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(54) **CONCEALED, ADJUSTABLE HINGE**

(57) Adjustable hidden hinge for doors/windows/shutters comprising a first hinge body (2), a second hinge body (6), and articulation means (10) which rotatably connect the first hinge body (2) and the second hinge body (6) around a rotation axis (X). The first hinge body (2) comprises a first hull (11), two adjustment sliding blocks (27) adjustably mounted on the first hull (11) along a first adjustment direction (H) parallel to the rotation axis (X), and a first adjustment carriage (12) adjustably mounted on the first hull (11) along a second adjustment direction (Y) orthogonal to the rotation axis (X). The first hinge body (2) also comprises two eccentric adjustment bodies (15), each comprises a first portion (28), which is inserted in a first engagement seat (16) of the first adjustment sliding block (27), and a second portion (21), which is placed in eccentric position with respect to the first portion (28), inserted in a second engagement seat (18) of the first adjustment carriage (12) and is actuatable in order to rotate the eccentric adjustment body (15) such that its second portion (21) acts abuttingly on the first adjustment carriage (12) in order to move it along the second adjustment direction (Y).

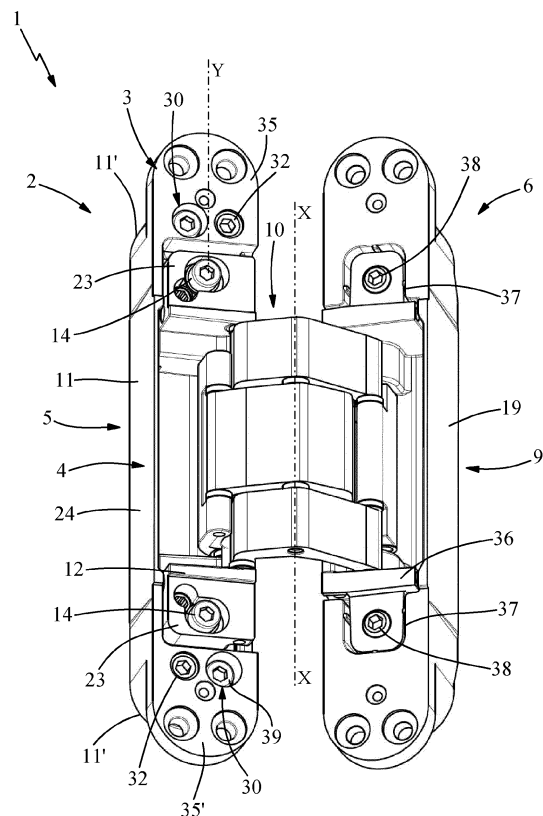


Fig. 1

Description

Field of application

[0001] The present invention regards an adjustable hidden hinge for doors/windows/shutters according to the preamble of the respective independent claim.

[0002] The present hidden hinge is intended to be employed for rotatably associating a movable wing, such as the wing of a door, with a fixed frame, such as the jamb of a door.

[0003] The hinge, object of the present invention, is of the type termed in the technical jargon of the field "hidden" or even "invisible", since it is not visible from the outside once the movable wing is placed in a closed position, since all the elements that constitute the hinge are substantially situated completely embedded within the movable wing and the fixed frame.

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

State of the art

[0005] As has been known for some time, in particular in the field of doors/windows/shutters, hinges are usually composed of two hinge bodies, of which one is fixed to the fixed frame of the shutter (such as for example the jamb of a door) and one is fixed to the movable member of the shutter, such as a wing of a door, which are mechanically connected to each other by one or more articulation arms in order to allow a rotation of the movable member with respect to the fixed frame, usually of about 180° around a central hinging axis.

[0006] In the case of the present invention, reference will be mainly made to a hinge of hidden (or invisible) type, in which the bodies of the same hinge are embedded within cavities of the structure of the movable member and of the fixed frame such that only portions of the articulation arms between the two bodies of the hinge itself project 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 movable wing or in the fixed 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 flanges which are extended outside the seat along the direction of its main extension, for the fixing to the movable wing or to the fixed frame, e.g. with screws.

[0008] Known in the field of doors/windows/shutters are numerous types of hidden hinges, which differ from each other mainly due to the different technical selections employed in the levers that constitute the articulation arms, and which can employ rotation-only pins or also slidable elements, provided with rotation-translation, as well as also due to the different dimensions of the hulls

which can allow housing articulations that are more complex but at the same time can involve limitations in the selection of the wings or of the frames.

[0009] The main drawback of the hidden hinges lies in the fact that their fixing position on the fixed frame is substantially determined by the cavity made in the shutter intended to receive the hull of the hinge.

[0010] Therefore, if during the step of mounting the shutter it is necessary to adjust the mutual distance between movable wing and fixed 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 hidden hinges are known on the market which allow varying the relative position between movable wing and fixed frame during the mounting of the shutter itself, with respect to three axes orthogonal to each other.

[0012] One example of such adjustable hidden hinges is described in the Italian patent application TV2008A000058 and provides that the hull of one of the hinge bodies 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 bodies respectively mounted on the movable wing and on the fixed 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 wing with respect to the frame.

[0014] Also, the adjustable hidden hinge of known type described in brief up to now has in practice shown that it does not lack drawbacks.

[0015] The main drawback lies in the fact that the adjustment of the position of the wing is decidedly inconvenient, in particular along the horizontal adjustment direction. Indeed, in order to execute such adjustment, the operator must apply wedges under the wing 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 setscrews. Hidden hinges are normally used in armored doors, such as the armored main doors of homes, e.g. in a condominium of apartments. Indeed, once the wing of the shutter is in closed configuration, the hinge is not accessible and ill-intentioned individuals are unable to unhinge the wing by operating on the hinges.

[0016] The above-described hinge of known type detects a further drawback in the case of application of the aforesaid doors of armored type, which are well-known to be provided with very heavy wings. Indeed, the adjustment of the hinge of known type requires the user to at least partially also move the wing together with the intermediate body, resulting in a considerable physical effort for the operator.

[0017] A further drawback lies in the fact that the ad-

justable hidden hinge of known type does not allow a fine adjustment, since the movement of the intermediate body occurs manually and it results impossible for the operator to adjust the position of the intermediate body in a precise and accurate manner.

Presentation of the invention

[0018] In this situation, therefore, the problem underlying present invention is to overcome the drawbacks of the abovementioned prior art, by providing an adjustable hidden hinge for doors/windows/shutters and an adjustable hinging assembly which allow an adjustment of the relative position of the movable wing with respect to the fixed frame in a manner that is convenient for the operator assigned for mounting the hinge.

[0019] A further object of the present invention is to provide an adjustable hidden hinge for doors/windows/shutters and an adjustable hinging assembly which are advantageously usable in armored doors/windows/shutters, maintaining the aforesaid ease of adjustment.

[0020] A further object of the present invention is to provide an adjustable hidden hinge for doors/windows/shutters and an adjustable hinging assembly which allow an adjustment of the relative position of the movable wing with respect to the fixed frame which is precise and accurate.

[0021] A further object of the present invention is to provide a method for adjusting a hidden hinge which is simple and quick to actuate.

[0022] A further object of the present invention is to provide a method for adjusting a hidden hinge which does not require the physical force of the operator.

[0023] A further object of the present invention is to provide an adjustable hidden hinge and an adjustable hinging assembly for doors/windows/shutters, which are inexpensive to make.

[0024] A further object of the present invention is to provide an adjustable hidden hinge for doors/windows/shutters, which is safe and entirely reliable in operation.

Brief description of the drawings

[0025] The technical characteristics of the invention, according to the aforesaid objects, can be clearly seen in the contents of the enclosed claims and the advantages thereof will more evident in the following detailed 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 front perspective view of an adjustable hidden hinge, object of the present invention;
- figure 2 shows a front view of the adjustable hidden hinge, object of the present invention;
- figure 3 shows a sectional view of a first hinge body

of the hinge, object of the present invention, made along the trace III-III of figure 2;

- figure 4 shows a partially exploded front view of the hidden hinge, object of the present invention;
- 5 - figure 5 shows a further perspective view of the adjustable hidden hinge according to the invention;
- figure 6 shows an exploded perspective view of the first hinge body of the hinge according to the invention and of a tool for the adjustment thereof.
- 10 - figure 7 shows a perspective view of a detail of the hinge according to the invention, regarding an adjustment sliding block of the first hinge body;
- figure 8 shows a front view of the detail of the hinge according to the invention, regarding an adjustment sliding block of the first hinge body, illustrated in figure 7;
- 15 - figure 9 shows a front view of a detail of the hinge according to the invention, regarding an eccentric adjustment body of the first hinge body;
- 20 - figure 10 shows a side view of the eccentric adjustment body illustrated in figure 9;
- figure 11 shows a perspective view of the eccentric adjustment body illustrated in figures 9 and 10;
- 25 - figure 12 shows a partial front view of the first hinge body with a first adjustment carriage in two different adjustment positions.

Detailed description

30 **[0026]** With reference to the enclosed drawings, reference number 1 overall indicates the adjustable hidden hinge, object of the present invention.

[0027] The hinge 1 according to the invention is intended to be employed for rotatably connecting a first member, for example a movable member of a shutter, with respect to a second member of a shutter, e.g. a fixed frame in particular constituted by a fixture of a door or by the structure for supporting a furniture piece.

[0028] Hereinbelow, the invention will be illustrated with reference to the preferred embodiment which provides for the use of the hinge in the field of doors/windows/shutters in order to connect, for example, the wing of a door to its frame fixed with the walling.

[0029] The hidden hinge 1, which the present invention refers to, is not visible from the outside once the movable wing is arranged in a closed position, since all the elements which compose the hinge 1 are substantially embedded within the same wing and the same fixed frame as will be better explained hereinbelow.

45 **[0030]** The hidden hinge 1, object of the present invention, comprises a first hinge body 2, which is provided with a first external face 3, on which a first containment seat 4 is made, and is provided with an opposite first internal face 5 intended to be embedded in the first member of the shutter.

50 **[0031]** The hinge 1 also comprises a second hinge body 6, which is provided with a second external face 7, on which a second containment seat 8 is made, and is

provided with an opposite second internal face 9 intended to be embedded in the second member of said shutter.

[0032] Advantageously, the first external face 3 of the first hinge body 2 and the second external face 7 of the second hinge body 6 remain visible once the hinge 1, object of the present invention, is mounted on the shutter (with the wing open), while the first internal face 5 of the first hinge body 2 and the second internal face 9 of the second hinge body 6 are housed within the member of the shutter and therefore are invisible for the user.

[0033] In accordance with a preferred but non-limiting embodiment, regarding which reference will be made hereinbelow for merely exemplifying purposes, the first hinge body 2 is intended to be embedded in the fixed frame of the shutter and the second hinge body 6 is intended to be embedded in the movable wing of the shutter itself.

[0034] Otherwise, in accordance with a further embodiment, the first hinge body 2 can be intended to be advantageously embedded within the movable wing of the shutter and the second hinge body 6 can be intended to be embedded of the fixed frame of the shutter itself, without departing from the protective scope of the present patent.

[0035] The hidden hinge 1, object of the present invention, also comprises, in a manner well-known to the man skilled in the art, articulation means 10, which rotatably connect said first hinge body 2 and the second hinge body 6 around a rotation axis X, in order to move the hinge bodies 2, 6 between a closed position, in which advantageously the first external face 3 of the first hinge body 2 and the second external face 7 of the second hinge body 6 are substantially facing and the first containment seat 4 of the first hinge body 2 and the second containment seat 8 of the second hinge body 6 at least partially house the articulation means 10, and an open position, in which advantageously the first external face 3 of the first hinge body 2 and the second external face 7 of the second hinge body 6 are moved away from each other and the articulation means 10 are at least partially extracted from the first containment seat 4 and from the second containment seat 8.

[0036] The articulation means 10 are per se well-known to the man skilled in the art and therefore will not be described in detail hereinbelow.

[0037] For example, with reference to the embodiment illustrated in the enclosed figures, the articulation means 10 comprise multiple arms connected to each other by means of connection pins parallel to the rotation axis X.

[0038] In particular, the kinematic mechanism of the articulation means 10 is adapted to allow the movement of the hinge bodies 2, 3 between the closed position and the open position with the rotation axis X that is movable on a plane orthogonal to the rotation axis X itself, in order to allow the articulation means 10 to return into the containment seats 4, 8 of the hinge bodies 2, 6 when the hinge 1 is in closed position.

[0039] More in detail, the articulation means 10 are pro-

vided with at least one substantially central pin, which defines the aforesaid rotation axis X. During the movement of the first hinge body 2 with respect to the second hinge body 6, the pin of the articulation means 10 is moved along a trajectory which lies along the aforesaid plane orthogonal to the rotation axis X itself and in particular substantially horizontal with the hinge 1 in use.

[0040] Consequently, also the rotation axis X is advantageously movable along the same trajectory of the central pin of the articulation means 10.

[0041] Advantageously, the external faces 3, 7 of the hinge bodies 2, 6 lie on corresponding planes parallel to the rotation axis X and which result parallel to each other and facing when the hinge 1 is in closed position.

[0042] The first hinge body 2 and the second hinge body 6 respectively comprise a first hull 11 and, advantageously, a second hull 19, preferably with elongated form, intended to be fixed respectively to the fixed frame and to the movable wing.

[0043] More in detail, each hull 11, 19 is preferably made of metal material, and it appears as a box-like body provided with an open side (at the respective external face 3, 7 of the respective hinge body 2, 6) defining a passage for the traversing of the articulation means 10. The latter are pivoted within the hull 11, 19 and serve for rotatably supporting the movable wing with respect to the fixed frame.

[0044] Each elongated hull 11, 19 is also advantageously provided, in a known manner, with two corresponding fixing flanges 35, 35', e.g. flat, which are projectingly extended along a main extension direction of the corresponding hull 11, 19 and are provided with through holes for inserting retention screws aimed to fix the corresponding hull 11, 19 to the wing or to the frame of the shutter.

[0045] The first hull 11 of the first hinge body 2 is intended to be fixed to the first member of the shutter and advantageously internally delimits the aforesaid first containment seat 4.

[0046] The first hull 11 of the first hinge body 2 is extended parallel to the rotation axis X between two opposite first ends 11' and is intended to be fixed to the first member of the shutter.

[0047] The first hinge body 2 also comprises two adjustment sliding blocks 27, which are mounted in a guided and adjustable manner on the first hull 11 along a first adjustment direction H parallel to the rotation axis X, and are each positioned at the respective end 11' of said first hull 11.

[0048] The first hinge body also comprises first locking means 30 mechanically connected to the first hull 11 and to the adjustment sliding blocks 27 and actuatable between a first loosening configuration, in which the adjustment sliding blocks 27 are susceptible of being moved along the first adjustment direction H, and a first locking configuration, in which the first locking means 30 rigidly lock the adjustment sliding blocks 27 to the first hull 11.

[0049] The first hull 2 of the hinge 1 according to the

invention also comprises a first adjustment carriage 12 adjustably mounted on the first hull 11 and placed on the first external face 3 of the first hinge body 2.

[0050] Preferably, the adjustment carriage 12 is made of metal material and is preferably at least partially housed within a first seat for housing the first hull 11.

[0051] The articulation means 10 are advantageously rotatably constrained to the first adjustment carriage 12, so as to connect the latter to the second hinge body 6 (as described in detail hereinbelow).

[0052] Advantageously, the first external face 3 of the first hinge body 2 is at least partially defined by a front wall of the first hull 11, intended to be visible with the first hinge body 2 fixed to the first member of the shutter, and by the first adjustment carriage 12.

[0053] The first adjustment carriage 12 comprises a central body 24 extended parallel to the rotation axis X between two opposite ends 24' and at least partially contained in the first containment seat 4.

[0054] The first adjustment carriage 12 also comprises two lateral appendages 23, each of which projectingly extended from the respective end 24' of the central body 24 and constrained to the respective adjustment sliding block 27.

[0055] The first hinge body 2 also comprises second locking means 14 mechanically connected to the adjustment sliding blocks 27 and to the first adjustment carriage 12 and actuatable between a second loosening configuration, in which the first adjustment carriage 12 is susceptible of being moved along a second adjustment direction Y, parallel to the first external face 3 of the first hinge body 2 and orthogonal to the rotation axis X, and a second locking configuration, in which the second locking means 14 rigidly lock the first adjustment carriage 12 to the adjustment sliding blocks 27.

[0056] According to the idea underlying the present invention, each adjustment sliding block 27 is provided with at least one first engagement seat 16, and preferably with two engagement seats 16 in accordance with the embodiment illustrated in the enclosed figures.

[0057] Advantageously, the second adjustment direction Y orthogonal to the rotation axis X (and in particular substantially horizontal) allows adjusting the position of the movable wing orthogonal to the lying plane of the fixed frame when the wing is closed.

[0058] In addition, each lateral appendage 23 of the first adjustment carriage 12 is provided with a second engagement seat 18 open on the first external face 3 of the first hinge body 2.

[0059] More in detail, the second seat 18 is accessible from outside the first hinge body 2 with the hinge 1 in use, so as to adjust the position of the first adjustment carriage 12 along the second adjustment direction Y, as described in detail hereinbelow.

[0060] In addition, according to the idea underlying the present invention, the first hinge body 2 comprises at least two eccentric adjustment bodies 15, and each of which connects the respective lateral appendage 23 of

the first adjustment carriage 12 to the respective adjustment sliding block 27 and is rotatable with respect to a reference axis N orthogonal to the first external face 3 of the first hinge body 2.

[0061] Each eccentric adjustment body 15 comprises a first portion 28, which is inserted in the first engagement seat 16 of the respective adjustment sliding block 27 and a second portion 21, which is placed in an eccentric position at the first portion 28 with respect to the reference axis N, is inserted in the second engagement seat 18 of the respective lateral appendage 23 of the first adjustment carriage, and is actuatable in order to rotate the eccentric adjustment body 15.

[0062] In particular, the eccentric adjustment body 15 is rotatable in a manner such that, with the second locking means 14 in the second loosening configuration, following the movement of the first portion 28 and of the second portion 21 with respect to the reference axis N, the second portion 21 acts abuttingly on the first adjustment carriage 12 at the second engagement seat 18 in order to move the first adjustment carriage 12 along the second adjustment direction Y.

[0063] Of course, the adjustment sliding blocks 27, the first adjustment carriage 12 and the eccentric adjustment bodies 15 can be provided in the second hinge body 6 instead of in the hinge body 2, in order to obtain the adjustment of the hinge with respect to the second adjustment direction Y, without departing from the protective scope of the present patent.

[0064] In this manner, by rotating eccentric adjustment body 15 with respect to the reference axis N, the second portion 21, eccentric with respect to the first portion 28, pushes the first adjustment carriage 12 along the second adjustment direction Y, in order to adjust the relative position.

[0065] Therefore, the hinge 1, object of the present invention, allows adjusting the position of the wing of the shutter also in the case of very heavy doors/windows/shutters, such as armored doors (in which the movable wing can even weigh 150 kg), since such movable wing is already constrained to the hinge and does not require being lifted by the operators.

[0066] Advantageously, the second portion 21 of the eccentric adjustment body 15 is provided with an engagement hole 22 intended to receive a work end of a tool 20, illustrated in the enclosed figure 6.

[0067] For example, the tool 20 can be an Allen wrench per se well-known to the man skilled in the art, and the engagement hole 22 can be shaped for receiving the substantially hexagonal work end of such Allen wrench.

[0068] Advantageously, the first adjustment carriage 12 comprises at least two through slots 25, with elongated form, each of which made on the respective lateral appendage 23 of the adjustment carriage 12 itself and longitudinally extended parallel to the second adjustment direction Y.

[0069] Advantageously, moreover, the second locking means 14 comprise at least two screws 26, each of which

provided with a stem placed to traverse the respective through slot 25 and engaged by means of screwing with the respective adjustment sliding block 27, and with a head, which is adapted to act in abutment against the respective lateral appendage 23 of the adjustment carriage 12 at the first external face 3 of the first hinge body 2.

[0070] In accordance with the preferred embodiment illustrated in the enclosed figures, the engagement portions 21, 28 of each eccentric adjustment body 15 have circular shape.

[0071] More in detail, the engagement portions 21, 28 have substantially circular section with respect to a plane orthogonal to the reference axis N.

[0072] Still in accordance with the preferred embodiment illustrated in the enclosed figures, at least one of the first and second engagement seat 16, 18 has elongated form according to a direction having at least one component parallel to the first adjustment direction H.

[0073] Advantageously, the other between the first and the second engagement seat 16, 18 has circular shape rotatably housing to size the corresponding said portion 28, 21 of the eccentric adjustment body 15.

[0074] In operation, upon rotating the second portion 21 of the eccentric adjustment body 15, the first adjustment portion 28 is also driven in rotation with respect to the aforesaid reference axis N (illustrated in the enclosed figures 10 and 11).

[0075] Both portions 21, 28 of the eccentric adjustment body 15 attain a rotation-translation motion with respect to the adjustment sliding block 27.

[0076] More in detail, during the adjustment of the first adjustment carriage 12, the first portion 28 of the eccentric adjustment body 15, housed in the first engagement seat 16 of the adjustment sliding block 27, rotates with respect to the reference axis N and translates along a direction substantially parallel to the first adjustment direction H.

[0077] In the same manner, during the adjustment of the first adjustment carriage 12, the second portion 21 of the eccentric adjustment body 15, housed in the second engagement seat 18 of the appendage 23 of the first adjustment carriage 12, rotates with respect to the reference axis N and translates along a direction substantially parallel to the second adjustment direction Y, also driving the first adjustment carriage 12 itself, allowing the adjustment thereof.

[0078] In order to allow the translation of the first portion 28 along the aforesaid direction parallel to the first adjustment direction H and simultaneously allow the driving of the first adjustment carriage 12 along the second adjustment direction Y, the first engagement seat 16 has elongated form, in particular parallel to the first adjustment direction H, and the second engagement seat 18 has circular shape, and preferably houses to size the second portion 21 of the eccentric adjustment body 15.

[0079] Preferably, each adjustment sliding block 27 is provided with two first engagement seats 16, advantageously side-by-side each other, so as to be able to use,

during the mounting of the hinge 1, the same adjustment sliding blocks 27 at both ends 11' of the first hull 11.

[0080] In order to allow an adjustment of the position of the movable wing of the shutter along the first adjustment direction H substantially parallel to the rotation axis X of the articulation means 10 (and in particular vertical), the adjustment sliding blocks 27 preferably comprise wedge means 31, provided with a profile that is tilted with respect to a bottom wall 34 of the first hull 11.

[0081] More in detail, the wedge means 31 comprise a tapered portion, which is extended tapering towards the corresponding first end 11' of the first hull 11.

[0082] In addition, for the same purpose, the first hinge body 2 preferably comprises at least one first adjustment setscrew 32 placed to mechanically engage the wedge means 31.

[0083] In accordance with the preferred embodiment illustrated in the enclosed figures, each adjustment sliding block 27 is provided with a threaded hole 27' which receives via screwing the stem of the screw 26 of the second locking means 14.

[0084] In order to adjust the relative position of the first adjustment carriage 12 with respect to the first hull 11 along the first adjustment direction H, each adjustment sliding block 27 is provided with the aforesaid wedge means 31, against which the tip of the first adjustment setscrew 32 acts abuttingly; such screw 32 is screwed in a corresponding threaded through hole made on the first hull 11, in particular on at least one of the fixing flanges 35, 35' of the latter. In addition, the adjustment sliding block 27 is provided with a slot 40 (illustrated in the enclosed figures 7 and 8) which is extended longitudinally parallel to the rotation axis X and is engaged by a retention screw 39 of the first locking means 30 passing through a corresponding through opening of the first hull 11 (in particular placed on the first external face 3 of the first hinge body 2 and suitably made in the respective fixing flange 35, 35' of the first hull 11) and adapted to lock adjustment sliding block 27 in the desired position and hence simultaneously also lock the first adjustment carriage 12, with respect to the second adjustment direction H. In particular, the retention screw 39 is screwed to a corresponding threaded hole made on the bottom wall 34 of the first hull 11.

[0085] More in detail, in accordance with the preferred embodiment illustrated in the enclosed figures, the first adjustment setscrew 32 is susceptible of being actuated by an operator in order to act in abutment against the wedge-like surface of the adjustment sliding block 27.

[0086] In this manner, as the first adjustment setscrew 32 is progressively pushed in abutment against the wedge 31, the adjustment sliding block 27 is moved along the first adjustment direction H. Once the first adjustment carriage 12 has been placed at a desired position, the operator screws the retention screw 39 in order to lock the adjustment sliding block 27 in position, to which the first adjustment carriage 12 is fixed by means of the screw 26 of the first locking means 14.

[0087] In accordance with the preferred embodiment illustrated in the enclosed figures, the second hinge body 6 comprises a second adjustment carriage 36 adjustably mounted on the second hull 19 along a second adjustment direction P orthogonal to the second external face 7 of the second hinge body 6 and preferably horizontal.

[0088] In particular, the second adjustment carriage 36 is placed on the second external face 7 of the second hinge body 6 and is provided with the second containment seat 8 adapted to at least partially house the articulation means 10.

[0089] Preferably, the second adjustment carriage 36 is made of metal material and is preferably at least partially housed within a second seat for housing the second hull 19.

[0090] The second adjustment carriage 36 is intended to allow an adjustment for centering the wing of the shutter with respect to the frame, when the wing is in closed position. In particular, by modifying the position of the second adjustment carriage 36 along the second adjustment direction P, it is possible to horizontally adjust the position of the wing on the lying plane of the fixed frame when the wing itself is in closed position, in a manner such that the wing is horizontally centered with respect to the opening of the shutter.

[0091] For such purpose, the second adjustment carriage 36 comprises guide means 37 which comprise at least one second threaded adjustment setscrew 38 having axis parallel to the second adjustment direction P, rotatably constrained in an idle manner to the second hull 19 and screwed in a corresponding threaded hole of the second adjustment carriage 36. In this manner, by screwing or unscrewing such second adjustment setscrew 38, it is possible to move the second adjustment carriage 36 with respect to the second hull 19 along the second adjustment direction P.

[0092] Advantageously, the second adjustment setscrew 38 is susceptible of being actuated by an operator by means of a tool in order to be screwed or unscrewed with respect to the second adjustment carriage 36.

[0093] In this manner, the second adjustment carriage 36 is driven by the second adjustment setscrew 38 depthwise with respect to the second external face 7, up to a pre-established position.

[0094] In accordance with the preferred embodiment illustrated in the enclosed figures, each of the lateral appendages 23 of the first adjustment carriage 12 defines, with the first hull 11, a housing compartment 33 occupied by one of the two adjustment sliding blocks 27.

[0095] More in detail, each of the adjustment sliding blocks 27 is provided with a face 27" directed towards the external face 3 of the first hinge element 2. In addition, each lateral appendage 23 of the first adjustment carriage 12 lies on the face 27" of the adjustment sliding block 27.

[0096] Preferably, in accordance with the preferred embodiment illustrated in the enclosed figures, the first hull 11 of the first hinge body 2 comprises a bottom wall

34 at least partially delimiting the first containment seat 4. Each adjustment sliding block 27 is advantageously interposed between the bottom wall 34 and one of the lateral appendages 23 of the first adjustment carriage 12.

[0097] Preferably, the bottom wall 34 of the first hull 11 of the first hinge body 2 comprises two raised portions 34' provided at the first ends 11' of the first hull itself.

[0098] The two adjustment sliding blocks 27 are advantageously housed above the aforesaid raised portions 34' of the bottom wall 34 of the first hull 11 of the first hinge body 2.

[0099] The finding thus conceived therefore attains the pre-established objects.

Claims

1. Adjustable hidden hinge (1) for doors/windows/shutters intended to rotatably connect a first member and a second member of a shutter, and such hidden hinge comprises:

- a first hinge body (2), which is provided with a first external face (3), on which a first containment seat (4) is obtained, and is provided with an opposite first internal face (5) intended to be embedded in the first member of said shutter;
- a second hinge body (6), which is provided with a second external face (7), on which a second containment seat (8) is obtained, and is provided with an opposite second internal face (9) intended to be embedded in the second member of said shutter;
- articulation means (10), which rotatably connect said first hinge body (2) and said second hinge body (6) around a rotation axis (X), in order to move said hinge bodies (2, 6) between a closed position and an open position;

wherein said first hinge body (2) comprises:

- a first hull (11) which is extended parallel to said rotation axis (X) between two opposite first ends (11') and is intended to be fixed to the first member of said shutter;
- two adjustment sliding blocks (27), which are mounted in a guided and adjustable manner on said first hull (11) along a first adjustment direction (H) parallel to said rotation axis (X), and are each positioned at the respective said end (11') of said first hull (11);
- first locking means (30) mechanically connected to said first hull (11) and to said adjustment sliding blocks (27) and actuatable between a first loosening configuration, wherein said adjustment sliding blocks (27) are susceptible of being moved along said first adjustment direction (H), and a first locking configuration, wherein said

first locking means (30) rigidly lock said adjustment sliding blocks (27) to said first hull (11);
 - a first adjustment carriage (12) adjustably mounted on said first hull (11) and placed on the first external face (3) of said first hinge body (2); said first adjustment carriage (12) comprising:

- a central body (24) extended parallel to said rotation axis (X) between two opposite ends (24') and at least partially contained in said first containment seat (4),
- two lateral appendages (23), each of which projectingly extended from the respective said end (24') of said central body (24) and constrained to the respective said adjustment sliding block (27);

- second locking means (14) mechanically connected to said adjustment sliding blocks (27) and to said first adjustment carriage (12) and actuatable between a second loosening configuration, wherein said first adjustment carriage (12) is susceptible of being moved along a second adjustment direction (Y), parallel to the first external face (3) of said first hinge body (2) and orthogonal to said rotation axis (X), and a second locking configuration, wherein said second locking means (14) rigidly lock said first adjustment carriage (12) to said adjustment sliding blocks (27);

said hidden hinge (1) being **characterized in that**:

- each said adjustment sliding block (27) is provided with at least one first engagement seat (16);
- each said lateral appendage (23) of said first adjustment carriage (12) is provided with a second engagement seat (18) open on the first external face (3) of said first hinge body (2);
- said first hinge body (2) comprises at least two eccentric adjustment bodies (15), each of which connects the respective lateral appendage (23) of said first adjustment carriage (12) to the respective said adjustment sliding block (27) and is rotatable with respect to a reference axis (N) orthogonal to the first external face (3) of said first hinge body (2); wherein each said eccentric adjustment body (15) comprises:

- a first portion (28), which is inserted in the first engagement seat (16) of the respective said adjustment sliding block (27);
- a second portion (21), which is placed in an eccentric position at said first portion (28) with respect to said reference axis (N), is inserted in the second engagement seat (18) of the respective said lateral append-

age (23), and is actuatable in order to rotate said eccentric adjustment body (15).

2. Adjustable hidden hinge (1) for doors/windows/shutters according to claim 1, **characterized in that** said second portion (21) of said eccentric adjustment body (15) is provided with an engagement hole (22) intended to receive a work end of a tool (20).

3. Adjustable hidden hinge (1) for doors/windows/shutters according to any one of the preceding claims, **characterized in that** said first adjustment carriage (12) is provided with at least two through slots (25), with elongated form, each of which made on the respective lateral appendage (23) of said adjustment carriage (12) and longitudinally extended parallel to said second adjustment direction (Y), and **in that** said second locking means (14) comprise at least two screws (26), each of which provided with a stem placed to traverse the respective said through slot (25) and engaged by means of screwing with the respective said adjustment sliding block (27), and with a head, which is adapted to act abuttingly against the respective lateral appendage (23) of said adjustment carriage (12) at the first external face (3) of said first hinge body (2).

4. Adjustable hidden hinge (1) for doors/windows/shutters according to any one of the preceding claims, **characterized in that**

- the engagement portions (21, 28) of each said eccentric adjustment body (15) have circular shape,
- at least one of said first and second engagement seats (16, 18) has elongated form according to a direction having at least one component parallel to said first adjustment direction (H).

5. Adjustable hidden hinge (1) for doors/windows/shutters according to claim 4, **characterized in that** the other of said first and second engagement seats (16, 18) has circular form, rotatably housing to size the corresponding said portion (21, 28).

6. Adjustable hidden hinge (1) for doors/windows/shutters according to claim 4 and 5, **characterized in that** said first engagement seat (16) has elongated form and said second engagement seat (18) has circular form.

7. Adjustable hidden hinge (1) for doors/windows/shutters according to any one of the preceding claims, **characterized in that** said adjustment sliding blocks (27) comprise wedge means (31), provided with a profile that is tilted with respect to a bottom wall (34) of said first hull (11), and **in that** said first hinge body (2) comprises at least one first adjustment setscrew

(32) placed to mechanically engage said wedge means (31).

8. Adjustable hidden hinge (1) for doors/windows/shutters according to any one of the preceding claims, **characterized in that** each of said lateral appendages (23) of said first adjustment carriage (12) defines, with said first hull (11), a housing compartment (33) occupied by one of said two adjustment sliding blocks (27). 5
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9. Adjustable hidden hinge (1) for doors/windows/shutters according to claim 8, **characterized in that** each of said adjustment sliding blocks (27) is provided with a face (27") directed towards said external face (3) of said first hinge element (2); each said lateral appendage (23) of said first adjustment carriage (12) lying on said face (27") of said adjustment sliding block (27). 15
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10. Adjustable hidden hinge (1) for doors/windows/shutters according to claim 9, **characterized in that** said first hull (11) of said first hinge body (2) comprises a bottom wall (34) at least partially delimiting said first containment seat (4); each said adjustment sliding block (27) being interposed between said bottom wall (34) and one of said lateral appendages (23) of said first adjustment carriage (12). 25

11. Adjustable hidden hinge (1) for doors/windows/shutters according to any one of the preceding claims, **characterized in that** said adjustment sliding block (27) is provided with a slot (40) which is extended longitudinally parallel to said rotation axis (X), and said first locking means (30) comprise a retention screw (39) which passes through a corresponding through opening of said first hull (11), engages said slot (40) and, with said first locking means (30) in said first locking configuration, locks said adjustment sliding block (27) to said first hull (11). 30
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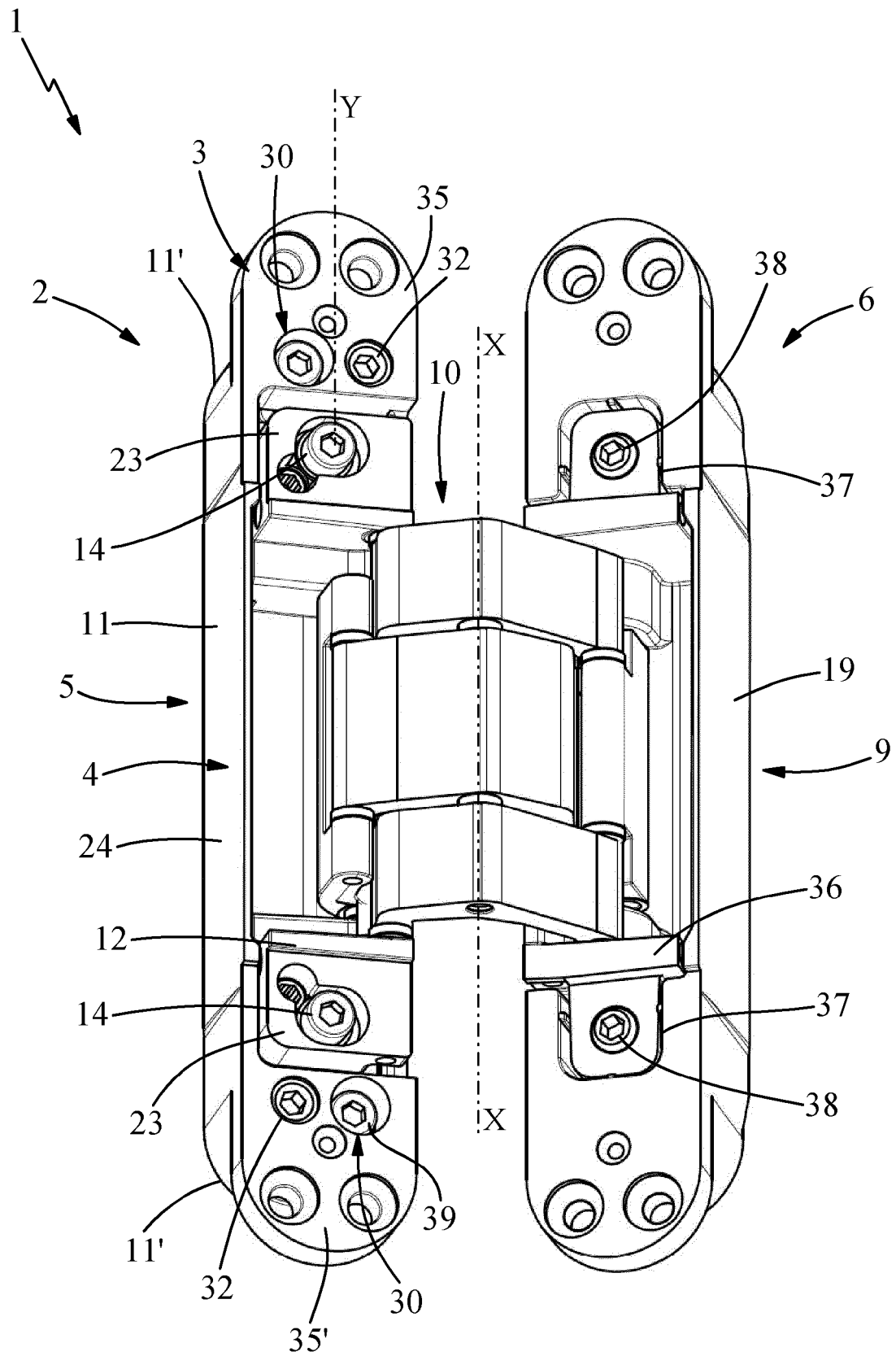


Fig. 1

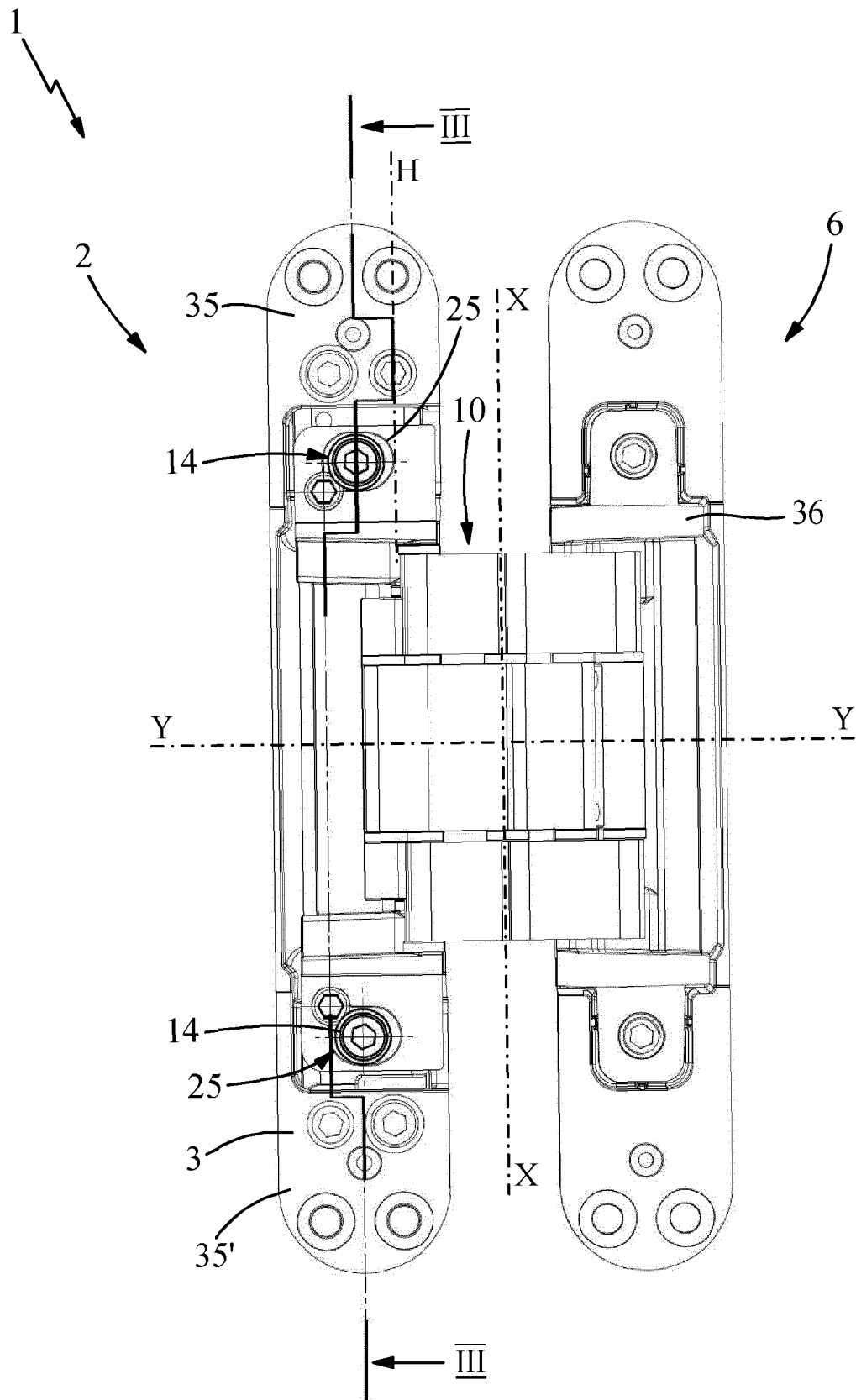


Fig. 2

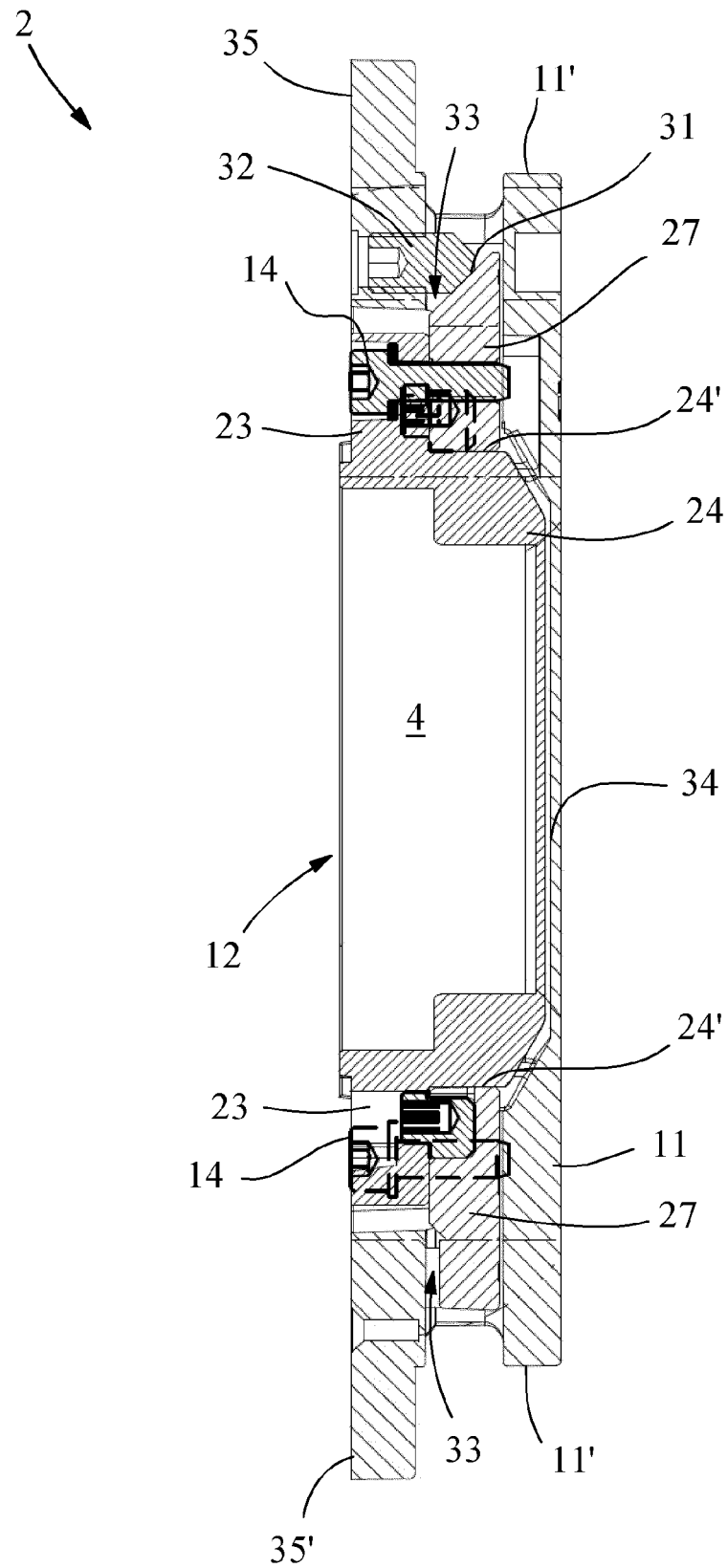


Fig. 3

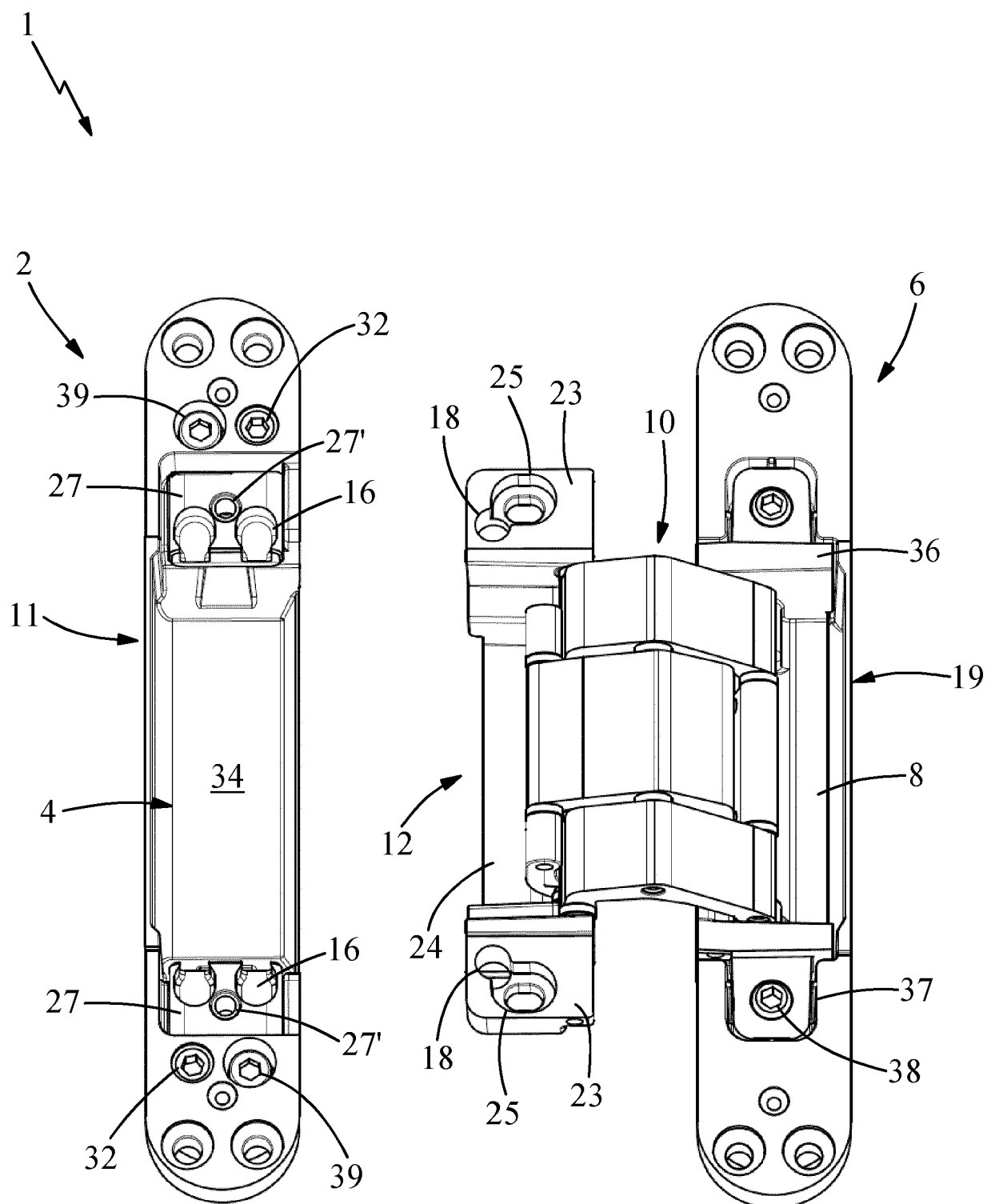


Fig. 4

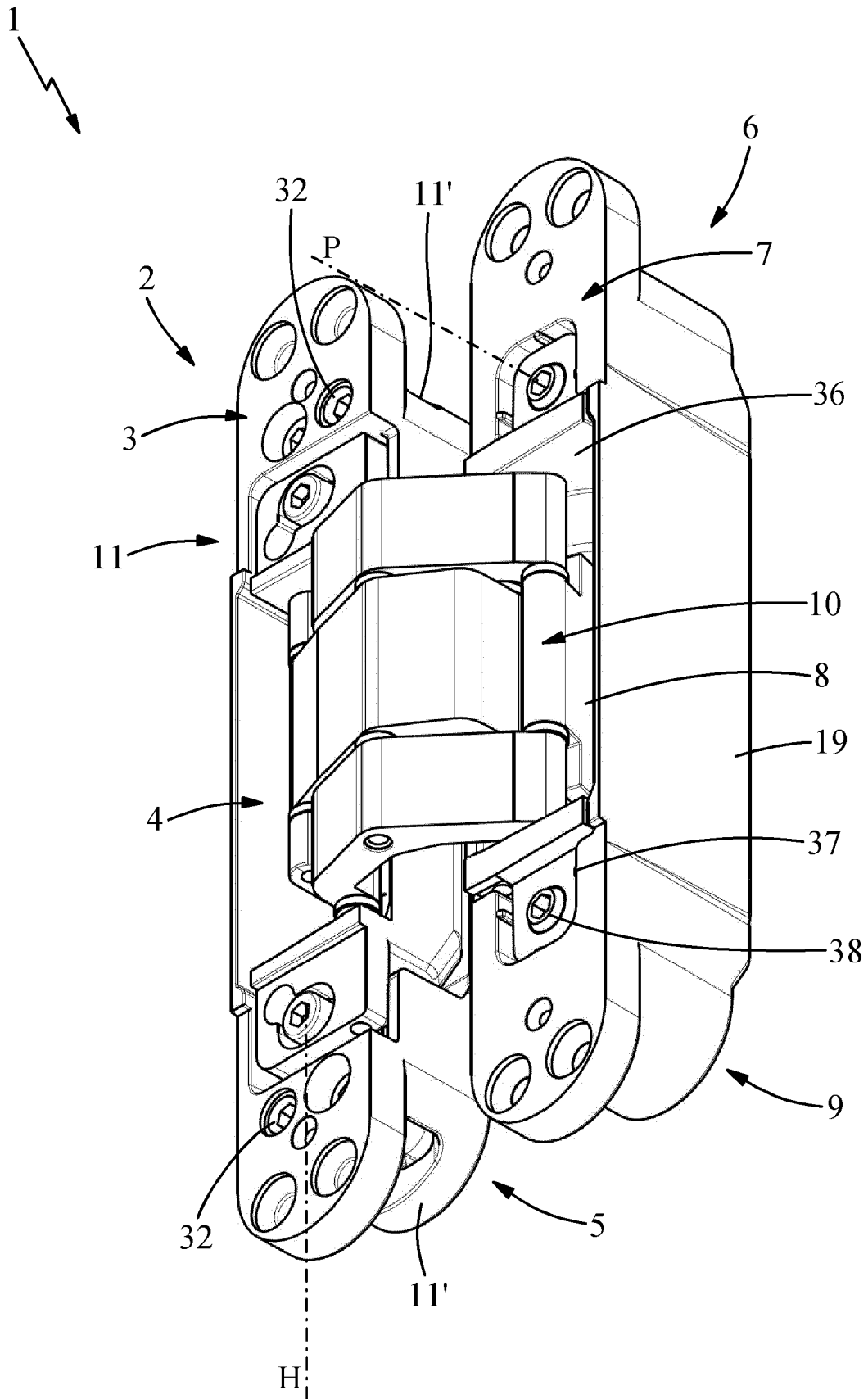


Fig. 5

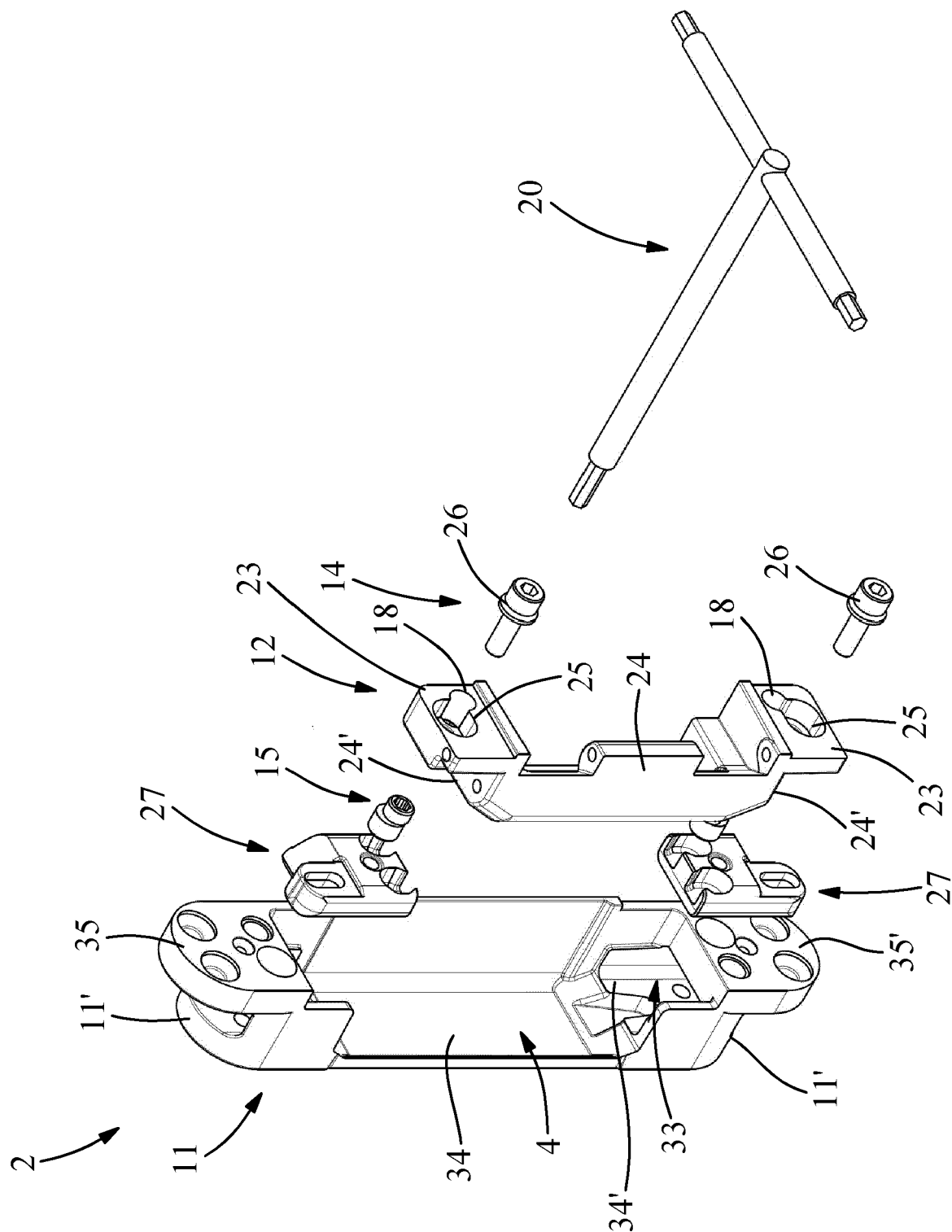


Fig. 6

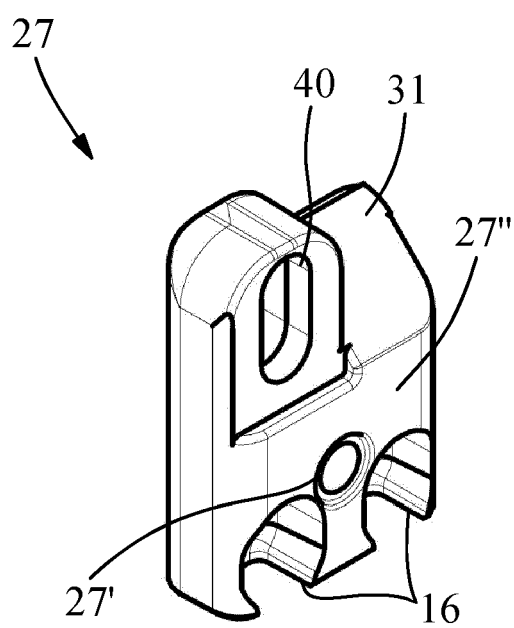


Fig. 7

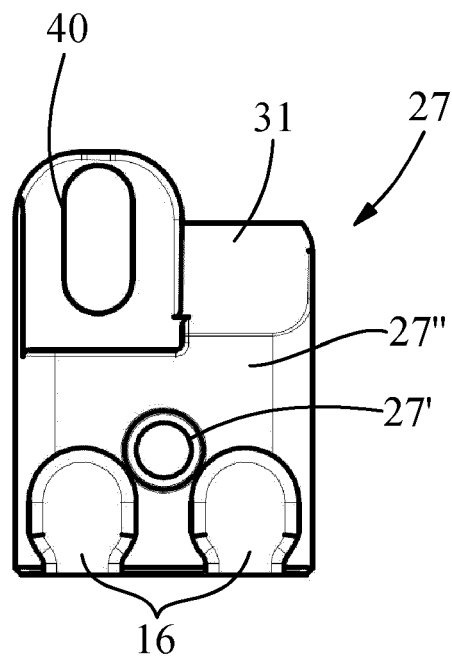


Fig. 8

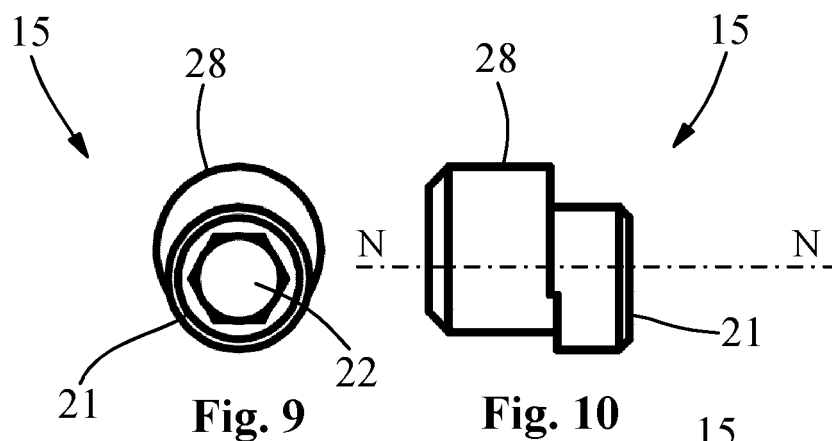


Fig. 9

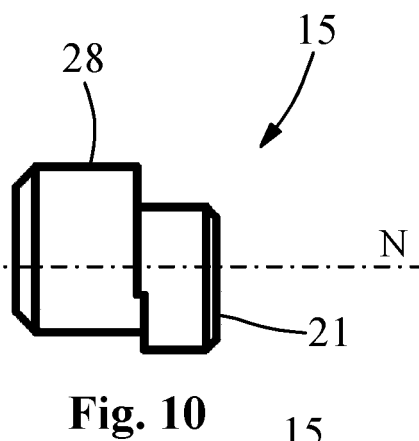


Fig. 10

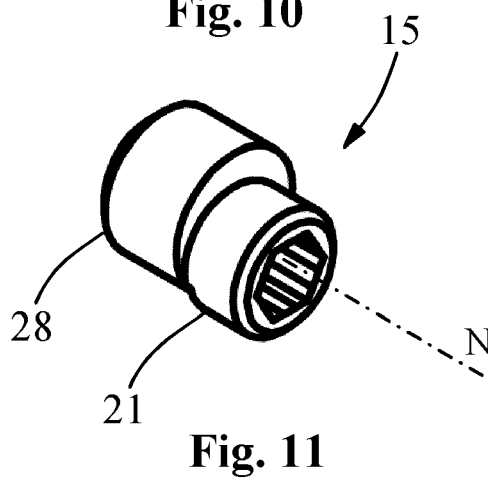


Fig. 11

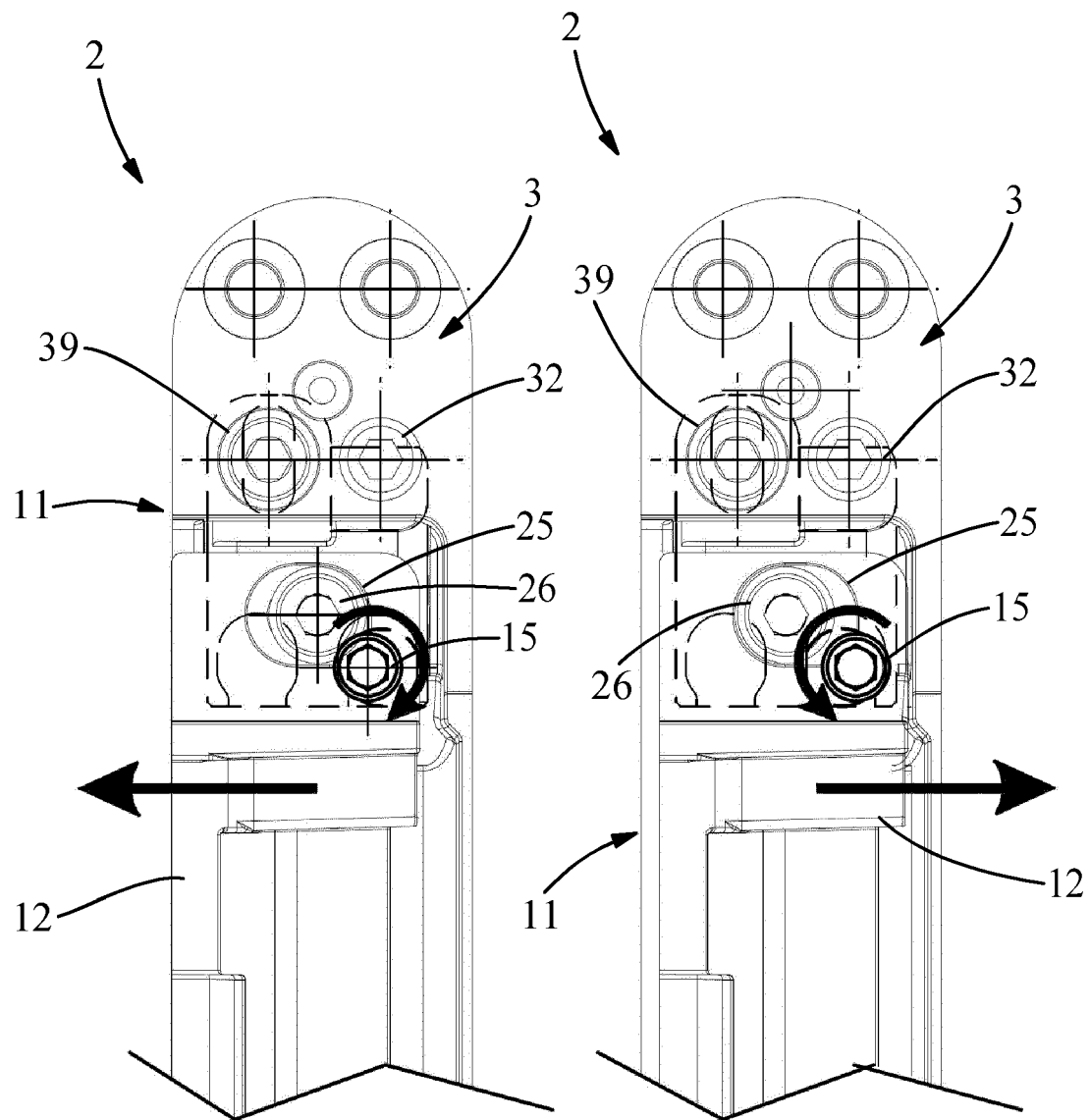


Fig. 12



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Application Number
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 November 2020	Examiner Prieto, Daniel
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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09-11-2020

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