible with the hinge 1 in open position, and towards the interior of the containment space 120, 130. Advantageously, at least one between the external face 22, 32 and the internal face 23, 33 is delimited by the aforesaid peripheral edge 21, 31.

[0035] Advantageously, the external faces 22, 32 of the first hinge element 2 and of the second hinge element 3 remain visible once the hinge 1, object of the present invention, is mounted on the window/door/shutter (with the panel 12 open), while the internal faces 23, 33 of the first hinge element 2 and of the second hinge element 3 are housed within the panel 12 or the frame 13 of the window/door/shutter and therefore invisible for the user.

[0036] In accordance with a preferred but non-limiting embodiment, regarding which reference will be made hereinbelow merely for exemplifying purposes, the first hinge element 2 is intended to be embedded in the panel 12 of the window/door/shutter (or of the furniture piece) and the second hinge element 3 is intended to be embedded in the frame 13 of the window/door/shutter (or of the furniture piece) itself.

[0037] Otherwise, in accordance with an embodiment variant, the first hinge element 2 can be intended to be advantageously embedded within the frame 13 of the window/door/shutter and the second hinge element 3 can be intended to be embedded in the panel 12 of the window/door/shutter itself, without departing from the protective scope of the present finding.

[0038] According to the invention, the hinge 1 also comprises articulation means 6, which rotatably connect the first hinge element 2 and the second hinge element 3 around a rotation axis X, substantially parallel to the extension axes T, T' of the hinge elements 2, 3, in order to move the hinge elements 2, 3 between a closed position, in which advantageously the external faces 22, 32 of the first hinge element 2 and of the second hinge element 3 are substantially facing, and an open position, in which advantageously the external faces 22, 32 of the first hinge element 2 and of the second hinge element 3 are moved away from each other.

[0039] Advantageously, the articulation means 6 are provided with at least one substantially central pin 62, which defines the aforesaid rotation axis X. In accordance with the embodiments illustrated hereinbelow, during the movement of the first hinge element 2 with respect to the second hinge element 3, the pin 62 of the articulation means 6 can be moved along a trajectory that lies on the aforesaid plane orthogonal to the rotation axis X itself and in particular substantially horizontal with the hinge 1 during use, for example in the case of a hinge 1 of concealed type (illustrated in figures 1-10), or it can remain fixed, for example in the case of a hinge of conventional visible type (illustrated in figures 11-14). Consequently, in the case of a concealed hinge 1 also the rotation axis X is advantageously movable along the same trajectory of the pin 62 of the articulation means 6. Advantageously, the external faces 22, 32 of the hinge elements 2, 3 lie on corresponding planes parallel to the rotation axis X and which are parallel to each other and facing when the hinge 1 is in closed position.

[0040] In accordance with the idea underlying the present invention, the hinge 1 comprises at least one eccentric adjustment body 71, 72 mechanically connected to at least one of the hinge elements 2, 3, and in particular is advantageously provided at at least one lateral wing 40, 50 with at least one of the hinge elements 2, 3.

[0041] In addition, the aforesaid eccentric adjustment body 71, 72 is susceptible of being moved between at least one retracted position and at least one extended

position, and in such positions the eccentric adjustment body 71, 72 projects from the corresponding peripheral edge 21, 31 to a different extent in order to adjust the position of the hinge elements 2, 3 with respect to the respective containment spaces 120, 130.

[0042] More in detail, the eccentric adjustment body 71, 72 is advantageously rotatably movable between the retracted position and the extended position by means of rotation around a pivoting axis Z thereof, which is preferably substantially orthogonal to the internal face 23, 33 and/or to the external face 22, 32 of the respective hinge element 2, 3 and/or advantageously orthogonal to the lying plane of the corresponding lateral wing 40, 50.

[0043] In particular, the containment space 120, 130 of the panel 12 or of the frame 13 is preferably delimited at least by a perimeter wall 121, 131 and by a bottom wall 122, 132 and, in the movement between the retracted position and the extended position or between two or more different extended positions, the eccentric adjustment body 71, 72 is advantageously intended to act in abutment against the perimeter wall 121, 131 of the containment space 120, 130 in order to adjust the position of the hinge element 2, 3 with respect to the containment space 120, 130 and, consequently, the relative position between panel 12 and frame 13.

[0044] Therefore, the containment space 120, 130 of the panel 12 and of the frame 13 advantageously has dimensions substantially greater than the respective hinge element 2, 3 contained at its interior. In particular, the containment space 120, 130 is advantageously obtained via milling and is advantageously shaped in a manner such to leave a clearance at least between the peripheral edge 21, 31 of the hinge element 2, 3 and the perimeter wall 121, 131 of the containment space 120, 130. In accordance with the embodiment solution visible in particular for example in figure 2, the eccentric adjustment bodies 71, 72 have substantially circular shape and are pivoted to the corresponding lateral wing 40, 50 in an eccentric manner.

[0045] Of course, without departing from the protective scope of the present invention, the eccentric adjustment bodies 71, 72 can have any other shape, e.g. oval or elliptical shape.

[0046] In order to decrease the bulk of the hinge 1 itself, on the internal face 23, 33 or on the external face 22, 32 of at least one hinge element 2, 3, preferably on the internal face 23, 33, is made at least one cavity 25, 35 in which the eccentric adjustment body 71, 72 is housed.

[0047] Otherwise, in accordance with a non-illustrated embodiment variant, the cavity 25, 35 is made starting from the peripheral edge 21, 31 of the hinge element 2, 3 and is obstructed on two sides by the external face 22, 32 and by the internal face 23, 33 of the hinge element 2, 3. In this manner, the eccentric adjustment body 71, 72 within the cavity 25, 35 is only visible if it projects from the peripheral edge 21, 31 in extended position, even if the hinge 1 is not mounted on the panel 12 or on the frame 13.

[0048] As illustrated for example in figure 3, each eccentric adjustment body 71, 72 comprises an eccentric adjustment head 70 and a substantially cylindrical pivoting portion 70', placed advantageously protruding from the adjustment head 70. The pivoting portion 70' is mounted on the corresponding lateral wing 40, 50 by means of insertion in a corresponding hole made on the lateral wing 40, 50 itself. For example, the pivoting portion 70' can be maintained within the hole (advantageously through) by means of fitting engagement or by means of the use of a fixing screw. Advantageously, connected to at least one (and preferably to each) of the two hinge elements 2, 3 are at least two corresponding adjustment bodies 71, 72.

[0049] Advantageously, the hinge 1, and in particular at least one of the two hinge elements 2, 3, comprises at least two first adjustment bodies 71 placed at the peripheral edge 21, 31 in opposite positions with respect to the extension axis T, T' of the hinge element 2, 3.

[0050] In particular, the peripheral edge 21, 31 of the hinge element 2, 3 is provided, advantageously at least at the respective lateral wings 40, 50, with opposite vertical sides 26, 36, substantially parallel to the extension axis T, T'. Advantageously, the first adjustment bodies 71 are placed at the aforesaid vertical sides 26, 36 of the peripheral edge 21, 31.

[0051] In accordance with the preferred embodiment illustrated in the enclosed figures, the hinge 1 is provided with two pairs of first adjustment bodies 71, preferably mounted on the first hinge element 2, which are each mounted on a respective opposite lateral wing 40 of the hinge element 2.

[0052] In this manner, it is possible to adjust the position of the hinge element 2 along a direction that is orthogonal with respect to its extension axis T in order to approach or space panel 12 and frame 13 on which the hinge elements 2, 3 are mounted.

[0053] Advantageously, the peripheral edge 21, 31 of at least one of the hinge elements 2, 3 is provided, advantageously at the respective lateral wings 40, 50, with opposite end sides 41, 51 along the extension axis T, T', which are advantageously substantially perpendicular to the extension axis T, T'.

[0054] Advantageously, in addition, the hinge comprises at least two second adjustment bodies 72, each placed at the aforesaid respective end side 41, 51.

[0055] Preferably, the second adjustment bodies 72 are aligned along the extension axis T, T' of the hinge element 2, 3.

[0056] In accordance with the preferred embodiment illustrated in the enclosed figures, the hinge 1 is provided with only one pair of second adjustment bodies 72, preferably mounted on the second hinge element 3, each of which mounted on a respective opposite lateral wing 50 of the hinge element 3.

[0057] Of course, without departing from the protective scope of the invention, the hinge 1 can be provided with more than two second adjustment bodies 72.

[0058] In this manner, it is possible to adjust the position of the hinge element 3 along a direction parallel with respect to its extension axis T' in order to lift or lower the panel 12 with respect to the frame 13.

[0059] In accordance with the embodiment illustrated in the enclosed figures, the first hinge element 2 is provided with two pairs of first adjustment bodies 71.

[0060] In addition, the second hinge element 3 is advantageously provided with a pair of second adjustment bodies 72.

[0061] Otherwise, in accordance with a non-illustrated embodiment variant of the invention, the first and the second adjustment bodies 71, 72 are mounted respectively on the second and on the first hinge element 3, 2, without departing from the protective scope of the invention.

[0062] Otherwise, additionally, in accordance with further non-illustrated embodiment variants of the invention, the first and the second adjustment bodies 71, 72 are only mounted on the first hinge element 2 or only on the second hinge element 3.

[0063] In accordance with a different embodiment not illustrated in the enclosed figures, at least one of the hinge elements 2, 3 is provided with only one eccentric adjustment body 71, 72. For example, it is possible to arrange only one second adjustment body 72 on the second hinge element 3, in particular at the lower end side 51 of the latter.

[0064] By means of use of the eccentric adjustment bodies 71, 72, the hinge 1 is thus adjustable in a simple and fast manner, by executing the rotation of the eccentric adjustment bodies 71, 72 around the pivoting axis Z thereof, and bringing them to protrude from the peripheral edge 21, 31 and to act advantageously against the perimeter wall 121, 131 of the containment space 120, 130.

[0065] In particular, the perimeter wall 121, 131 of at least one containment space 120, 130, preferably both, is provided with two opposite vertical surfaces 123, 133, parallel to the extension axis T, T' of the hinge element 2, 3 and advantageously parallel to the vertical sides 26, 36 of the peripheral edge 21, 31. Advantageously, the first adjustment bodies 71 in at least one extended position act in abutment against the aforesaid vertical surfaces 123, 133 of the corresponding containment space 120, 130.

[0066] In addition, the perimeter wall 121, 131 of at least one containment space 20, 130, preferably of both, is advantageously provided with two opposite end surfaces 124, 134 (substantially in the case of the first embodiment), perpendicular to the extension axis T, T' of the hinge element 2, 3 and advantageously opposite the end sides 41, 51 of the peripheral edge 21, 31. Advantageously, the second adjustment bodies 72 in at least one extended position act in abutment against the aforesaid end surfaces 124, 134 of the corresponding containment space 120, 130.

[0067] Advantageously, the hinge 1 comprises fixing means 91, 92 mechanically connected to the first and to the second hinge element 2, 3 and arranged for fixing the latter respectively to the panel 12 and to the frame 13, in particular in the position defined by means of the eccentric adjustment body 71, 72. In order to maintain the hinge elements 2, 3 slidably associated with the panel 12 and with the frame 13, and in particular to the corresponding containment spaces 120, 130, the hinge 1 is advantageously provided with at least one elongated first guide seat 81, which is made on at least one of the hinge elements 2, 3, preferably on its lateral wing 40, 50, and is extended along a first adjustment direction Y substantially orthogonal to the extension axis T, T' of the corresponding hinge element 2, 3.

[0068] In addition, the hinge 1 is advantageously provided with first fixing means 91, which are placed to traverse the first guide seat 81 and are susceptible, when loosened, to make the first guide seat 81 slide along them and, when tightened, to fix the hinge element 2, 3 to the corresponding containment space 120, 130.

[0069] For example, the first fixing means 91 can comprise fixing screws 91', placed through in the first guide seat 81 and intended to be screwed to the corresponding panel 12 or frame 13 and in particular to the bottom wall 122, 132 of the corresponding containment space 120, 130.

[0070] In operation, the first fixing means 91 are completely tightened with a pre-established torque in order to operate, by acting in abutment with a head portion 91" against the external face 22, 32 of the hinge element 2, 3, a seal via friction between the internal face 23, 33 of the hinge element 2, 3 and the bottom wall 122, 132 of the containment space 120, 130. Otherwise, in order to modify the position of the hinge 1, the first fixing means 91 are advantageously loosened in order to allow free movement of the first guide seat 81 and hence the relative movement between the first fixing means 91 and the corresponding hinge element 2, 3. With the first fixing means 91 loosened, it is possible to act on the eccentric adjustment bodies 71, 72, in particular on the first adjustment bodies 71, by executing the rotation therefore in order to move the hinge 1 along the first adjustment direction Y. Advantageously, in addition, the hinge 1 is provided with at least one elongated second guide seat 82, which is made on at least one of the hinge elements 2, 3, preferably on its lateral wing 40, 50, and is extended along a second adjustment direction Y' substantially parallel to the extension axis T, T' of the corresponding hinge element 2, 3.

[0071] In addition, the hinge 1 is advantageously provided with second fixing means 92, which are placed to traverse the second guide seat 82 and are susceptible, when loosened, to make the second guide seat 82 slide along them and, when tightened, to fix said hinge element 2, 3 to the corresponding containment space 120, 130.

[0072] For example, the second fixing means 92, like the first fixing means 91, can comprise fixing screws 92', placed through in the second guide seat 82 and intended to be screwed to the corresponding panel 12 or frame 13 and in particular to the bottom wall 122, 132 of the cor-

responding containment space 120, 130.

[0073] In operation, the second fixing means 92 are completely tightened with a pre-established torque in order to operate, by acting in abutment with a head portion 92" against the external face 22, 32 of the hinge element 2, 3, a seal via friction between the internal face 23, 33 of the hinge element 2, 3 and the bottom wall 122, 132 of the containment space 120, 130. Otherwise, in order to modify the position of the hinge 1, the second fixing means 92 are advantageously loosened in order to free the movement of the second guide seat 82 and thus the relative movement between the second fixing means 92 and the corresponding hinge element 2, 3. With the second fixing means 92 loosened, it is possible to act on the eccentric adjustment bodies 71, 72, in particular on the second adjustment bodies 72, by executing the rotation thereof in order to move the hinge 1 along the second adjustment direction Y'.

[0074] In accordance with the preferred embodiment, illustrated in the enclosed figures, the hinge 1 is provided with two first guide seats 81 made on the first hinge element 2, and in particular each on a corresponding lateral wing 40, in order to adjust the first hinge element 1 along the first adjustment direction Y.

[0075] Advantageously, in addition, the hinge is provided with two second guide seats 82 made on the second hinge element 3, and in particular each on a corresponding lateral wing 50, in order to adjust the second hinge element 3 along the second adjustment direction Y'.

[0076] More in detail, the guide seats 81, 82 are shaped in the form of through holes placed along the respective adjustment directions Y, Y' and arranged for the passage of the fixing means 91, 92.

[0077] In accordance with an embodiment not illustrated in the enclosed figures, the hinge 1 can be provided with further adjustment systems, for example in order to adjust the position of the articulation means 6 with respect to the hinge elements 2, 3, which are of the type known in the field and therefore will not be described in detail.

[0078] Hereinbelow, two different embodiments of hinges 1 will be described of which a first is concealed, illustrated in figures 1-10, and a second is more conventional, with bodies pivoted by a visible protruding pin, illustrated in figures 11-14.

[0079] In accordance with the first embodiment illustrated in figures 1-10 the hinge 1 is of concealed type and provides that the hinge elements 2, 3 comprise hulls 2', 3' of elongated shape, one fixed to the panel 12 and the other fixed to the frame 13 and embedded within the respective containment spaces 120, 130, and articulation bodies 2", 3" housed within the housing seats 24, 34 of central seats 4, 5 made in the hull 2', 3' and to which the articulation means 6 are connected.

[0080] More in detail, each hull 2', 3' terminates, at its ends, with the abovementioned two lateral wings 40, 50, which are advantageously extended starting from respective ends 4', 5' of the central seat 4, 5. In accordance with this abovementioned embodiment at least one eccentric adjustment body 71, 72 is placed at at least one of the lateral wings 40, 50.

[0081] The articulation means 6 are per se well known to the man skilled in the art and therefore they will not be described in detail hereinbelow.

[0082] Advantageously, in accordance with this embodiment of concealed hinge 1, the articulation means 6 comprise multiple arms 61 connected to each other by means of connection pins 62 parallel to the rotation axis X.

[0083] In particular, the kinematic mechanism of the articulation means 6 is adapted to allow the movement of the hinge elements 2, 3 between the closed position and the open position with the rotation axis X which is movable on a plane orthogonal to the rotation axis X itself, advantageously in order to allow the articulation means 6 to return in the housing seats 24, 34 of the hinge elements 2, 3 when the concealed hinge 1 is in closed position.

[0084] In the closed position of the first hinge element 2 and of the second hinge element 3, the housing seats 24, 34 receive at their interior, at least partially, the articulation means 6, while in the open position the articulation means 6 are at least partially extracted from the housing seats 24, 34.

[0085] Each central seat 4, 5 of each hull 2', 3' appears as a box-like body provided with an open side (at the respective external face 22, 32 of the respective hinge element 2, 3) defining a passage for the traversing of the articulation means 6.

[0086] In accordance with the second embodiment illustrated in figures 11-14 the two hinge elements 2, 3 are made from two plates elongated along the extension axes T, T' which define, in the central part, the two articulation bodies 2", 3" and at the opposite ends the two lateral wings 40, 50, which must be intended extended from the end up to substantially a third of the longitudinal extension of the relative hinge element 2, 3. The articulation means 6 are connected to the two articulation bodies and advantageously comprise projecting plates, rotatably connected to each other by means of bodies with bushing form pivoted through a central pin 62, which defines the rotation axis X of the hinge 1.

[0087] Also forming the object of the present invention is a frame-panel assembly 10 for closing a space or a wall opening, preferably comprising the above-described hinge 1, regarding which the same reference numbers will be maintained for the sake of description simplicity, and regarding which both embodiments are referred to. Still for the sake of description simplicity, the main characteristics of the hinge 1, already described above, will still be used with reference to the assembly 10.

[0088] The frame-panel assembly 10 according to the invention is intended to be used in particular in windows/doors/shutters, e.g. doors or windows, or furniture pieces in order to close the opening defined advantageously by the frame 13 itself.

[0089] The frame-panel assembly 10, object of the invention comprises a panel 12 and a frame 13, each of which provided with a containment space 120, 130 delimited at least by a perimeter wall 121, 131 and by a bottom wall 122, 132. For example, the panel 12 and/or the frame 13 can be made, in a manner per se known in the field, by means of beams or sections made of wood or metal and can be advantageously provided with a hinging surface 12', 13', on which the corresponding containment space 120, 130 is made.

[0090] The frame-panel assembly 10 comprises, in addition, a hinge 1 of the type described above in accordance with the different embodiments, which is placed to connect the panel 12 and the frame 13 and comprising a first hinge element 2 and a second hinge element 3, each of which provided with a main extension along an extension axis T, T' and is advantageously provided with two lateral wings 40, 50 extended along the corresponding extension axis T, T'.

[0091] In addition, each hinge element is embedded in the containment space 120, 130 respectively of the panel 12 and of the frame 13 and is perimetrically delimited by a peripheral edge 21, 31.

[0092] More in detail, each hinge element 2, 3 is advantageously provided with an external face 22, 32 and with an opposite internal face 23, 33 placed in the respective containment space 120, 130. In particular, at least one between the external face 22, 32 and the internal face 23, 33 is delimited by the aforesaid peripheral edge 21, 31.

[0093] In accordance with a preferred but non-limiting embodiment and regarding which reference will be made hereinbelow for merely exemplifying purposes, the first hinge element 2 is embedded in the panel 12 of the window/door/shutter (or of the furniture piece) and the second hinge element 3 is embedded in the frame 13 of the window/door/shutter (or of the furniture piece) itself.

[0094] Otherwise, in accordance with a further embodiment, the first hinge element 2 can be advantageously embedded within the frame 13 of the window/door/shutter and the second hinge element 3 can be embedded within the panel 12 of the window/door/shutter itself, without departing from the protective scope of the present finding.

[0095] In accordance with the first embodiment illustrated in figures 1-10, the hinge 1 of the assembly 10 is of concealed type and provides that the hinge elements 2, 3 comprise hulls 2', 3' of elongated shape, one fixed to the panel 12 and the other to the frame 13 and embedded within the respective containment spaces 120, 130, and an articulation body 2", 3", housed within the housing seats 24, 34 of central seats 4, 5 made in the hull 2', 3' and to which articulation means 6 are connected. More in detail, each hull 2', 3' terminates at its ends with the abovementioned two lateral wings 40, 50, which are advantageously extended starting from respective ends 4', 5' of the central seat 4, 5. In accordance with this abovementioned embodiment at least one eccentric adjustment body 71, 72 is placed at at least one of the lateral wings 40, 50.

[0096] The articulation means 6 are per se well known to the man skilled in the art and therefore they will not be described in detail hereinbelow.

[0097] For example, with reference to this embodiment of concealed hinge illustrated in the enclosed figures, the articulation means 6 comprise multiple arms 61 that are connected to each other by means of connection pins 62 parallel to the rotation axis X.

[0098] In particular, the kinematic mechanism of the articulation means 6 is adapted to allow the movement of the hinge elements 2, 3 between the closed position and the open position with the rotation axis X which is movable on a plane orthogonal to the rotation axis X itself, in order to advantageously allow the articulation means 6 to return within the housing seats 24, 34 of the hinge elements 2, 3 when the concealed hinge 1 is in closed position.

[0099] In the closed position of the first hinge element 2 and of the second hinge element 3, the housing seats 24, 34 receive at their interior, at least partially, the articulation means 6, while in the open position the articulation means 6 are at least partially extracted from the housing seats 24, 34.

[0100] Each central seat 4, 5 of each hull 2', 3' appears as a box-like body provided with an open side (at the respective external face 22, 32 of the respective hinge element 2, 3) defining a passage for the traversing of the articulation means 6.

[0101] In accordance with the second embodiment illustrated in figures 11-14, the two hinge elements 2, 3 are made from two plates elongated along the extension axes T, T' which define, in the central part, the two articulation bodies 2", 3" and at the opposite ends the two lateral wings 40, 50, which must be intended extended from the end up to substantially a third of the longitudinal extension of the relative hinge element 2, 3. The articulation means 6 are connected to the two articulation bodies and advantageously comprise protruding plates that are rotatably connected to each other by means of bodies with bushing form pivoted through a central pin 62, which defines the rotation axis X of the hinge 1.

[0102] In accordance with the idea underlying the present invention, the hinge 1 of the frame-panel assembly 10 comprises at least one eccentric adjustment body 71, 72 mechanically connected to at least one of the hinge elements 2, 3, advantageously connected to at least one lateral wing 40, 50 of at least one of the hinge elements 2, 3.

[0103] In addition, the aforesaid eccentric adjustment body 71, 72 is susceptible of being moved between at least one retracted position and at least one extended position, and in such positions the eccentric adjustment body 71, 72 projects from the corresponding peripheral edge 21, 31 to a different extent and is susceptible of acting against perimeter wall 121, 131 of the containment space 120, 130 in order to adjust the position of the hinge

element 2, 3 with respect to the corresponding containment space 120, 130.

[0104] More in detail, the eccentric adjustment body 71, 72 of the hinge 1 is rotatably movable between the retracted position and the extended position by means of rotation around a pivoting axis Z thereof, which is preferably substantially orthogonal to the external face 22, 32 or to the internal face 23, 33 of the respective hinge element 2, 3 and/or advantageously orthogonal to the lying plane of the lateral wing 40, 50.

[0105] In particular, in the movement between the retracted position and the extended position or between two or more different extended positions, the eccentric adjustment body 71, 72 acts against the perimeter wall 121, 131 of the containment space 120, 130 in order to adjust the position of the hinge element 2, 3 with respect to the containment space 120, 130 and, consequently, the relative position between panel 12 and frame 13.

[0106] Therefore, the containment space 120, 130 of the panel 12 or of the frame 13 advantageously has greater size than the respective hinge element 2, 3 contained at its interior. In particular, the containment space 120, 130 is advantageously obtained via milling and is advantageously shaped in a manner such to leave a clearance at least between the peripheral edge 21, 31 of the hinge element 2, 3 and the perimeter wall 121, 131 of the containment space 120, 130.

[0107] In particular, the perimeter wall 121, 131 of at least one containment space 120, 130, preferably both, is provided with two opposite vertical surfaces 123, 133, parallel to the extension axis T, T' of the hinge element 2, 3. Advantageously, the extension of the vertical surfaces 123, 133 parallel to the extension axis T, T' is greater than the corresponding extension of the hinge element 2, 3, so as to allow the adjustment parallel to the extension axis T, T' itself.

[0108] In addition, the perimeter wall 121, 131 of at least one containment space 120, 130, preferably both, is advantageously provided with two opposite end surfaces 124, 134 (substantially horizontal in the case of the first embodiment), perpendicular to the extension axis T, T' of the hinge element 2, 3. Advantageously, the extension of the end surfaces 124, 134 perpendicular to the extension axis T, T' is greater than the corresponding extension of the hinge element 2, 3 along the perpendicular direction, so as to allow the adjustment perpendicular to the extension axis T, T' itself. Advantageously, the eccentric adjustment bodies 71, 72 are of the type already described above and therefore they will not be described more in detail hereinbelow.

[0109] Advantageously, the hinge 1 of the frame-panel assembly 10, and in particular at least one of the two hinge elements 2, 3, comprises at least two first adjustment bodies 71 placed at the peripheral edge 21, 31 in opposite positions with respect to the extension axis T, T' of the hinge element 2, 3. In particular, the peripheral edge 21, 31 of the hinge element 2, 3 is advantageously provided, at least at the respective lateral wings 40, 50, with opposite vertical sides 26, 36, substantially parallel to the extension axis T, T'. Advantageously, the first adjustment bodies 71 are placed at the aforesaid vertical sides 26, 36 of the peripheral edge 21, 31.

[0110] In accordance with the preferred embodiment illustrated in the enclosed figures, the hinge 1 is provided with two pairs of first adjustment bodies 71, preferably mounted on the first hinge element 2, which are each mounted on a respective opposite lateral wing 40 of the hinge element 2.

[0111] In this manner, it is possible to adjust the position of the hinge element 2 along a direction that is orthogonal with respect to its extension axis T in order to approach or space panel 12 and frame 13 on which the hinge elements 2, 3 are mounted. Advantageously, the first adjustment bodies 71 in at least one extended position act in abutment against the aforesaid vertical surfaces 123, 133 of the corresponding containment space 120, 130.

[0112] Advantageously, the peripheral edge 21, 31 of at least one of the hinge elements 2, 3 is advantageously provided, at the respective lateral wings 40, 50, with opposite end sides 41, 51, along the extension axis T, T', which are advantageously substantially perpendicular to the extension axis T, T'.

[0113] Advantageously, in addition, the hinge 1 comprises at least two second adjustment bodies 72 each placed at the aforesaid respective end side 41, 51.

[0114] Preferably, the second adjustment bodies 72 are aligned along the extension axis T, T' of the hinge element 2, 3.

[0115] In accordance with the preferred embodiment illustrated in the enclosed figures, the hinge 1 is provided with only one pair of second adjustment bodies 72, preferably mounted on the second hinge element 3, each of which mounted on a respective opposite lateral wing 50 of the hinge element 3.

[0116] Of course, without departing from the protective scope of the invention, the hinge 1 can be provided with more than two second adjustment bodies 72.

[0117] In this manner, it is possible to adjust the position of the hinge element 2, 3 along a direction that is parallel with respect to its extension axis T, T' in order to raise or lower the panel 12 with respect to the frame 13 on which the hinge elements 2, 3 are mounted. Advantageously, the second adjustment bodies 72 in at least one extended position act in abutment against the aforesaid end surfaces 124, 134 of the corresponding containment space 120, 130.

[0118] In accordance with the embodiment illustrated in the enclosed figures, the first hinge element 2 is provided with two pairs of first adjustment bodies 71.

[0119] In addition, the second hinge element 3 is advantageously provided with a pair of second adjustment bodies 72.

[0120] Otherwise, in accordance with a non-illustrated embodiment variant of the invention, the first and the second adjustment bodies 71, 72 are mounted respectively

on the second and on the first hinge element 3, 2, without departing from the protective scope of the invention.

[0121] Otherwise, in addition, in accordance with further non-illustrated embodiment variants of the invention, the first and the second adjustment bodies 71, 72 are only mounted on the first hinge element 2 or only on the second hinge element 3.

[0122] By means of the use of the eccentric adjustment bodies 71, 72, the hinge 1 is thus adjustable in a simple and fast manner, by executing the rotation of the eccentric adjustment bodies 71, 72 around the pivoting axis Z thereof and bringing them to protrude from the peripheral edge 21, 31 and to advantageously act against the perimeter wall 121, 131 of the containment space 120, 130.

[0123] In order to maintain the hinge elements 2, 3 slidably associated with the panel 12 and with the frame 13, and in particular with the corresponding containment spaces 120, 130, the hinge 1 is advantageously provided with at least one elongated first guide seat 81, which is made on at least one of the hinge elements 2, 3, preferably on the lateral wing 40, 50, and is extended along a first adjustment direction Y substantially orthogonal to the extension axis T, T' of the corresponding hinge element 2, 3.

[0124] In addition, the hinge 1 is advantageously provided with first fixing means 91, which are placed to traverse the first guide seat 81 and are susceptible, when loosened, to make the first guide seat 81 slide along them and, when tightened, to fix the hinge element 2, 3 to the corresponding containment space 120, 130.

[0125] For example, the first fixing means 91 can comprise fixing screws 91', placed through in the first guide seat 81 and intended to be screwed to the corresponding panel 12 or frame 13 and in particular to the bottom wall 122, 132 of the corresponding containment space 120, 130. Advantageously, moreover, the hinge 1 is provided with at least one elongated second guide seat 82, which is made on at least one of the hinge elements 2, 3, preferably on the lateral wing 40, 50, and is extended along a second adjustment direction Y' substantially parallel to the extension axis T, T' of the corresponding hinge element 2, 3.

[0126] In addition, the hinge 1 is advantageously provided with second fixing means 92, which are placed to traverse the second guide seat 82 and are susceptible, when loosened, to make the second guide seat 82 slide along them and, when tightened, to fix the hinge element 2, 3 to the corresponding containment space 120, 130.

[0127] For example, the second fixing means 92, like the first fixing means 91, can comprise fixing screws 92', placed through in the second guide seat 82 and intended to be screwed to the corresponding panel 12 or frame 13 and in particular to the bottom wall 122, 132 of the corresponding containment space 120, 130.

[0128] In accordance with the preferred embodiment, illustrated in the enclosed figures, the hinge 1 is provided with two first guide seats 81 made on the first hinge element 2, and in particular each on a corresponding lateral wing 40, for adjusting the first hinge element 2 along the first adjustment direction Y.

[0129] Advantageously, moreover, the hinge 1 is provided with two second guide seats 82 made on the second hinge element 3, and in particular each on a corresponding lateral wing 50, for adjusting the second hinge element 3 along the second adjustment direction Y'.

[0130] More in detail, the guide seats 81, 82 are shaped in the form of through slots placed along the respective adjustment directions Y, Y' and arranged for the passage of the fixing means 91, 92. Also forming the object of the invention is a process for adjusting the frame-panel assembly 10, object of the above-described invention, regarding which the same references will be maintained for the sake of description simplicity.

[0131] Advantageously, the process is intended to be employed in order to adjust the relative position between panel 12 and frame 13, by acting on the hinge 1 placed to connect them and in particular by modifying the relative position between at least one of the hinge elements 2, 3 and the corresponding containment space 120, 130 made on the panel 12 or on the frame 13.

[0132] In accordance with the idea underlying the present invention, the process comprises a step of loosening the fixing means, in which the first or second fixing means 91, 92 are loosened in order to allow the movement of the hinge element 2, 3 along the first or second adjustment direction Y, Y'. Advantageously, in the loosening step, the first fixing means 91 are loosened in order to allow free movement of the first guide seat 81 and thus the relative movement between the first fixing means 91 and the corresponding hinge element 2, 3.

[0133] Advantageously, in addition, the second fixing means 92 are loosened in order to allow free movement of the second guide seat 82 and hence the relative movement between the second fixing means 92 and the corresponding hinge element 2, 3.

[0134] According to the invention, the process also comprises an adjustment step, in which at least one of the eccentric adjustment bodies 71, 72 is moved between at least one retracted position and at least one extended position, and in such positions the eccentric adjustment body 71, 72 projects from the corresponding peripheral edge 21, 31 to a different extent, and acts in abutment against the perimeter wall 121, 131 of the corresponding containment space 120, 130, moving the hinge element 2, 3 along the first or the second adjustment direction Y, Y', preferably into a new desired adjustment position.

[0135] Therefore, with the first fixing means 91 loosened, it is possible to act on the first adjustment bodies 71, executing the rotation thereof in order to move the hinge 1 along the first adjustment direction Y.

[0136] In addition, with the second fixing means 92 loosened, it is possible to act on the second adjustment bodies 72, executing the rotation thereof in order to move the hinge 1 along the second adjustment direction Y'.

[0137] For example, figures 7-10 illustrate two exemplifying adjustment positions of the frame-panel assem-

bly 10, in which the passage between the first and the second position is obtained by means of rotation of the eccentric adjustment bodies 71, 72 in the adjustment step.

[0138] In particular, in a first adjustment position illustrated in figures 7 and 8, the first adjustment bodies 71 mounted on the first hinge element 2 are placed in a retracted position, in which they partially protrude from the peripheral edge 21. In such first position, the first fixing means 91 are placed in a substantially central position within the first guide seat 81 and the first hinge element 2 is placed centrally within the containment space 120 of the panel 12 with respect to the first adjustment direction Y.

[0139] In addition, in the first adjustment position illustrated in figures 7 and 8, the second adjustment bodies 72 mounted on the second hinge element 3 are placed in a retracted position, in which they partially protrude from the peripheral edge 31. In such first configuration the second fixing means 92 are placed in a central position within the second guide seat 82 and the second hinge element 3 is placed centrally within the containment space 130 of the frame 13 with respect to the second adjustment direction Y'.

[0140] In accordance with a second adjustment position illustrated in figures 9 and 10, two of the first adjustment bodies 71 mounted on the first hinge element 2 are placed in a completely retracted position, in which they are completely contained within the peripheral edge 21 and the other two first adjustment bodies 71 are placed in extended position, protruding with their maximum extension from the peripheral edge 21 of the first hinge element 2, and in particular protruding from one of the vertical sides 26 of the peripheral edge 21. In such second position, the first fixing means 91 are placed in an end position within the first guide seat 81 and the first hinge element 2 is placed adjacent to a vertical surface 123 of the containment space 120 of the panel 12.

[0141] In addition, in the second adjustment position illustrated in figures 9 and 10, one of the second adjustment bodies 72 mounted on the second hinge element 3 is placed in a completely retracted position, in which it is completely contained within the peripheral edge 31, and the other second adjustment body 72 is placed in extended position, protruding with the maximum extension from the peripheral edge 31 of the second hinge element 3. In such second position the second fixing means 92 are placed in an end position within the second guide seat 82 and the second hinge element 3 is placed adjacent to a horizontal surface 134 of the containment space 130 of the frame 13.

[0142] The process according to the invention comprises, in addition, a step of tightening the aforesaid fixing means, in which the first or second fixing means 91, 92 are tightened in order to newly fix the hinge element 2, 3 to the containment space 120, 130, advantageously in the new position achieved with the adjustment step.

[0143] In particular, in the tightening step, the first fixing means 91 are advantageously completely tightened with a pre-established torque in order to operate, by acting in abutment with a head portion 91" against the external face 22, 32 of the hinge element 2, 3, a seal via friction between the internal face 23, 33 of the hinge element 2, 3 and the bottom wall 122, 132 of the containment space 120, 130.

[0144] Advantageously, in addition, the second fixing means 92 are completely tightened with a pre-established torque in order to operate, by acting in abutment with a head portion 92" against the external face 22, 32 of the hinge element 2, 3, a seal via friction between the internal face 23, 33 of the hinge element 2, 3 and the bottom wall 122, 132 of the containment space 120, 130.

[0145] The invention thus conceived therefore attains the pre-established objects.

Claims

1. Hinge (1) in particular for windows/doors/shutters or furniture pieces, intended to rotatably connect together a panel (12) and a frame (13), said hinge (1) comprising:

    - a first hinge element (2) and a second hinge element (3), and each of which:

        - is provided with a main extension along an extension axis (T, T');
        - is intended to be embedded in a containment space (120, 130) respectively of a panel (12) and of a frame (13) delimited at least by a perimeter wall (121, 131) and by a bottom wall (122, 123); and
        - is perimetrically delimited by a peripheral edge (21, 31);

    - articulation means (6), which rotatably connect said first hinge element (2) and said second hinge element (3) around a rotation axis (X), substantially parallel to said extension axes (T, T'), in order to move said hinge elements (2, 3) between a closed position and an open position;

    said hinge (1) being **characterized in that it comprises** at least one eccentric adjustment body (71, 72) mechanically connected to at least one of said hinge elements (2, 3), and said eccentric adjustment body (71, 72) is susceptible of being moved between at least one retracted position and at least one extended position, and in said positions said eccentric adjustment body (71, 72) projects from the corresponding peripheral edge (21, 31) to a different extent and is susceptible of acting against the perimeter wall (121, 131) of said containment space (120, 130), in order to adjust the position of said first and/or second hinge element (2, 3) with respect to the respec-

tive containment space (120, 130).

2. Hinge (1) according to claim 1, **characterized in that** said eccentric adjustment body (71, 72) is rotatably movable between said retracted position and said extended position by means of rotation around a pivoting axis (Z) thereof.

3. Hinge (1) according to claim 1 or 2, **characterized in that** it comprises at least two first adjustment bodies (71) of said eccentric adjustment bodies (71, 72) placed at the peripheral edge (21, 31) in opposite positions with respect to said extension axis (T, T').

4. Hinge (1) according to any one of the preceding claims, **characterized in that** the peripheral edge (21, 31) of at least one of said hinge elements (2, 3) is provided with opposite end sides (41, 51) along said extension axis (T, T') and **in that** said hinge (1) comprises at least two second adjustment bodies (72) of said eccentric adjustment bodies (71, 72), each placed at the respective said end side (41, 51).

5. Hinge (1) according to any one of the preceding claims, **characterized in that** it is provided with:

- at least one elongated first guide seat (81), which is made on at least one of said hinge elements (2, 3) and is extended along a first adjustment direction (Y) substantially orthogonal to said extension axis (T, T') of the corresponding said hinge element (2, 3);
- first fixing means (91), which are placed to traverse said first guide seat (81) and are susceptible, when loosened, to make said first guide seat (81) slide along them and, when tightened, to fix said hinge element (2, 3) to the corresponding said containment space (120, 130).

6. Hinge (1) according to any one of the preceding claims, **characterized in that** it is provided with:

- at least one elongated second guide seat (82), which is made on at least one of said hinge elements (2, 3) and is extended along a second adjustment direction (Y') substantially parallel to said extension axis (T, T') of the corresponding said hinge element (2, 3);
- second fixing means (92), which are placed to traverse said second guide seat (82) and are susceptible, when loosened, to make said second guide seat (82) slide along them and, when tightened, to fix said hinge element (2, 3) to the corresponding said containment space (120, 130).

7. Hinge (1) according to any one of the preceding claims, **characterized in that** each of said first hinge element (2) and second hinge element (3) is provided with two lateral wings (40, 50) extended along the corresponding said extension axis (T, T'), wherein at least one of said eccentric adjustment bodies (71, 72) is provided at at least one lateral wing (40, 50) of at least one of said hinge elements (2, 3).

8. Frame-panel assembly (10) for closing a space or a wall opening, which comprises:

- a panel (12) and a frame (13), each of which provided with a containment space (120, 130) delimited at least by a perimeter wall (121, 131) and by a bottom wall (122, 123);
- a hinge (1) according to any one of the preceding claims, which is placed to connect said panel (12) and frame (13); wherein each of said first hinge element (2) and said second hinge element (3) is embedded in the containment space (120, 130) respectively of said panel (12) and of said frame (13).

9. Frame-panel assembly (10) according to claim 8, **characterized in that** the eccentric adjustment body (71, 72) of said hinge (1) is rotatably movable between said retracted position and said extended position by means of rotation around a pivoting axis (Z) thereof.

10. Frame-panel assembly (10) according to claim 8 or 9, **characterized in that** said hinge (1) comprises at least two first adjustment bodies (71) of said eccentric adjustment bodies (71, 72) placed at the peripheral edge (21, 31) in opposite positions with respect to said extension axis (T, T').

11. Frame-panel assembly (10) according to any one of the claims from 8 to 10, **characterized in that** the peripheral edge (21, 31) of at least one of said hinge elements (2, 3) is provided with opposite end sides (41, 51) along said extension axis (T, T') and **in that** said hinge (1) comprises at least two second adjustment bodies (72) of said eccentric adjustment bodies (71, 72), each placed at the respective said end side (41, 51).

12. Frame-panel assembly (10) according to any one of the claims from 8 to 11, **characterized in that** said hinge (1) is provided with:

- at least one elongated first guide seat (81), which is made on at least one of said hinge elements (2, 3) and is extended along a first adjustment direction (Y) substantially orthogonal to said extension axis (T, T') of the corresponding said hinge element (2, 3);
- first fixing means (91), which are placed to traverse said first guide seat (81), are suscepti-

ble, when loosened, to make said first guide seat (81) slide along them and, when tightened, to fix said hinge element (2, 3) to the corresponding said containment space (120, 130).

13. Frame-panel assembly (10) according to any one of the claims from 8 to 12, **characterized in that** said hinge (1) is provided with:

- at least one elongated second guide seat (82), which is made on at least one of said hinge elements (2, 3) and is extended along a second adjustment direction (Y') substantially parallel to said extension axis (T, T') of the corresponding said hinge element (2, 3);
- second fixing means (92), which are placed to traverse said second guide seat (82) and are susceptible, when loosened, to make said second guide seat (82) slide along them and, when tightened, to fix said hinge element (2, 3) to the corresponding said containment space (120, 130).

14. Process for adjusting a frame-panel assembly (10) according to claim 12 or 13, **characterized in that** it comprises the following steps:

- a step of loosening the fixing means, wherein said first or second fixing means (91, 92) are loosened in order to allow the movement of said hinge element (2, 3) along said first or second adjustment direction (Y, Y');
- an adjustment step, wherein at least one of said eccentric adjustment bodies (71, 72) is moved between at least one retracted position and at least one extended position, and in said positions said eccentric adjustment body (71, 72) projects from the corresponding peripheral edge (21, 31) to a different extent, and acts in abutment against the perimeter wall (121, 131) of the corresponding said containment space (120, 130), moving said hinge element (2, 3) along said first or second adjustment direction (Y, Y');
- a step of tightening said fixing means, wherein said first or second fixing means (91, 92) are tightened in order to newly fix said hinge element (2, 3) to said containment space (120, 130).

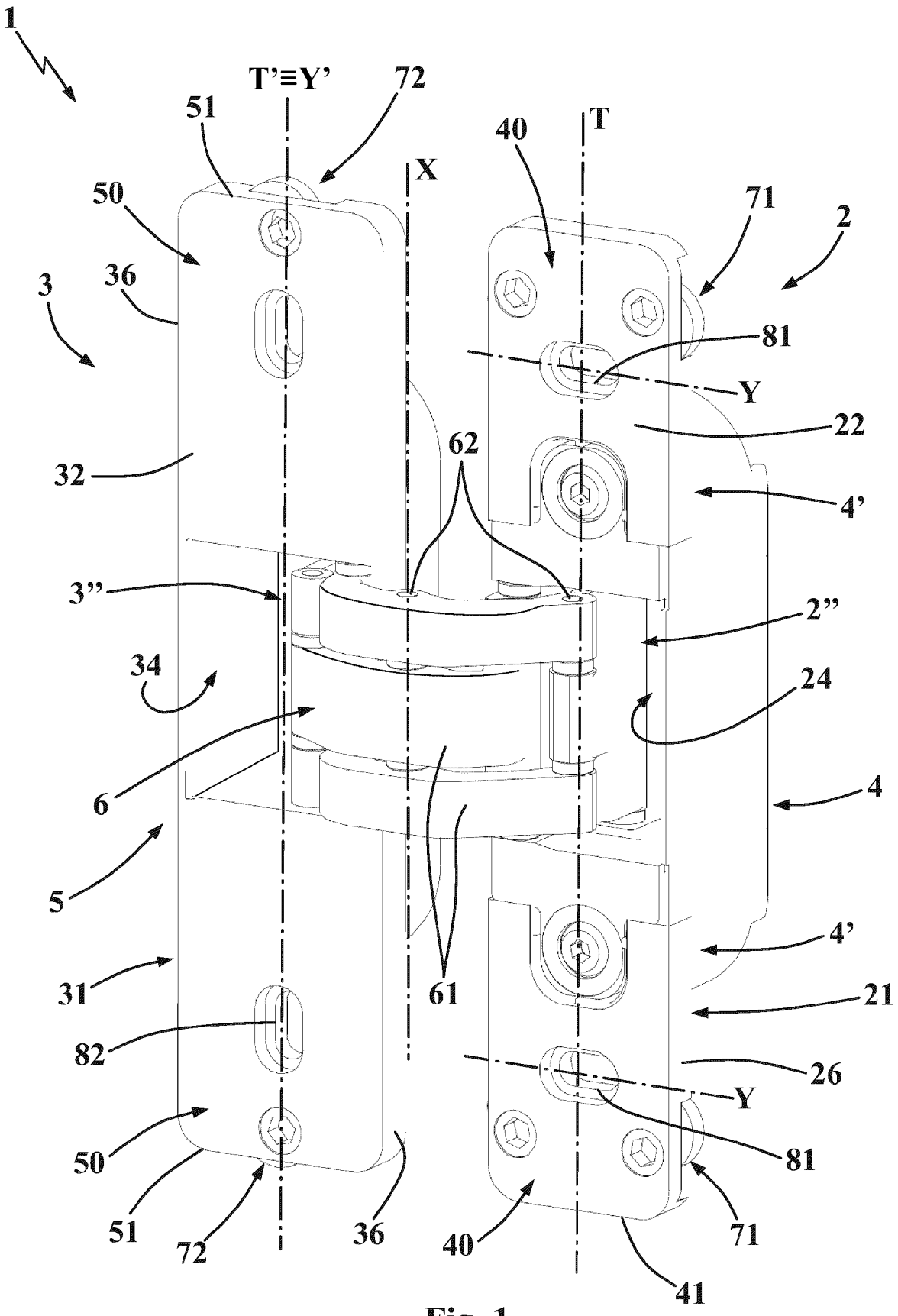
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Fig. 1

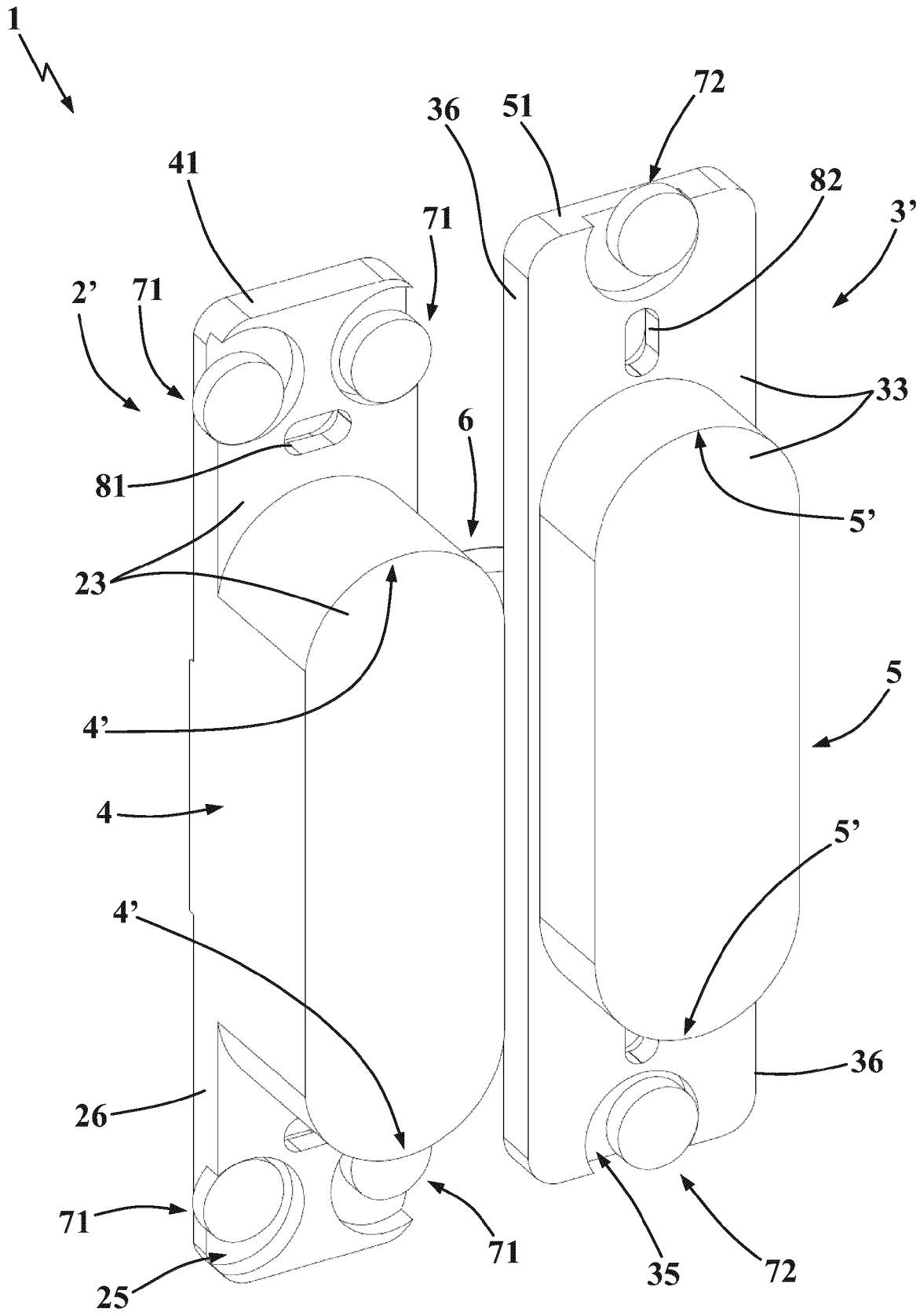

Fig. 2

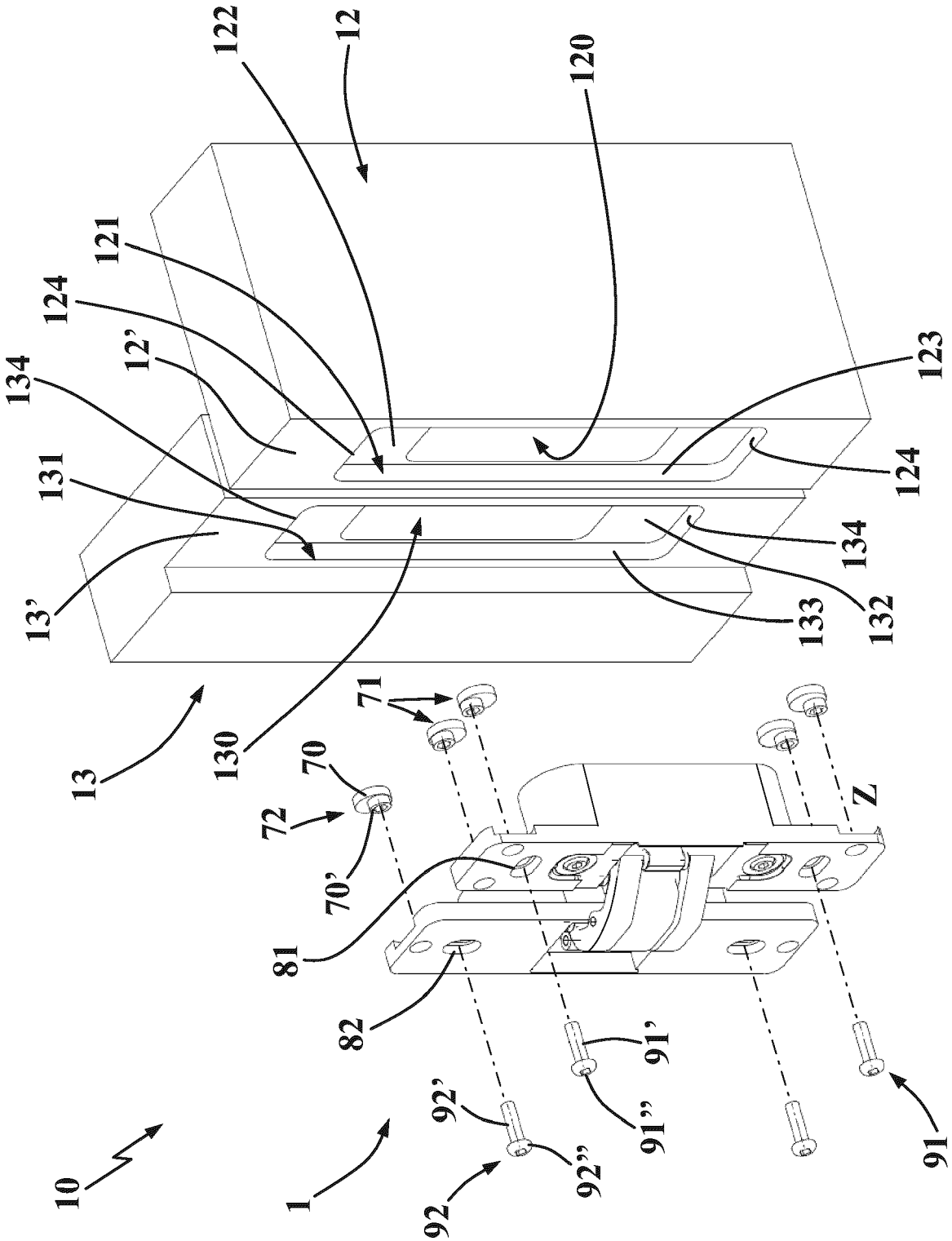
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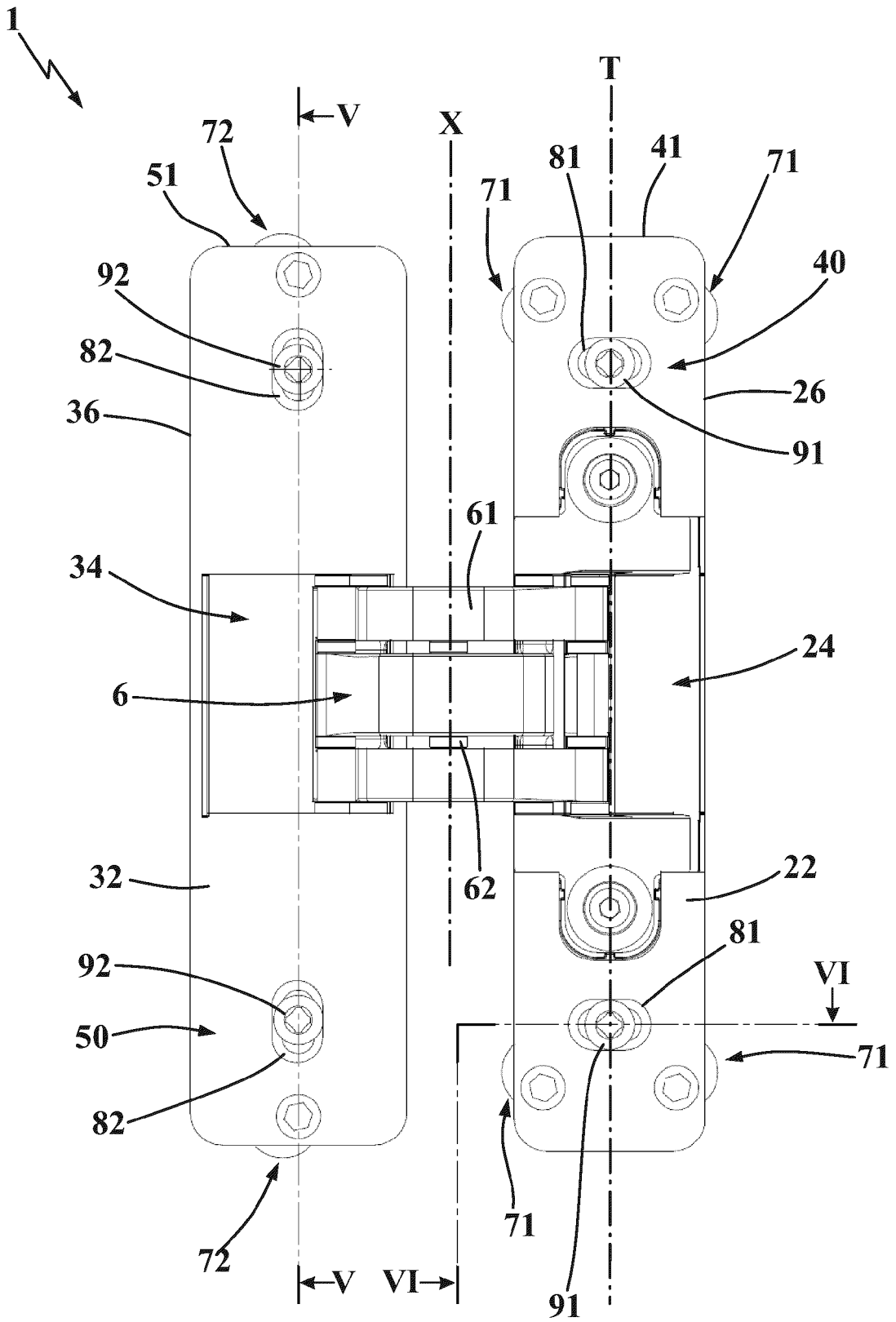
Fig. 3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VI
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Fig. 4

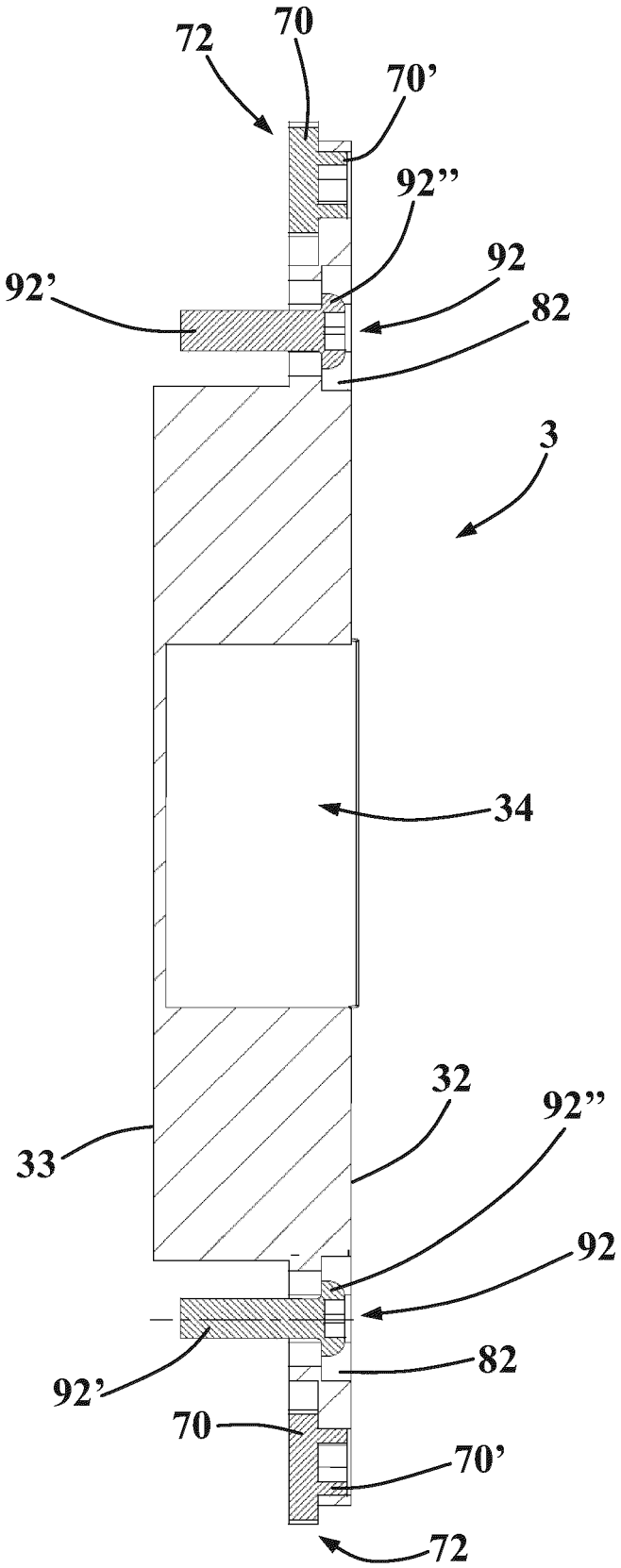


Fig. 5

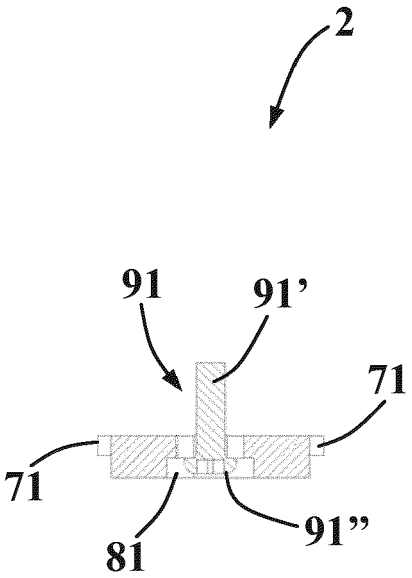
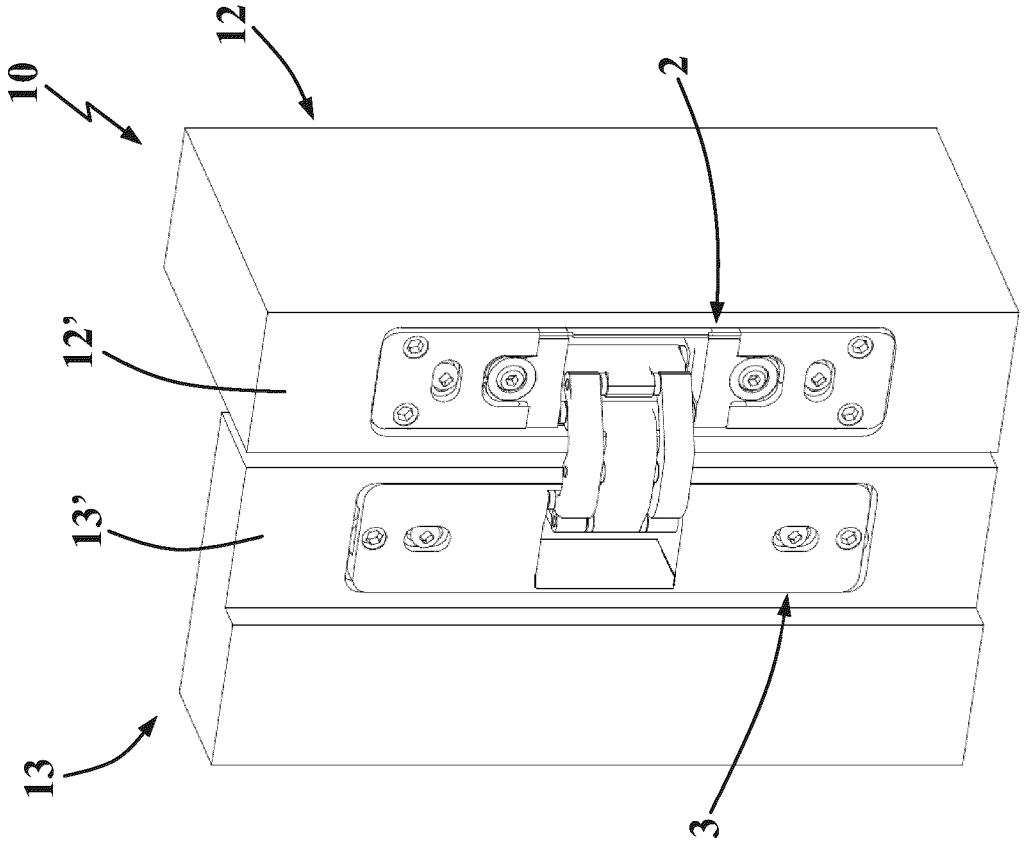


Fig. 6



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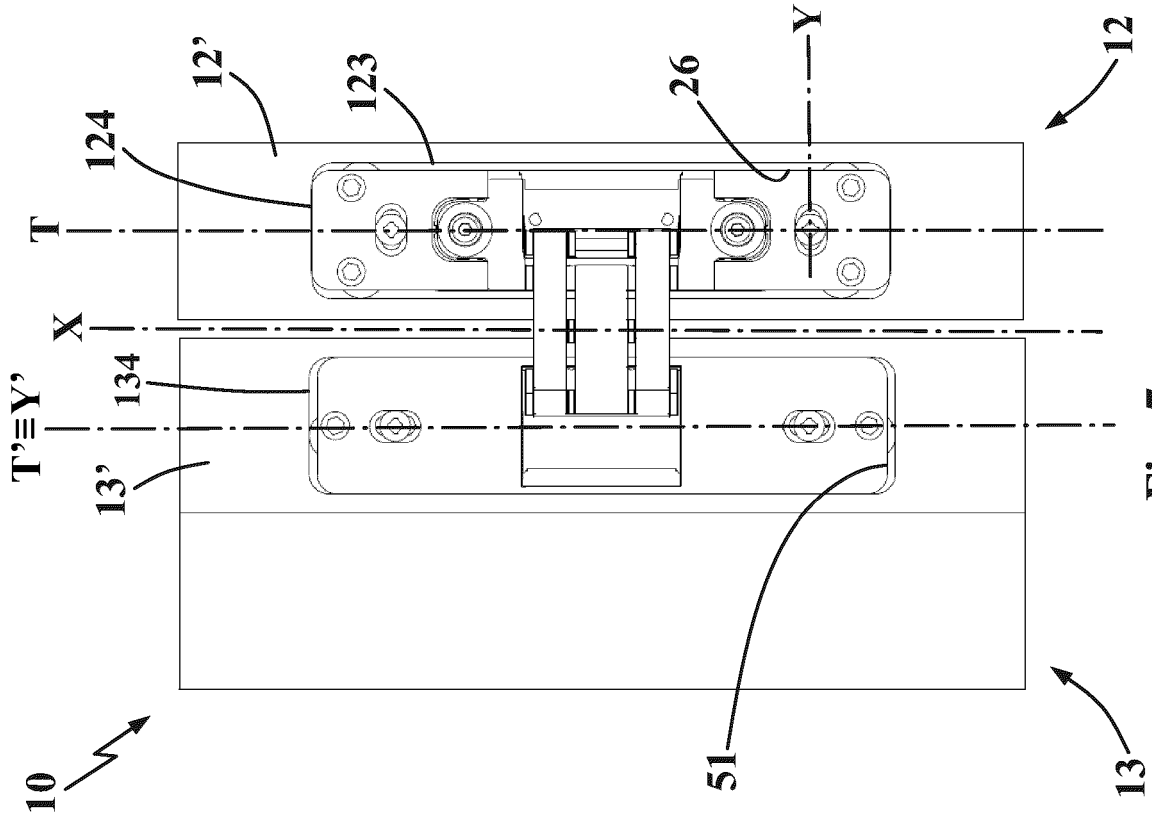

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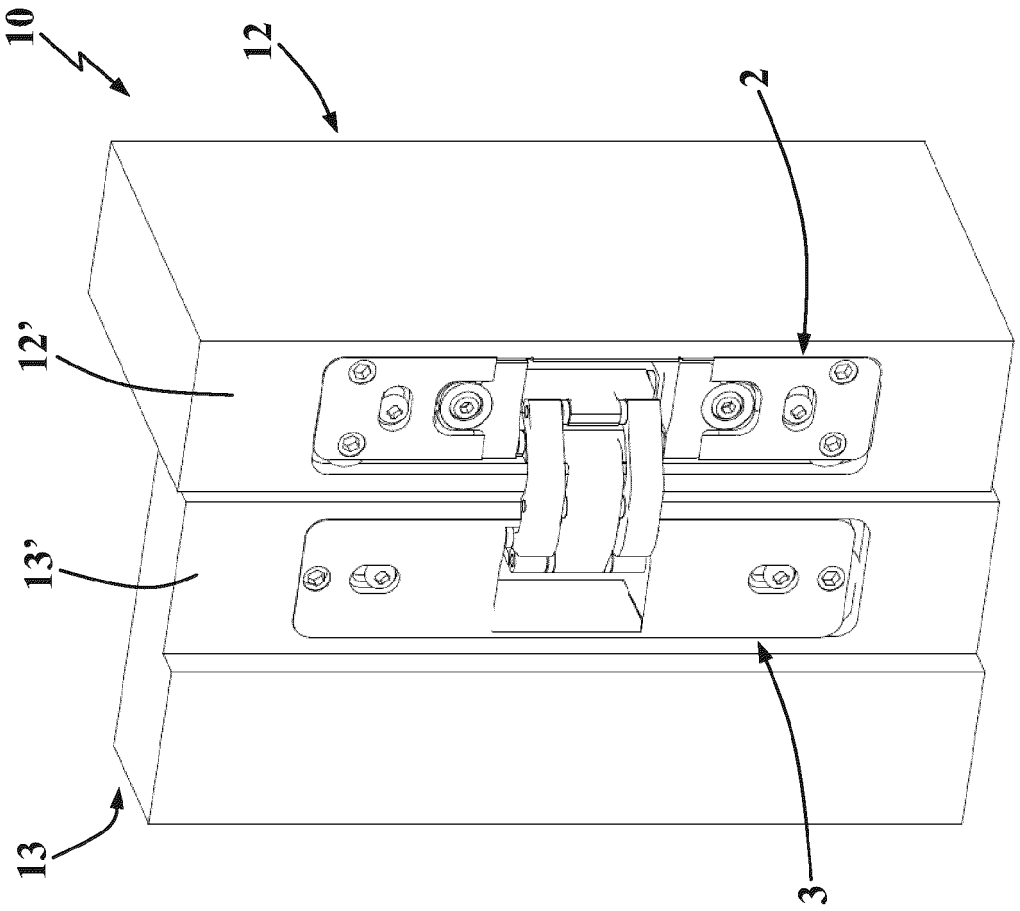

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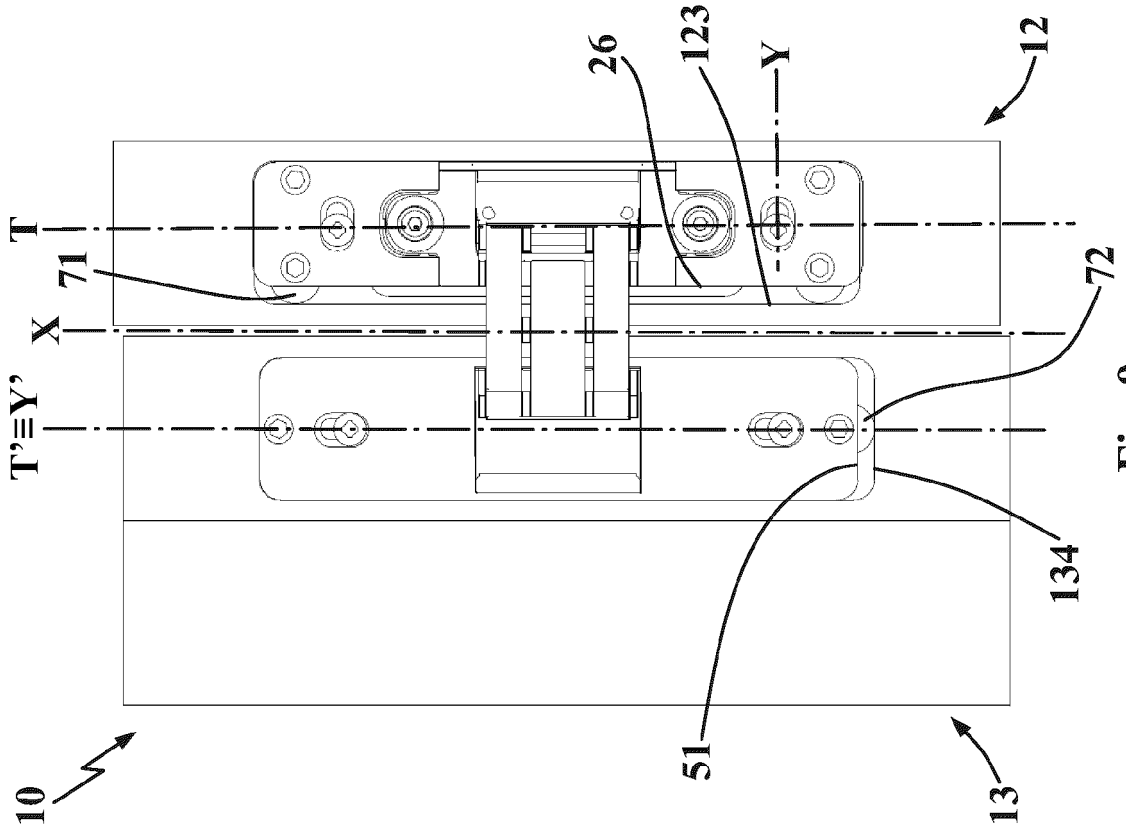

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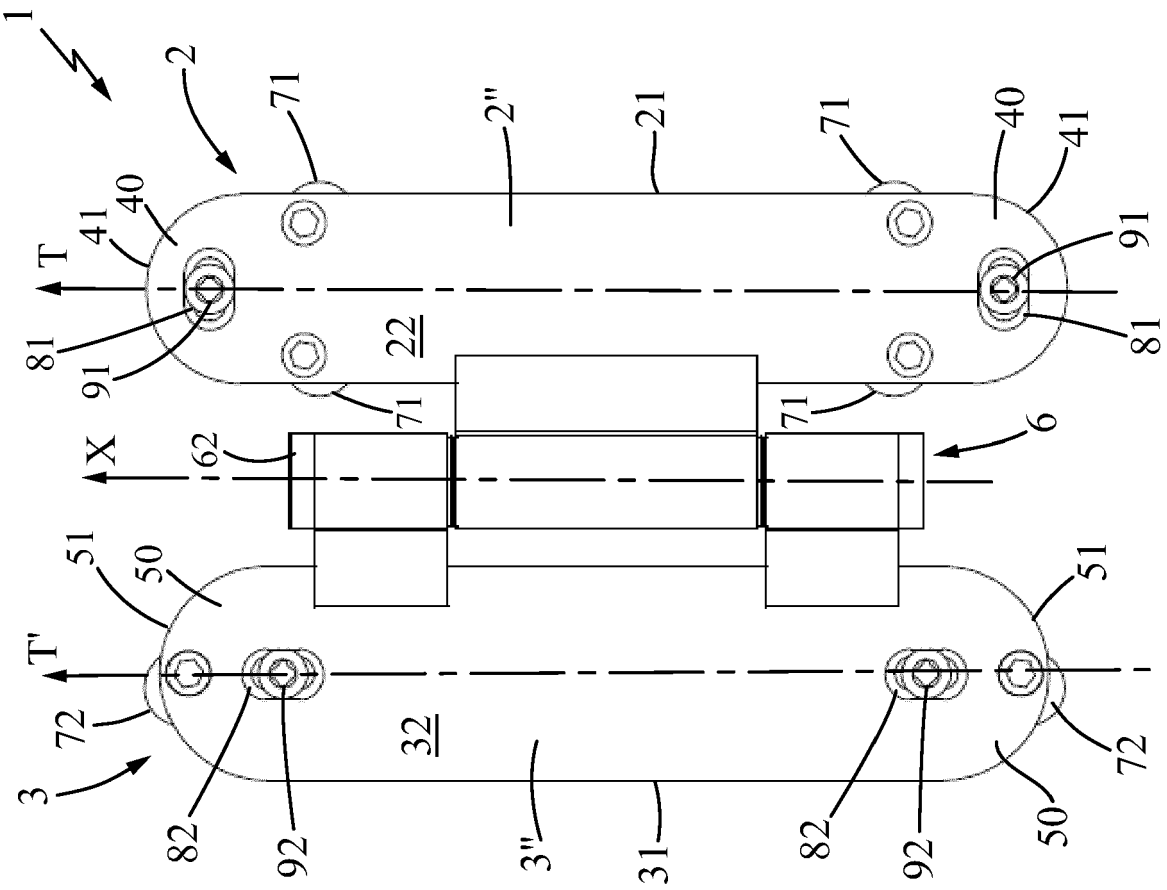
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Fig. 12

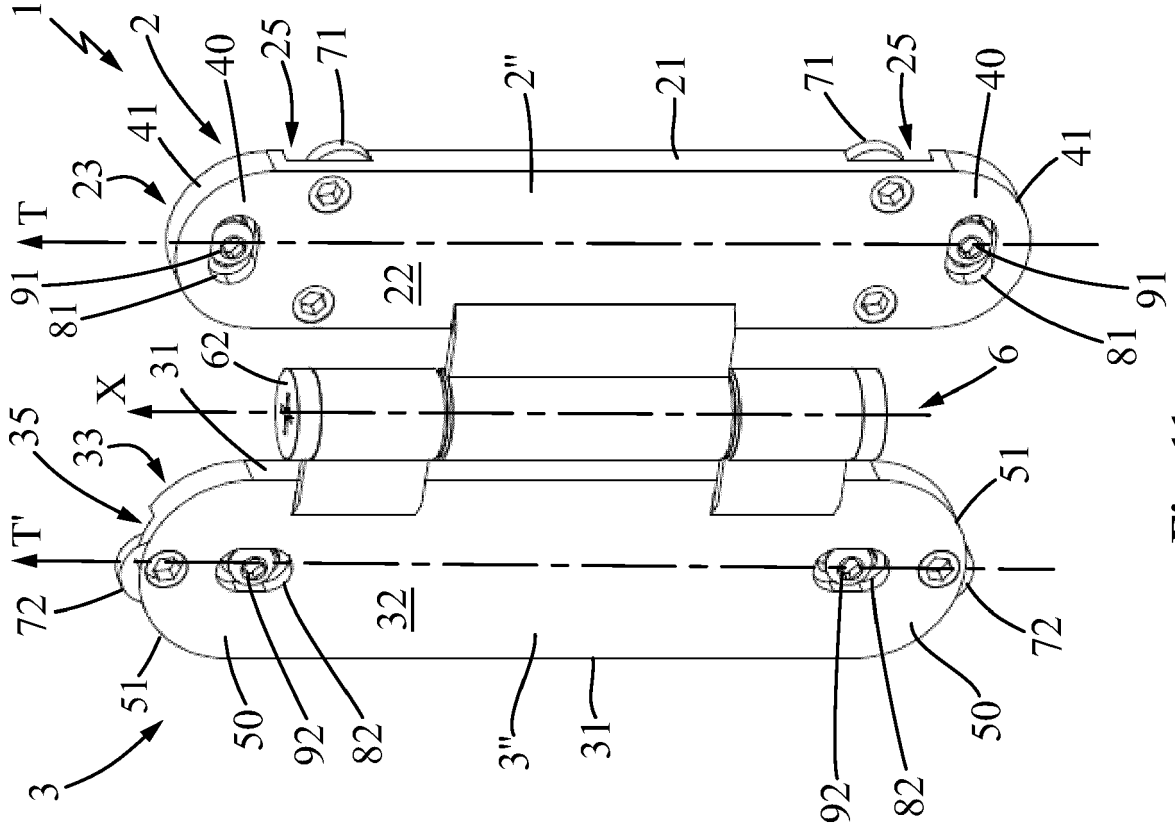
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Fig. 11

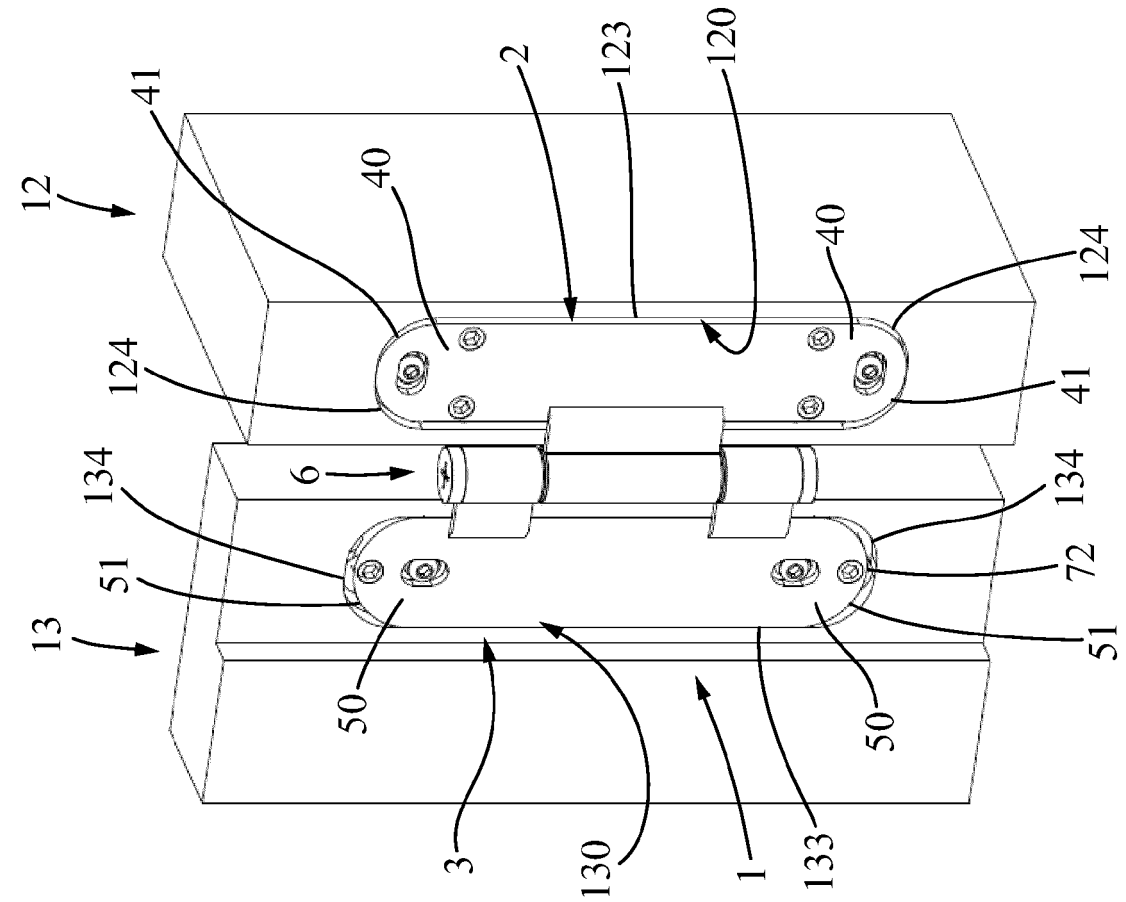
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Fig. 14

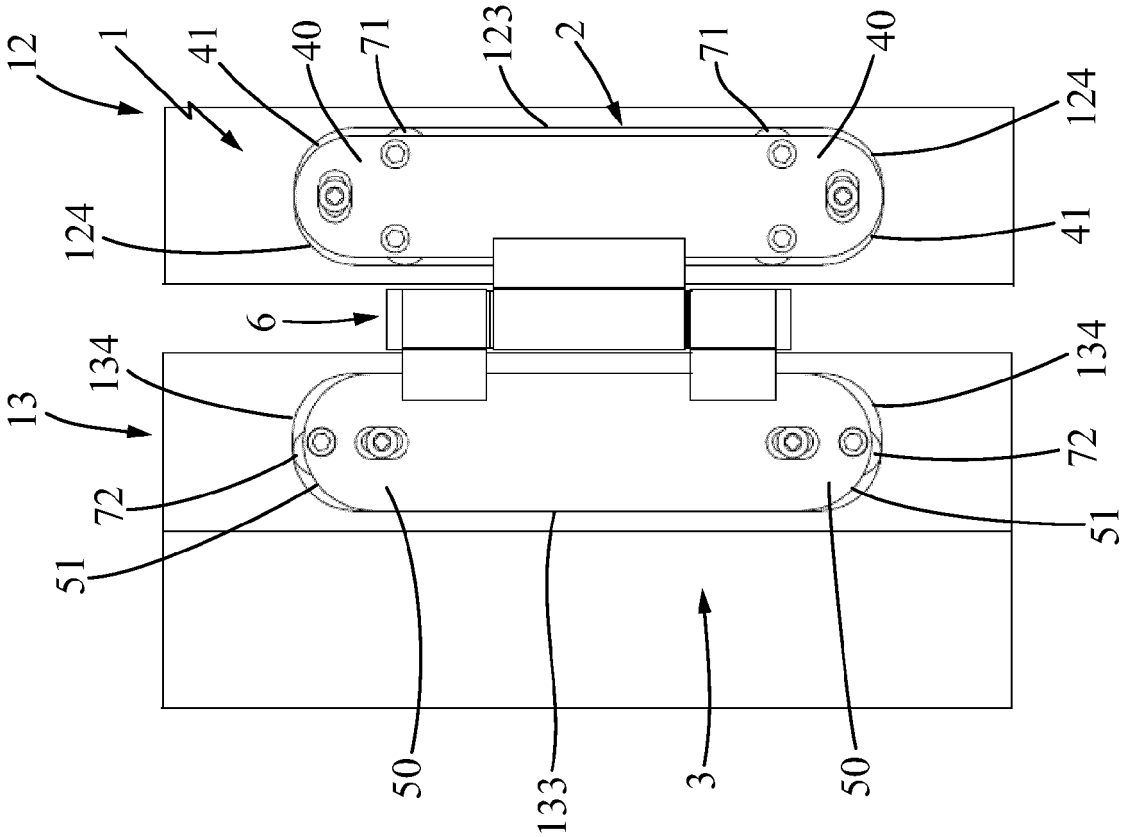
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Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 7513

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1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 January 2022	Mund, André

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