(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 795 790 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
**24.03.2021 Bulletin 2021/12**

(51) Int Cl.:
***E05D 11/10*** *(2006.01)* ***E05F 5/00*** *(2017.01)*

(21) Application number: **20197051.4**

(22) Date of filing: **18.09.2020**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **20.09.2019 EP 19198760**
**03.10.2019 IT 201900017906**

(71) Applicant: **Formenti & Giovenzana S.p.A.**
**20837 Veduggio con Colzano MB (IT)**

(72) Inventor: **FORMENTI, Leonardo**
**20837 Veduggio con Colzano (IT)**

(74) Representative: **Simino, Massimo**
**Cuccia & Simino S.r.l.**
**Corso di Porta Romana, 23**
**20122 Milano (IT)**

(54) **A SNAP HINGE WITH A DAMPER DEVICE**

(57) A snap hinge (1) with a damper device, comprises a hinge arm (4) extended along a prevalent longitudinal direction (X-X) and a hinge cup (3) connected by means of first articulated connection means (11, 12, 13, 14, 15, 16) to change reversibly from a closed hinge configuration to an open hinge configuration, the hinge also comprises leaf springs (30) acting between the hinge cup and the hinge (3) to cause a snap closure of the hinge (1) and a damper device (2) to generate a braking action to slow down the approach movement between the hinge cup (3) and the hinge (4), advantageously both said leaf springs (30) and said damper device (2) are positioned below the hinge arm (4) arranged side by side in parallel with each other along said longitudinal direction (X-X) so as not to overlap each other in a plane perpendicular to said longitudinal sides (4b) of said hinge arm (4).

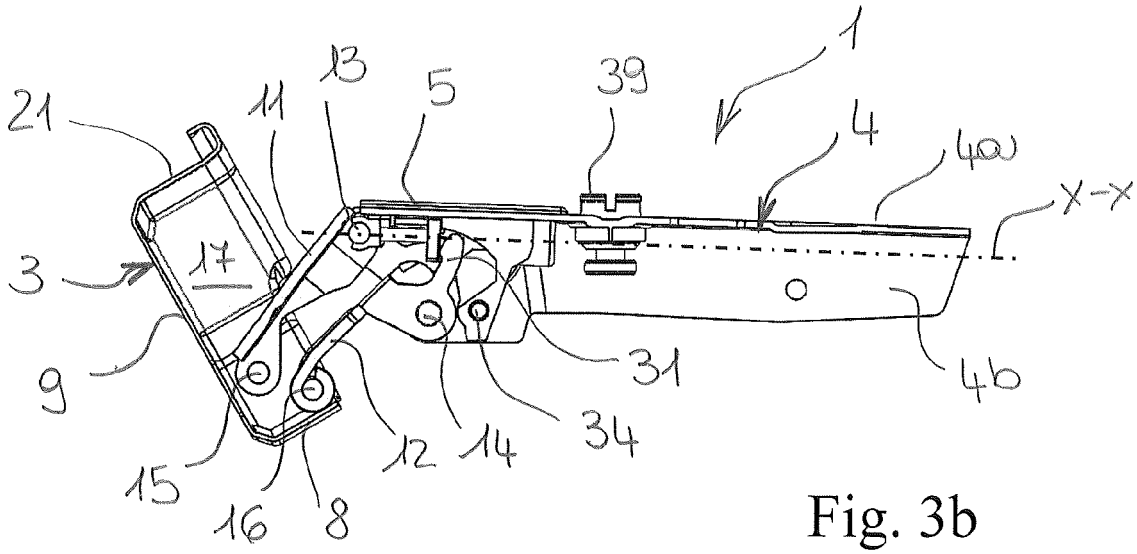


Fig. 3b

EP 3 795 790 A1

## Description

### Field of the invention

**[0001]** The present invention refers to a snap hinge with a damper device in accordance with the preamble of claim 1, particularly but not exclusively a snap hinge intended to be used in furniture to support the doors and to guide the mobile doors in their movement of opening and closing.

### Background of the invention

**[0002]** As is known, snap hinges are widely used to allow the opening and closing of furniture doors and doors and comprising a cup-shaped part to be recessed secured to the furniture door, a hinge arm hooked to a securing plate for hinges intended to be secured to a furniture shoulder, articulation means for connecting the hinge arm and the hinge cup to each other in an operatively connected manner and elastic means for ensuring the snap closure of the hinge, thereby preventing the doors from opening by themselves in an unwanted way.

**[0003]** In the furniture industry, there is an increasing need to have hinges with standard shapes and sizes that:

- are able to correctly support the doors, both statically and during the opening and closing movements,
- are able to guarantee an effective snap closure of the doors even after a high and repeated number of operating cycles and
- allow removing the hinge arm from the furniture shoulder without having to move the securing base from the furniture shoulder.

**[0004]** This last aspect, i.e. the possibility of unhooking the hinge arm from the securing plate, is essential in order to allow the door to be removed from the furniture shoulder without losing the positioning adjustments of the door with respect to the furniture shoulder itself.

**[0005]** In addition to meeting the requirements listed above, the further need is nowadays strongly felt that during the closing movement of the hinge the return action exerted by the elastic means involves a flapping closure of the door, since this is undesirable by end users.

**[0006]** In order to meet even this last need, the solution of providing the hinges with special damping devices able to dampen and slow down the closing movement of the doors has been accepted.

**[0007]** Basically it is required the furniture door to have a snap closing movement due to the elastic return action exerted by the elastic means during the closing movement of the hinge and, at the same time, we want the closing movement of the door is braked, i.e. slowed down, by the action of a damper, so as to prevent the door from slamming shut.

**[0008]** Generally, the dampers used are of the damped fluid piston type and can be secured to the cabinet in such positions that they can be directly activated by the doors during the last stretch of their closing movement. This solution, however simple and effective, is penalized by the negative aesthetic impact due to the presence of the dampers which remain visible, even if inside the cabinet. Moreover, the application of these dampers to the cabinet involves the need to carry out further drilling and assembly operations with respect to those generally required.

**[0009]** To overcome the above-mentioned problems, an attempt was made to integrate the dampers into the hinge, securing the fluid dampers directly on the hinge arm, for example as described and shown in US 2004/0205935.

**[0010]** Although appreciable in terms of the damping achieved, securing the damper on the hinge arm is not practical, as it requires shaping the hinge arm so as to make it suitable for securing with the damper, as well as not very firm in as it offers a securing point spaced from the shoulder of the furniture to which the hinge arm is secured by means of the securing plate.

**[0011]** Other solutions involve placing the damper inside the hinge arm, so as not to be visible from the outside. However, these solutions provide for an increase in the dimensions of the hinge arm in length and/or height, in order to be able to contain both the damper and the components of the damper operating mechanism inside the arm.

**[0012]** For example, document EP 3290624 B1 provides for the positioning of a linear damper under the hinge arm, so that the free end of the damper stem acts on the helical spring which acts between the arm and the cup to determine the snap closure. This solution is unsatisfactory as it determines a greater bulk in the longitudinal length of the hinge arm in order to house a damper inside which cannot be reduced in size too much in order not to lose efficiency. In particular, the hinge in accordance with the prior document EP 3290624 B1 requires increasing the length of the hinge arm, in order to avoid interference with the more advanced of the two adjustment screws on the top side of the hinge arm.

**[0013]** It is therefore evident that nowadays the need is felt to have a snap hinge equipped with a substantially retractable damper having contained dimensions and overall dimensions, substantially equal to those of a standard hinge without a damper, particularly as regards the overall dimensions in height and length of the hinge arm.

### Summary of the invention

**[0014]** The problem underlying the present invention is that of devising a snap hinge with a damper device having structural and functional characteristics such as to allow damping in the snap closure movement of a hinge and to meet the requirements referred to, particularly with regard to the containment of the height and width dimensions of the hinge arm and the dimensions of the hinge

cup.

**[0015]** This problem is solved by a snap hinge with a damper device according to claim 1.

## Brief description of the drawings

**[0016]** Further characteristics and advantages of the securing plate and of the snap hinge with a damping device for furniture according to the present invention will result from the description given below of some preferred embodiments, given by way of non-limiting example, with reference to the attached Figures, wherein:

- Figure 1 is a perspective view of a hinge according to the invention in an open configuration complete with a securing plate;
- Figure 2 is a perspective view of the hinge of Figure 1 without the securing plate;
- Figure 3a is a longitudinal section view of the hinge of - Figure 2 in open configuration;
- Figure 3b is a longitudinal sectional view of the hinge of Figure 2 in an intermediate configuration between the open configuration and the closed configuration;
- Figure 3c is a longitudinal section view of the hinge of Figure 2 in closed configuration;

Figure 4 is a perspective view only of the cup, the top connecting rod, the lower connecting rod, the elastic means and the damping device of the hinge of Figures 1 and 2;

- Figure 5 is an exploded perspective view only of the top connecting rod, the lower connecting rod, the elastic means and the damper device of the hinge of Figures 1 and 2;
- Figures 6a and 6b are respective exploded perspective views only of the elastic means and of the damper device of the hinge of Figures 1 and 2 from two different points of view,
- Figures 7 and 8 are two respective perspective views in partial exploded view of different assembly steps of the hinge of Figures 1 and 2,
- Figures 9a, 9b and 9c are plan views in longitudinal section of the hinge according to the invention in accordance with a second embodiment thereof respectively in open, intermediate and closed configuration;
- Figure 10 is a perspective view only of the cup, the top connecting rod, the lower connecting rod, the support, the elastic means and the damper device of the hinge according to the second embodiment in open configuration;
- Figure 11 is a perspective view only of the cup, the top connecting rod, the lower connecting rod, the support, the elastic means and the damper device of the hinge according to the second embodiment in closed configuration;
- Figures 12 and 13 are partial exploded perspective views of the support, of the elastic means and of the damper device of the hinge according to the second embodiment, with the stem more extracted and respectively more recessed into the body of the damper device.

## Detailed description of the invention

**[0017]** With reference to the above-mentioned Figures 1 to 8, numeral 1 generally indicates a snap hinge with a damper device for opening and closing a furniture door (not shown) according to the invention.

**[0018]** Hinge 1 includes:

- a hinge cup 3 designed to be recessed secured in a circular hole obtained in the internal part of a furniture door;
- a securing plate 7 to be secured to a furniture shoulder;
- a hinge arm 4 extending along a prevalent longitudinal direction X-X and intended to be secured to the furniture shoulder by means of removable engagement with said securing plate 7,
- first articulated connection means adapted to articulately connect 11, 12, 13, 14, 15, 16 a rear end 8 of the hinge cup 3 to a front end 5 of the hinge arm 4, so that the hinge cup 3 and the hinge arm 4 are mutually articulated to pass reversibly from an open hinge configuration (Figures 1, 2 and 3a) to a closed hinge configuration (Figure 3c), and vice versa, wherein the door supported by the hinge is open and closed, respectively, with respect to the remaining part of the furniture, and
- elastic means 30 adapted to the above-mentioned closed hinge configuration (Figure 3c) at least during a last stretch of the movement from the open hinge configuration (Figures 1, 2, 3a) to the closed hinge configuration (Figure 3c).

**[0019]** It should be pointed out that, in accordance with a preferred embodiment, the connection of the hinge arm 4 to the underlying securing plate 7 takes place with the interposition of an intermediate base (not shown), being however possible to provide a direct securing of the hinge arm to the base or, even, according to a further embodiment not shown, it is possible to provide a direct securing of the hinge arm to the furniture shoulder. In this last case, the hinge arm is provided with appropriate flanges with through slots for securing screws.

**[0020]** In a conventional way, the hinge 1 is provided with centering and adjustment elements by acting on which it is possible to:

- ensure the securing and correct positioning of the hinge arm 4 with respect to the underlying securing plate 7, as well to
- record the position of the hinge arm 4 with respect to the securing plate 7 in the longitudinal direction X-X along which the hinge arm itself extends. Since the above-mentioned engagement means and the

centering and adjustment elements are well known to those skilled in the art, it is avoided in the context of the present description to proceed with a detailed description of them.

**[0021]** In the example, the hinge arm 4 takes the form of a C-shaped profile section, having a predetermined longitudinal axis X-X, formed by a top flat wall 4a from which two respective and opposite longitudinal sides 4b extend.

**[0022]** As can be seen from the Figures, when the hinge arm 4 is in engagement with the underlying securing plate 7, the open side of the C-shaped open side faces towards the securing plate 7 itself. This conformation of the hinge arm 4 is completely conventional for a person skilled in the art.

**[0023]** As regards the above-mentioned intermediate base (not shown), it should be noted that it is preferably shaped in such a way as to fit into the "C" identified by the hinge arm 4, forming with it a coupling of a suitable shape to allow the hinge arm 4 to be able to perform a limited relevant displacement in the above-mentioned longitudinal direction X-X with respect to the intermediate base. In accordance with what has been described above, the correct positioning of the hinge arm 4 with respect to the underlying securing plate 7 is obtained by suitably acting on the above-mentioned centering and adjustment elements accessible from the top flat wall 4a of the hinge arm (see the two cross screw heads 39).

**[0024]** The hinge cup part 3 extends as an extension of the hinge arm 4 in the above-mentioned axial direction X-X starting from the rear end 8 and is identified by a bottom 9 from which the side walls extend vertically.

**[0025]** Preferably, according to a standard of construction, the hinge cup 3 has a size such that it can be housed in a hole having a diameter of 35 mm or, alternatively, it is possible that the hinge cup has such dimensions that it can be housed in a hole having a diameter of 26 mm, the hole diameter values equal to 26 mm or 35 mm being universally used today. More specifically, the hinge cup 3 has in the direction of the axis X-X along which the hinge arm 4 extends a length equal to the measure listed above, while in the transverse direction Y-Y which is perpendicular to the above-mentioned longitudinal direction XX, it has an internal width defined between two opposite side walls 17 substantially arranged parallel to axis X-X.

**[0026]** The hinge cup 3 has a front wall 21 extending between the two opposite side walls 17 at its front end, that is to say the opposite end to the rear end where it is hinged to the hinge arm 4.

**[0027]** In the examples shown, the hinge cup 3 is provided with a top securing flange 6 which passes in front the part actually shaped like a hinge cup and is provided with holes, in the example two in number, each suitable for receiving a respective securing means, for example, a screw or an expansion plug, to ensure the securing of the hinge cup 3 to the internal wall of the door. It should be noted that, in some embodiments, the hinge cup can be devoid of a securing flange. Furthermore, the shape of the hinge cup 3 may differ from that of the example considered herein.

**[0028]** In the embodiments shown, the above-mentioned first articulated connection means 11, 12, 13, 14, 15, 16 comprise:

- an upper connecting rod 11 pivoted to said hinge arm 4 and to said hinge cup 3 in correspondence of a first pin 13 and of a second pin 15, respectively, extending between said longitudinal sides 4b along a transverse direction Y-Y perpendicular to said longitudinal direction X-X and
- a lower connecting rod 12 pivoted to said hinge arm 4 and to said hinge cup 3 in correspondence with a third pin 14 and with a fourth pin 16, respectively, extending between said longitudinal sides 4b in said transverse direction Y-Y.

**[0029]** The elastic means 30 act in thrust between a part integral with the hinge arm and a part integral with one of the two above-mentioned connecting rods 11, 12 to generate the above-mentioned elastic return action that brings the hinge 1 into the above-mentioned closing configuration. In accordance with the embodiment shown, the above-mentioned elastic means act:

- on a front portion of the hinge arm, in particular against the side of the top flat wall 4a facing the underlying base 7 and
- on a portion 12b of the lower connecting rod 12 which is cam-shaped and is positioned in correspondence with the above-mentioned fourth pin 16, the cam conformation of the above-mentioned portion 12b allows the elastic means to act in thrust only during the last portion of the movement of closing the hinge 1.

**[0030]** The hinge 1 also comprises a damper device 2 comprising a body 18 and a rod 19 extending along said longitudinal direction X-X and operatively coupled to each other to identify a cylinder-piston group and to be mutually movable along said longitudinal direction X-X in contrast to a braking action relative motion damping/contrast.

**[0031]** Therefore, the damper device 2 is provided in the hinge 1 in order to slow down the approach movement between the hinge cup 3 and the hinge arm 4 during the above-mentioned last portion of the closing movement of the hinge 1 when passing from the open hinge configuration to the closed hinge configuration,

**[0032]** The above-mentioned damper device 2 is positioned inside the hinge 1 so as to:

- be positioned under the hinge arm 4, more specifically below the top flat wall 4a, taking care to identify as the lower part of the hinge arm 4 the one on the side of the top flat wall 4a facing the underlying base 7 and

- to extend in the longitudinal direction X-X starting from said front end 5 of the hinge arm 4.

**[0033]** According to the invention, both the above-mentioned elastic means 30 and the damper device 2 are positioned under the hinge arm 4 so as to be arranged side by side in parallel with each other along the longitudinal direction X-X, so as to be able to contain the overall length in the longitudinal direction X-X of the hinge arm 4. Compared to hinges without a damper positioned under the hinge arm, this allows the above-mentioned centering and adjustment elements accessible from the top flat wall 4a of the hinge arm to be removed from the front end 5 of the hinge arm 4, as well as not to have to provide a greater distance between the above-mentioned centering and adjustment elements.

**[0034]** As can be seen from the Figures, the elastic means 30 and the damper device 2 are offset from each other in the above-mentioned Y-Y transverse direction so as not to overlap each other in a plane perpendicular to the longitudinal sides 4b of the hinge arm 4.

**[0035]** The elastic means 30 extend, for a prevalent part of them, in the longitudinal direction X-X starting from the front end 5 of the hinge arm 4.

**[0036]** In accordance with a preferred embodiment, the elastic means 30 have a substantially U-shape comprising opposing arms 30a, extended in said longitudinal direction X-X, connected to each other by a central connecting portion 30b, an arm 30a (specifically the upper arm) acts in thrust against the hinge arm 4, while the remaining arm (specifically the lower arm) acts in thrust against the above-mentioned cam element 12a of the lower connecting rod 12.

**[0037]** Preferably, the above-mentioned central connecting portion 30b is a curvilinear connecting portion between the two arms 30a and is not helical-shaped.

**[0038]** Preferably, the elastic means 30 are arranged side by side in parallel with the damping device 2 at least in correspondence with said central connecting portion 30b.

**[0039]** In accordance with the embodiment shown, the free end of the arms 30a is positioned in proximity to said front end 5 of the hinge arm 4, while the above-mentioned central connecting portion 30b is positioned further back with respect to said end front 5.

**[0040]** Preferably, the above-mentioned elastic means are a leaf spring 30.

**[0041]** In accordance with the embodiment shown, the hinge 1 in the above-mentioned transverse direction Y-Y comprises, staggered in succession, a damping device 2 interposed between two distinct leaf springs 30. This configuration proved to be advantageous as it is well balanced, thus preventing the presence of an odd number of springs on one side only from causing imbalances or irregularities in the functioning of the hinge.

**[0042]** In any case it is possible to provide other configurations, for example, with a single spring. If only one spring is present, a leaf spring and a damper device are offset from each other in succession in the transverse direction Y-Y.

**[0043]** The damper device 2 has two opposite head ends 19a, 20a in the longitudinal direction X-X respectively identified:

- from the free end of the head 19a of the portion of the stem 19 projecting from the body 18 and
- from the end 18a of the body 18 opposite the end of the body 18 from which the stem 19 comes out.

**[0044]** It is evident that an outflow or insertion of the stem 19 from/into said body 18 determines an increase or a decrease in the measurable longitudinal distance between the above-mentioned opposite head ends 18a, 19a of the damper device 2.

**[0045]** The damper device 2 is supported and guided in the hinge 1 so as to allow a reciprocal separation or approach between the above-mentioned opposite head ends 18a, 19a following a greater outflow or a greater retraction of the stem 19 from/in said body 18.

**[0046]** In accordance with the embodiment shown, the hinge 1 comprises:

- a longitudinal stop integral with the hinge arm 4 and acting on a first part of said damper device 2, selected between the body 18 and the stem 19, closer in the longitudinal direction X-X to the hinge cup 3, this longitudinal stop constituting a stop to limit the maximum longitudinal approach towards the hinge cup 3 allowed by the damper device 2 and
- a lever 31 for actuating the damper device 2 supported in rotation with the upper connecting rod 11 or with the lower connecting rod 12 and in kinematic engagement with a second part 18 of the damper device 2, selected between said body 18 and said rod 19 more distant in the longitudinal direction X-X from the front end 5 of the hinge arm 4,

since during the above-mentioned last portion of the closing movement of the hinge 1 while passing from the open hinge configuration to the closed hinge configuration, the rotation of the above-mentioned lever 31 for actuating the damper device 2 involves, as a consequence of the engagement, kinematic engagement performed by said lever 31 with said first part of said damper device 2, a dragging of the first part of damper device 2 along the longitudinal direction X-X approaching the front end 5 of the hinge arm 4.

**[0047]** This determines a consequent reversible reciprocal approach between the opposite head ends 18a, 19a of the damping device 2 for the greater insertion of the stem 19 in the body 18, since a greater advancement in the longitudinal direction of the damping device 2 towards the hinge cup 3 is prevented by the presence of the above-mentioned longitudinal stop.

**[0048]** In accordance with the embodiment shown:

- the damper device 2 is positioned in the axial direction X-X so as to turn the stem 19 towards the hinge cup 3;
- the above-mentioned longitudinal stop acts on the stem 19, preferably acts on the free end of the head 19a of said stem 19 to prevent a greater longitudinal approach of the damper device 2 to the hinge cup 3 and
- the operating lever 31 acts on the body 18 by engaging a portion thereof, specifically a flange 18b with which said body 18 is specially provided.

**[0049]** Preferably the above-mentioned longitudinal stop is identified by a portion of the first pin 13 which ensures the connection of the first connecting rod 11 to the hinge arm, or alternatively it can be identified by a component integral with said first pin 13 or directly integral/integral with the hinge arm 4.

**[0050]** Preferably, the above-mentioned lever 31 for actuating the damper device 2 is integral in rotation with the lower connecting rod 12 and, preferably, has a rotation axis coincident or parallel to the said fourth pin 16 which ensures the connection of the lower connecting rod 12 to the hinge arm 4.

**[0051]** Correspondingly to what is shown in Figures 3a, 3b and 3c, in this configuration of the hinge 1 during the closing movement of the hinge 1:

- the stem 19 remains fixed in substantial abutment against the above-mentioned longitudinal stop which is specifically identified by the first pin 13, while

- the kinematic engagement which takes place between the actuation lever 31 and the body 18 causes the whole body 18 to approach the front end 5 of the hinge arm as a consequence of a greater insertion of the stem 19 into the body 18 in contrast to a contrast braking action of the above-mentioned insertion movement.

**[0052]** This determines an attenuation, that is to say a damping, of the closing effect of the hinge cup 3 towards the front end 5 of the hinge arm 4 determined by the presence and strength of the elastic means 30.

**[0053]** In accordance with further embodiments:

- the above-mentioned longitudinal stop integral with the hinge arm can act on the part of the damper device, chosen between said body and said stem, which is positioned further away in the longitudinal direction from the front end of the hinge arm so as to limit the maximum possible longitudinal distance of said damper device from the front end of the hinge arm, and
- the above-mentioned actuation lever of the damper device supported integrally in rotation by the upper connecting rod or the lower connecting rod is in kinematic engagement with a first part of the damper device, selected between the rod and the body, closer in said longitudinal direction to the front end of said hinge arm.

**[0054]** In particular, Figures 9a to 13 show a second embodiment of the hinge 1 according to the invention, whose parts which are structurally and/or functionally corresponding to those of the hinge 1 in accordance with the first embodiment already described will be further described in detail and will be marked with the same reference numbers.

**[0055]** In the hinge 1, in accordance with this second embodiment (see Figures 9a to 13), the damper device 2 is positioned inside the hinge 1, extended in the axial direction X-X, so that the head end 18a of the body 18 faces the hinge cup 3.

**[0056]** The device actuation lever 31 continues to act on the above-mentioned flange 18b of the body 18 to cause the free head end 18a of the body 18 to approach the hinge cup 3 during the above-mentioned last stretch of the closing movement of the hinge 1 while passing from the open hinge configuration to the closed hinge configuration.

**[0057]** In accordance with this second embodiment, the longitudinal stop integral with the hinge arm is identified by a transverse pin 40 supported by the opposing longitudinal sides 4b of the hinge arm 4. Said transverse pin 40 is then secured integrally to the stem 19, preferably at its head end 19a.

**[0058]** Therefore, in the second embodiment of the hinge 1 (see Figures 9a to 13), the stem 19 of the damper device 2 is secured in the longitudinal direction X-X with respect to the hinge arm 4, so that, during the above-mentioned last section of the movement of closure of the hinge 1 while passing from the open hinge configuration to the closed hinge configuration, the above-mentioned actuation lever 31 supported integrally in rotation with the lower connecting rod 12 causes longitudinal dragging X-X of the whole body 18 towards the hinge cup 3.

**[0059]** When passing from the open hinge configuration (see Fig. 9a) to the closed hinge configuration (see Fig. 9c), the measurable longitudinal distance between the above-mentioned opposing head ends 18a, 19a of the damper device 2 is therefore increased, which is why the damper device 2 in accordance with the second embodiment of the hinge 1 is found to work in traction, that is to say, the relative movement of the rod 19 with respect to the body 18 has to be braked at least during the exit of the rod 19 from the body 18.

**[0060]** In the hinge 1 according to the invention, in accordance with all the embodiments shown above, the stem 19 is preferably positioned so that its extension in the longitudinal direction X-X is intersecting or tangent to the first pin 13.

**[0061]** Preferably, in the hinge 1 according to the invention, the above-mentioned damper device 2 comprising the body 18 and the stem 19 is mounted on the edge of a rigid support 33 secured to the hinge arm 4.

**[0062]** Preferably the above-mentioned rigid support 33 is secured to the hinge arm 4 by means of a fifth pin 34 extended in the transverse direction Y-Y between the opposing longitudinal sides 4b of the hinge arm 4.

**[0063]** Preferably, the above-mentioned rigid support 33 is shaped so as to identify a longitudinal cradle 38 for receiving and sliding guide in the axial longitudinal direction X-X of said body 18.

**[0064]** Preferably, the above-mentioned rigid support 33 comprises a front cross member 35 which extends in the transverse direction Y-Y and is shaped to rest, preferably to embrace the first pin 13, the end of the damper device 2 facing the hinge cup being in contact with the above-mentioned front cross member 35.

**[0065]** Preferably the above-mentioned rigid support 33 comprises positioning seats 37 for keeping the elastic means 30 in position, so that said rigid support 33, said damper 2 and said elastic means 30 identify a pre-assembled group 36 arranged to be inserted as a unitary component in the assembly of the hinge 1, as can be seen from Figure 7 (an analogous situation is found with the hinge in accordance with Figures 9a to 13).

**[0066]** Therefore, the above-mentioned elastic means 30 and the damper device 2 are mounted on the edge of the rigid support 33 which maintains them in the correct mutual positioning for subsequent housing in the hinge.

**[0067]** In the hinge 1, therefore, a pre-assembled unit 36 is identified, which is designed to be inserted as a unitary component in the assembly of the hinge 1. Basically, in the assembly of the hinge 1, the pre-assembled group 36 is positioned between the opposing longitudinal sides 4b of the hinge arm 4 before being secured there by inserting the fifth pin 34.

**[0068]** The cylinder-piston assembly of the damper device 2 can be of the fluid type (for example with air or oil) or with grease, being possible to use also a cylinder-piston assembly of different types, for example, using an elastically deformable solid element.

**[0069]** Preferably, the cylinder-piston assembly of the damper device 2 comprises second elastic means (not shown) which act on the rod 19 to push it with a predetermined elastic load towards the above-mentioned advanced end stroke position wherein the rod 19 projects more from the body 18 (see Figures 3a, 5, 6a and 6b). In this regard, it should be noted that the above-mentioned predetermined elastic load of these second elastic means is suitable for overcoming the damping/contrast braking action that is generated in the damper device 2 between the rod 19 and the body 18, thus causing the rearming towards the end advanced stroke position of the stem 19 when no part of the hinge acts on it, for example, when the hinge is in the open configuration (see Figure 3a).

**[0070]** Given the characteristics described above, the hinge 1 according to the invention is therefore a hinge of the damped type, wherein, during the last stretch of the closing movement of the hinge 1 from the open hinge configuration (Figures 1, 2, 3a) to the closed hinge configuration (Figure 3c), the body 18 of the damper device 2 is operated to move towards the free projecting end of the rod 19, thus reaching the above-mentioned rear end stroke position of the rod with respect to the body, and to brake the reciprocal movement approach between the hinge cup 3 and the hinge arm 4.

**[0071]** When using the hinge 1, it was found that, during the last stretch of the closing movement of the hinge, the damper device 2 was able to ensure an effective damping/contrast action capable of slowing down the closing movement of the hinge and the supported door, thus preventing the door from slamming shut.

In particular, the view 3a shows the open hinge condition. In this configuration:

- the free end of the stem 19 insists against the first pin 13 with the interposition of the above-mentioned cross member 25 and
- the opposite longitudinal head ends 18a and 19a of the damper device 2 are at the maximum distance allowed to them.

**[0072]** The view of Figure 3b shows the instant wherein the drive arm 31 comes to act on the flange 18b of the body 18.

**[0073]** A further closing movement of the hinge 1 determines a longitudinal translation of the whole body 18 towards the front end 5 of the hinge arm, with consequent greater insertion of the stem (which in this embodiment is stationary) in the body 18 which advances towards the free end.

**[0074]** As explained above, the above-mentioned relative movement of insertion of the stem 19 into the body 18 takes place in contrast to the desired damping braking action which extends until the hinge reaches the closed position shown in Figure 3C, wherein the opposite head ends longitudinal sections 18a and 19a of the damper device 2 are at the minimum distance allowed by the geometry of the hinge.

**[0075]** As can be appreciated from what has been described, the snap hinge for furniture according to the present invention allows the above requirements to be met, while overcoming the drawbacks referred to in the introductory part of the present description with reference to the known art.

**[0076]** In fact, the hinge according to the invention allows an excellent damping of the closing movement of the hinge to be achieved while having dimensions and external overall dimensions corresponding to those of a common hinge for furniture without damping, and without penalizing the aesthetic appearance of the hinge due to the presence of the damper device.

**[0077]** Another advantage of the hinge for furniture according to the present invention lies in the possibility of being able to contain the length of the hinge arm while retaining the same degrees of adjustment as the previously known hinges.

**[0078]** Another advantage of the hinge for furniture ac-

cording to the present invention lies in the possibility of being able to detach the hinge arm from the securing plate, without the damper device being in the way.

**[0079]** Furthermore, the positioning of the damper device is such as to leave the maximum freedom of actuation both of the engagement means and of the above-mentioned hinge centering and adjustment elements.

**[0080]** A still further advantage of the hinge for furniture according to the present invention lies in the unusual structural and manufacturing simplicity, as well as in the possibility of using this hinge as a spare part for furniture using standard hinges.

## Claims

1. **A snap hinge with a damper device,** particularly for opening and closing furniture doors, said hinge (1) comprising:

   - a hinge cup (3) designed to be secured to a door of a piece of furniture,
   - a hinge arm (4) extending in a prevailing longitudinal direction (X-X) and designed to be connected to a sidewall of a piece of furniture,
   - first articulated connection means (11, 12, 13, 14, 15, 16) for connecting in articulated fashion a rear end (8) of the hinge cup (3) to a front end (5) of said hinge arm (4), said hinge cup (3) and said hinge arm (4) being connected in articulated fashion to reversibly move from a closed hinge configuration to an open hinge state, and vice versa, in which the furniture door is closed and open relative to the rest of the piece of furniture respectively and
   - elastic means (30) designed to operate between said hinge cup (3) and said hinge arm (4) to bias said hinge (1) with a preset elastic load toward said closed hinge state during a final section of the closing movement of the hinge from the open hinge configuration to the closed hinge configuration and
   - a damper device (2) having a body (18) and a stem (19) which extend in said longitudinal direction (X-X) and are operably associated with each other to define a cylinder-piston unit and to be mutually movable in said longitudinal direction (X-X) against a braking action for damping/counteracting their relative movement, said damper device (2) being positioned in said hinge (1) to reduce the speed of movement of said hinge cup (3) and said hinge arm (4) toward each other during said final section of the closing movement of the hinge from the open hinge configuration to the closed hinge configuration, wherein:
   - said hinge arm (4) comprises a top wall (4a) from which respective opposite longitudinal sides (4b) extend, in said longitudinal direction (X-X);
   - said first articulated connection means (11, 12, 13, 14, 15, 16) comprise:

     • an upper connecting rod (11) pivoted to said hinge arm (4) and said cup (3) at a first pin (13) and a second pin (15) respectively, extending between said longitudinal sides (4b) in a transverse direction (Y-Y) perpendicular to said longitudinal direction (X-X) and
     • a lower connecting rod (12) pivoted to said hinge arm (4) and said cup (3) at a third pin (14) and a fourth pin (16) respectively, extending between said longitudinal sides (4b) in said transverse direction (Y-Y) and

   - said damper device (2) is positioned in said hinge in a such a position as to be under said hinge arm (4) and extend in said longitudinal direction (X-X) from said front end (5) to said hinge arm (4),

   **characterized in that:**
   said elastic means (30) and said damper device (2) are positioned under said hinge arm (4) in parallel side-by-side positions along said longitudinal direction (X-X).

2. A hinge as claimed in claim 1, wherein said elastic means (30) and said damper device (2) are offset from each other in said transverse direction (Y-Y) to be in non-overlapping relationship in a plane perpendicular to said longitudinal sides (4b) of said hinge arm (4).

3. A hinge as claimed in claim 1 or 2, wherein said elastic means (30):

   - are positioned at said front end (5) of said hinge arm (4) and
   - comprise a leaf spring (30) extended in said longitudinal direction (X-X) for a prevalent part.

4. A hinge as claimed in claim 1, 2 or 3, wherein said elastic means (30) have a U shape comprising opposite arms (30a), extending in said longitudinal direction (X-X) and connected by a central connecting portion (30b), wherein a free end of said arms (30a) is positioned proximate to said front end (5) of the hinge leaf (4), whereas said central connecting portion (30b) is positioned in a more retracted position relative to said front end (5), preferably said elastic means (30) are in parallel side-by-side position along said longitudinal direction (X-X) at least in correspondence of said central connecting portion (30b).

**5.** A hinge as claimed in claim 3, wherein said transverse direction (Y-Y) comprises, in successive offset positions:

- a damper device (2) interposed between two distinct leaf springs (30) or
- a leaf spring and a damper device.

**6.** A hinge as claimed in any one of claims 1 to 5, wherein:

- two opposite ends (19a, 20a) are defined in said damper device (2) in said longitudinal direction (X-X) which are defined, respectively:
  - by the free end (19a) of the portion of said stem (19) that projects out of said body (18) and
  - by the end (18a) of said body (18) that faces away from the end of said body (18) having the stem (19) projecting there from;
- a movement of said stem (19) out of or into said body (18) causes the longitudinal distance between said opposite ends (18a, 19a) of said damper device (2) to increase or decrease and
- said damper device (2) is supported and guided in said hinge (1) to allow said opposite ends (18a, 19a) to increase or decrease their mutual distance as a result of said stem (19) moving further out of or into said body (18),

and wherein said hinge (3) comprises:

- a longitudinal stop member, which is rigidly joined to said hinge arm (4) and acts upon a first portion of said damper device (2), selected between said body (19) and said stem (19), closer to said hinge cup (3) in said longitudinal direction (X-X) to limit the maximum longitudinal travel of said damper device (2) toward said hinge cup (3) and
- an actuation lever (31) for actuating said damper device (2), which is pivotally rigidly joined to said upper connecting rod (11) or said lower connecting rod (12) and is kinematically engaged with a second portion of said damper device (2), selected between said body (18) and said stem (19) which is farther from said front end (5) of said hinge arm (4) in said longitudinal direction (X-X),

during said final section of the closing movement of the hinge (1) from the open hinge configuration to the closed hinge configuration, the pivotal movement of said actuation lever (31) causing said first portion of said damper device (2), as a result of said kinematic engagement of said actuation layer (31) with said first portion of said damper device (2), to be driven in said longitudinal direction (X-X) toward said front end (5) of said hinge arm (4), thereby reversibly changing the distance between said opposite ends (18a, 19a) of the damper device (2), a further longitudinal movement of said damper device (2) toward the hinge cup (3) being prevented by the longitudinal stop member.

**7.** A hinge as claimed in claim 6, wherein:

- said damper device (2) is placed in said axial direction (X-X) in such a position that said stem (19) faces said hinge cup (3) and said longitudinal stop member acts upon said stem (19) and preferably acts upon the free end (19a) of said stem (19) or alternatively
- said damper device (2) is placed in said axial direction (X-X) in such a position that said body (18) faces said hinge cup (3) and said longitudinal stop member (40) acts upon said body (18), preferably upon the free end (18a) of said body (18).

**8.** A hinge as claimed in any one of claim 1 to 5, wherein:

- two opposite ends (19a, 20a) are defined in said damper device (2) in said longitudinal direction (X-X) which are defined, respectively:
  - by the free end (19a) of the portion of said stem (19) that projects out of said body (18) and
  - by the end (18a) of said body (18) that faces away from the end of said body (18) having the stem (19) projecting therefrom;
- a movement of said stem (19) out of or into said body (18) causes the longitudinal distance between said opposite ends (18a, 19a) of said damper device (2) to increase or decrease and
- said damper device (2) is supported and guided in said hinge (1) to allow said opposite ends (18a, 19a) to increase or decrease their mutual distance as a result of said stem (19) moving further out of or into said body (18),

and wherein said hinge (3) comprises:

- a longitudinal stop member (40), which is rigidly joined to said hinge arm (4) and acts upon a second portion of said damper device (2), selected between said body (19) and said stem (19), farther from said front end (5) of said hinge arm (4) in said longitudinal direction (X-X) to set the longitudinal position of said second portion of said damper device relative to said hinge arm (4) and

- an actuation lever (31), which is pivotally rigidly joined to said upper connecting rod (11) or said lower connecting rod (12) and is kinematically engaged with a first portion of said damper device, selected between said stem and said body, which is closer to said front end (5) of said hinge arm (4) in said longitudinal direction (X-X),

during said final section of the closing movement of the hinge from the open hinge configuration to the closed hinge configuration, the pivotal movement of said actuation lever causing said first portion of said damper device, as a result of said kinematic engagement of said actuation layer with said first portion of said damper device, to be driven in said longitudinal direction away from said front end of said hinge arm, thereby reversibly changing the distance between said opposite ends (18a, 19a) of the damper device (2).

**9.** A hinge as claimed in claim 8, wherein:

- said damper device is placed in said axial direction in such a position that said stem faces said hinge cup and said longitudinal stop member acts upon said body, and preferably acts upon the free end of said body or alternatively
- said damper device (2) is placed in said axial direction (X-X) in such a position that said body (18) faces said hinge cup (3) and said longitudinal stop member (40) acts upon said stem (19), preferably upon the free end (19a) of said stem.

**10.** A hinge as claimed in any one of claims 6 to 9, wherein:

- said longitudinal stop member is identified by a portion of said first pin (13) or by a component (40) that is rigidly joined to said first pin (13) or directly joined to/integral with said hinge arm (4) and/or
- said actuation lever (31) is pivotally rigidly joined to said lower connecting rod (12), preferably said actuation lever (31) has its axis of rotation coincident with or parallel to said fourth pin (16).

**11.** A hinge as claimed in any one of claims 1 to 10, wherein said stem (19) is in such a position that its extension in said longitudinal direction (X-X) will intersect or be tangent to the first pin (13).

**12.** A hinge as claimed in any one of claims 1 to 11, wherein said damper device (2) comprising said body (18) and said stem (19) is mounted on board a rigid support (33) fixed to said hinge arm (4).

**13.** A hinge as claimed in claim 12, wherein said rigid support (33) is fixed to said hinge arm (4) via a fifth pin (34) extending in said transverse direction (Y-Y) between said longitudinal sides (4b) of the hinge arm (4).

**14.** A hinge as claimed in claim 12 or 13, wherein said rigid support (33) comprises a longitudinal cradle (38) for receiving and guiding the sliding movement of said body (18) in said longitudinal direction (X-X).

**15.** A hinge as claimed in any one of claims 12 to 14, wherein said rigid support (33) comprises a front cross member (35) extending in said transverse direction (Y-Y), which is formed with such a shape as to rest upon, preferably embrace, said first pin (13), the end of said damper device (2) that faces toward said hinge cup resting upon said front cross member (35).

**16.** A hinge as claimed in any one of claims 12 to 15, wherein said rigid support (33) comprises positioning seats (37) for holding said elastic means (30) in position so that said rigid support (33), said damper (2) and said elastic means (30) will define a pre-assembled unit suitable to be fitted into the hinge (1) as a single part, during assembly.

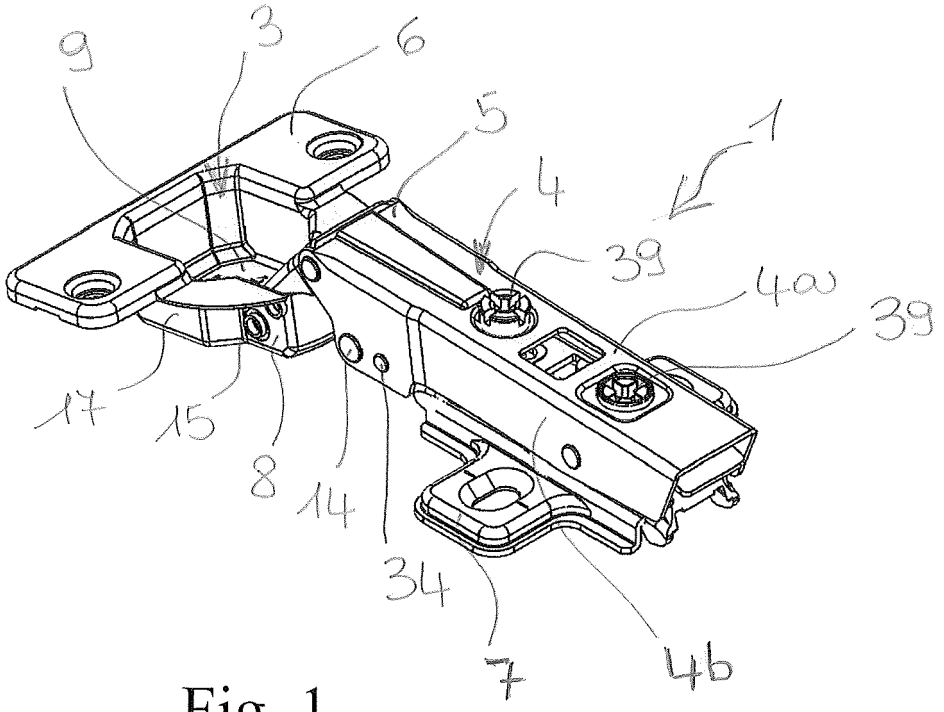
9
3
6
5
1
4
39
40
39
17
15
8
14
34
7
4b

Fig. 1

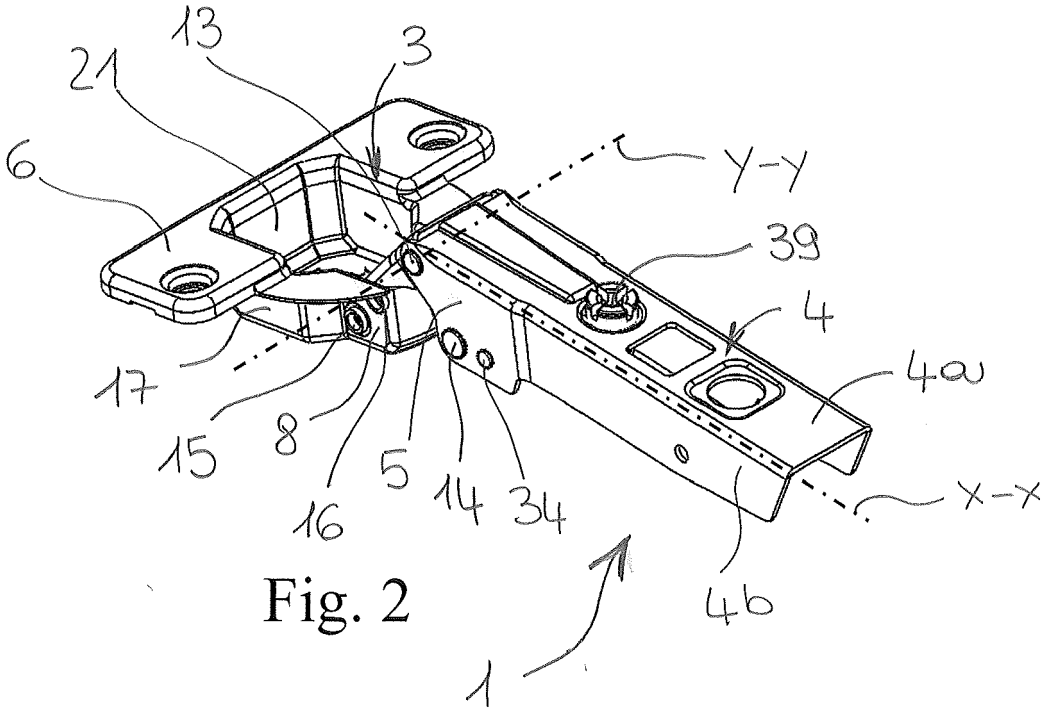
13
21
3
6
Y-Y
39
4
40
17
15
8
5
14
34
16
X-X
4b
1

Fig. 2

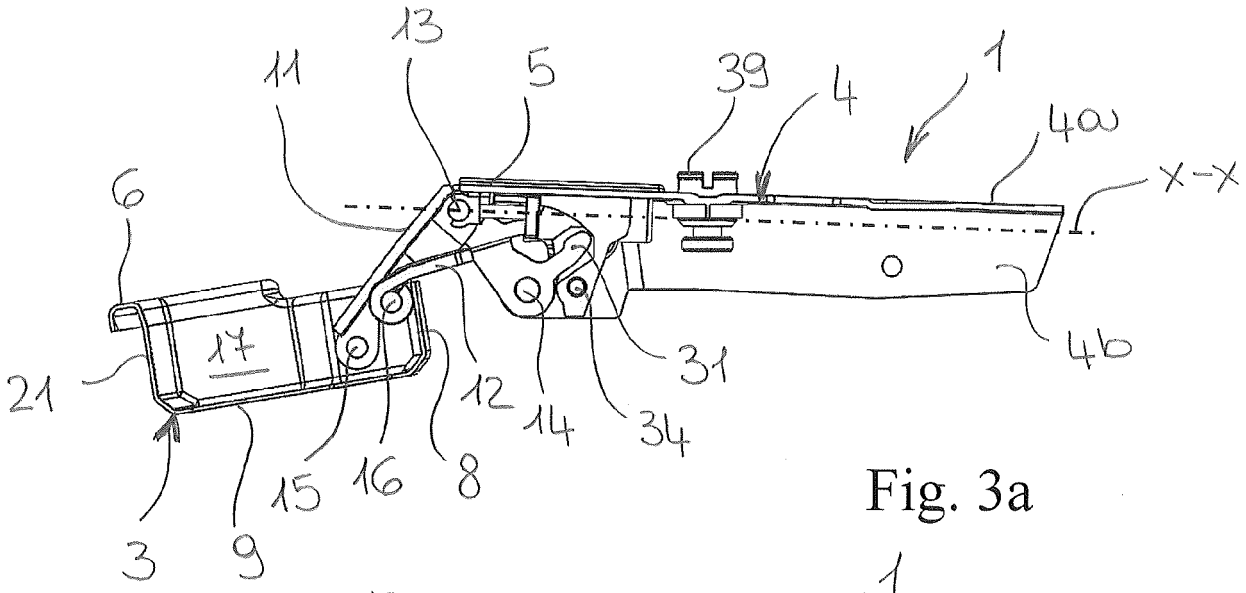


Fig. 3a

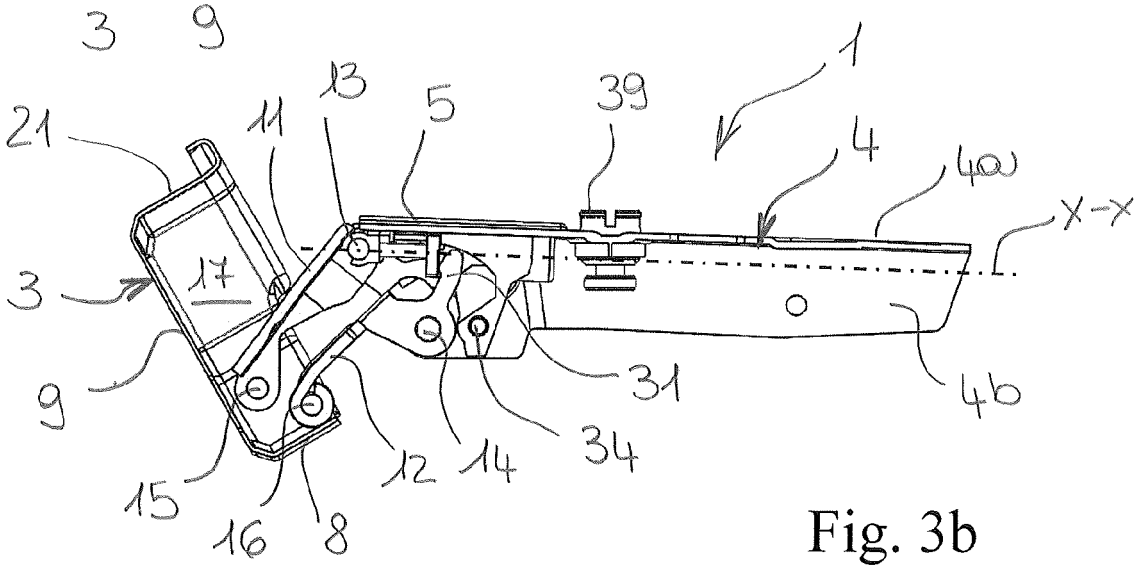


Fig. 3b

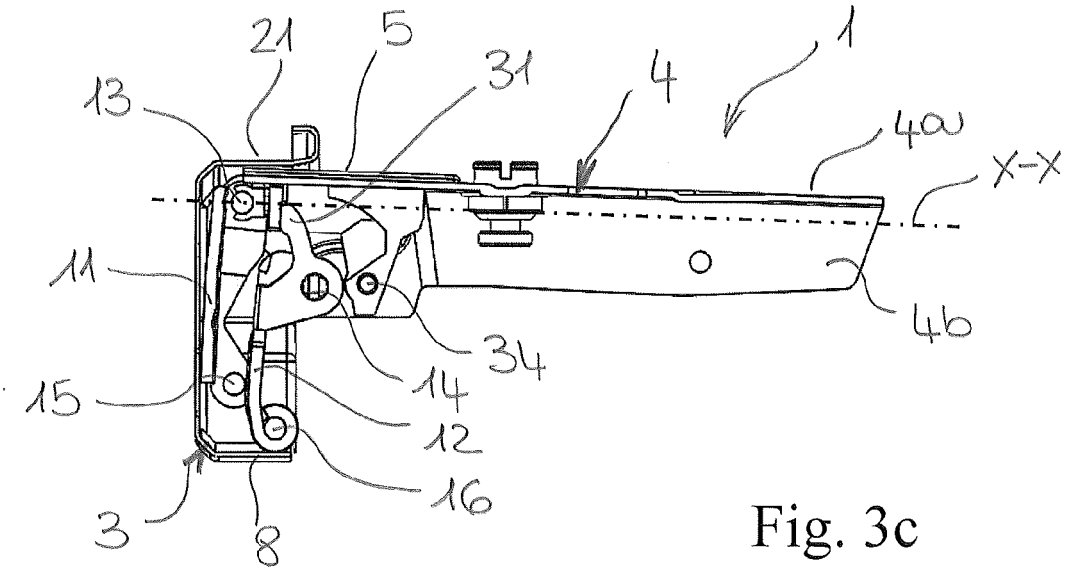


Fig. 3c

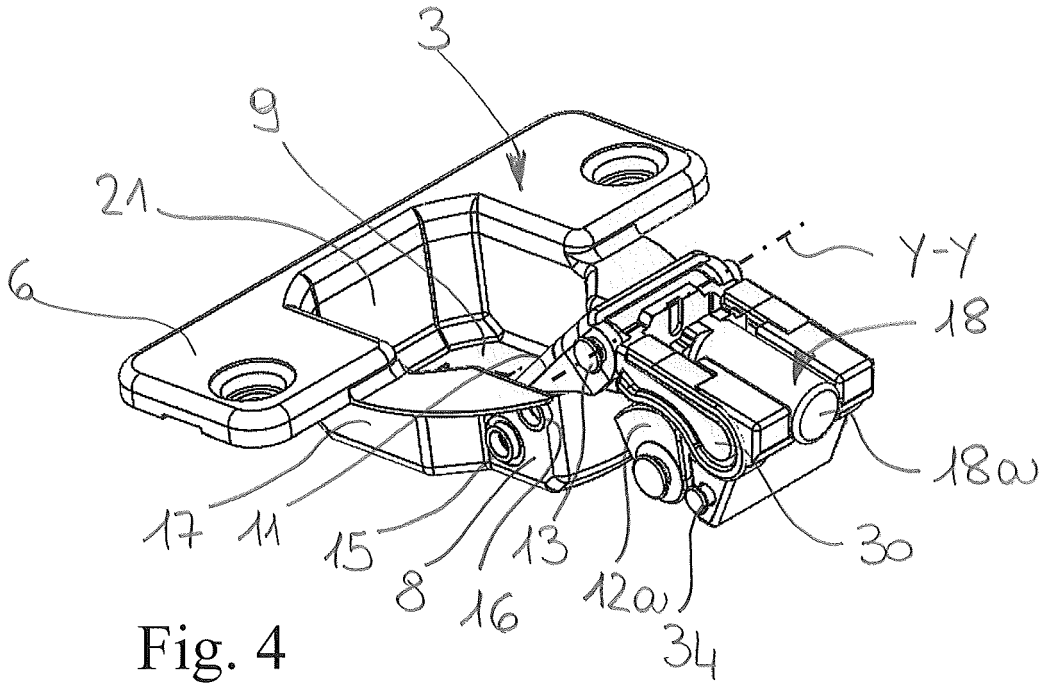
3
9
21
6
Y-Y
18
18a
30
17
11
15
8
16
13
12a
34

Fig. 4

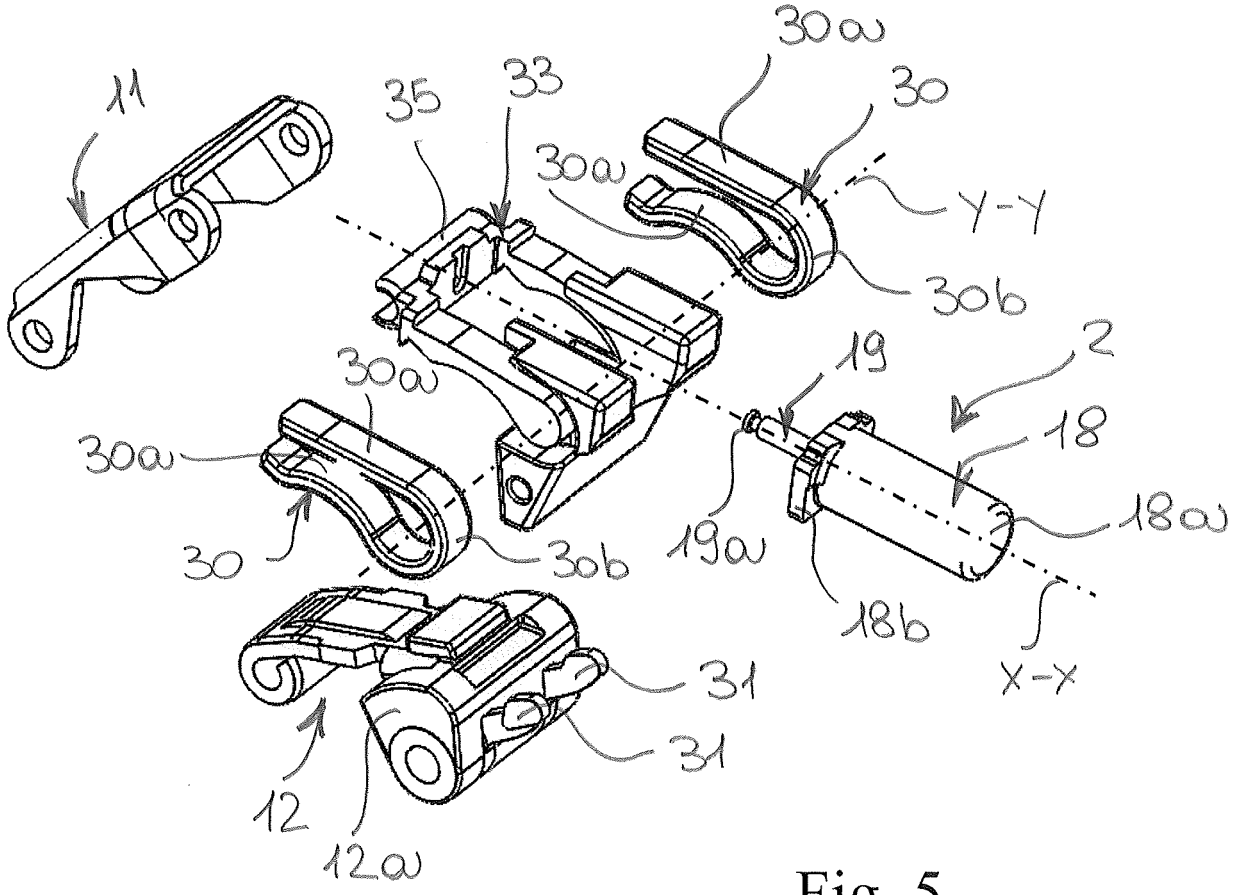
11
35
33
30a
30
30a
Y-Y
30b
30a
19
2
18
30a
18a
30
30b
19a
18b
X-X
31
31
12
12a

Fig. 5

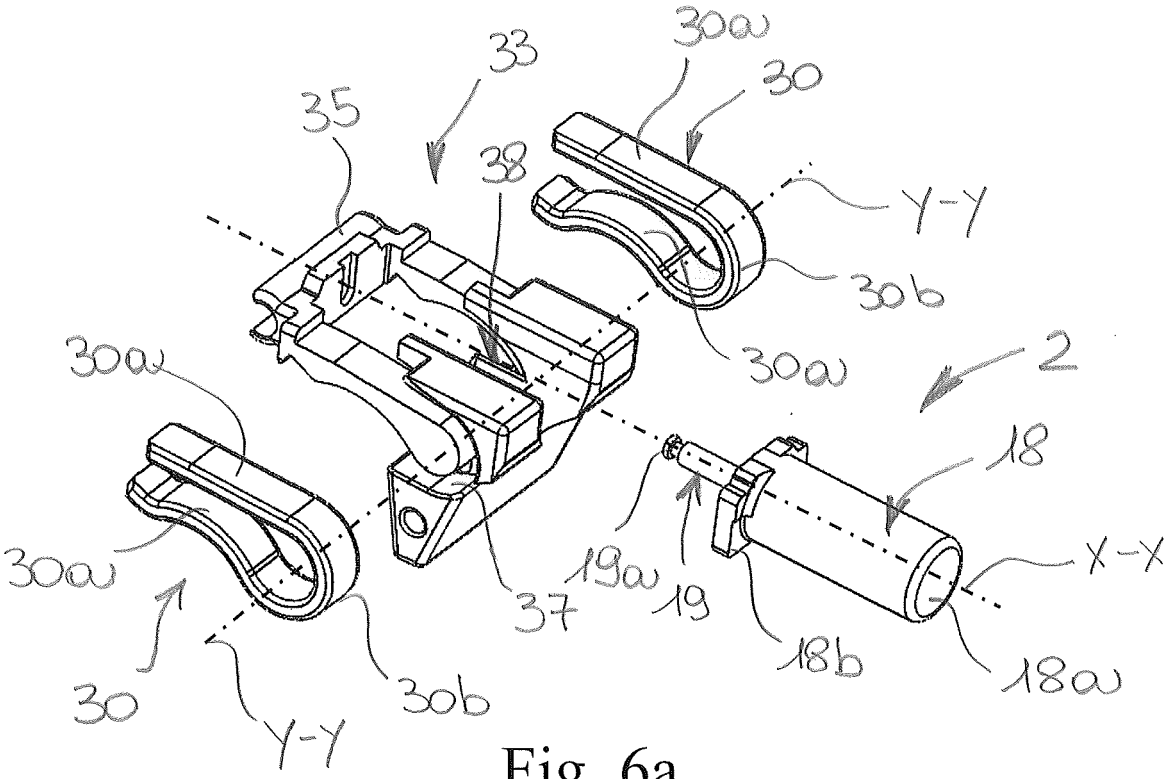
33
30a
30
35
38
Y-Y
30b
30a
2
30a
18
19a
19
X-X
37
18b
18a
30
Y-Y
30b

Fig. 6a

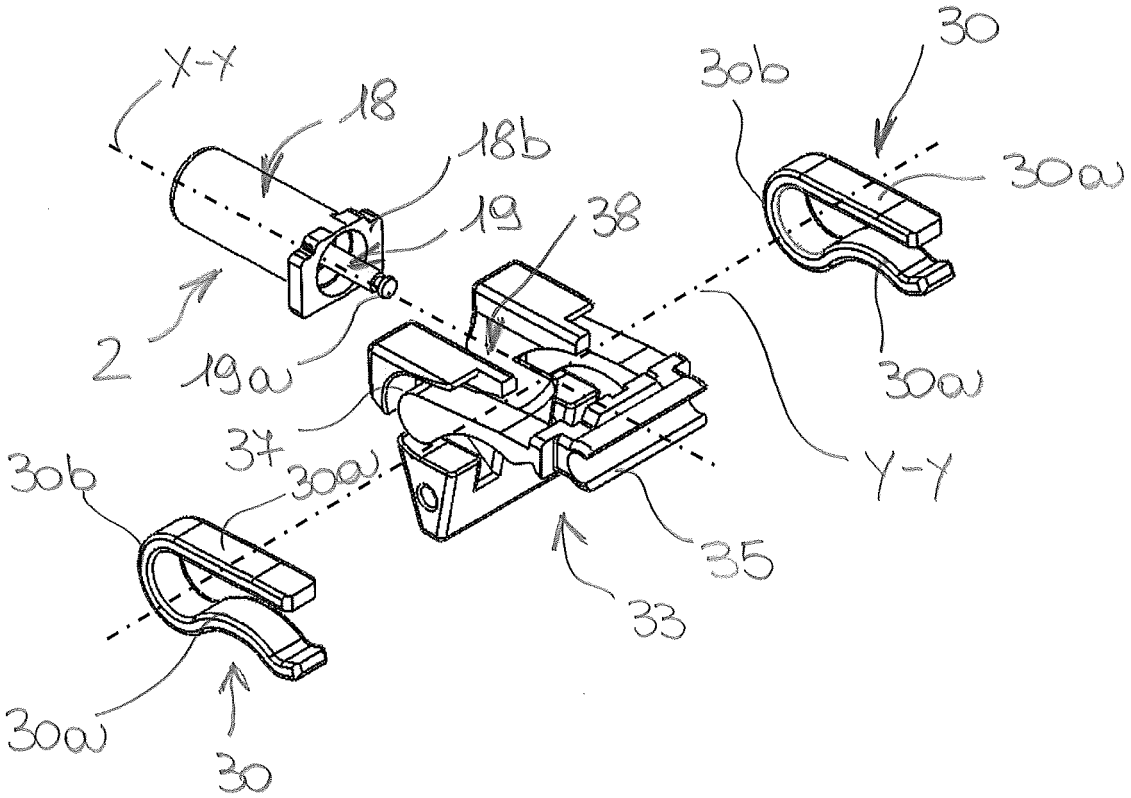
X-Y
18
18b
19
38
30
30b
30a
2
19a
37
30a
Y-Y
30b
35
30a
33
30

Fig. 6b

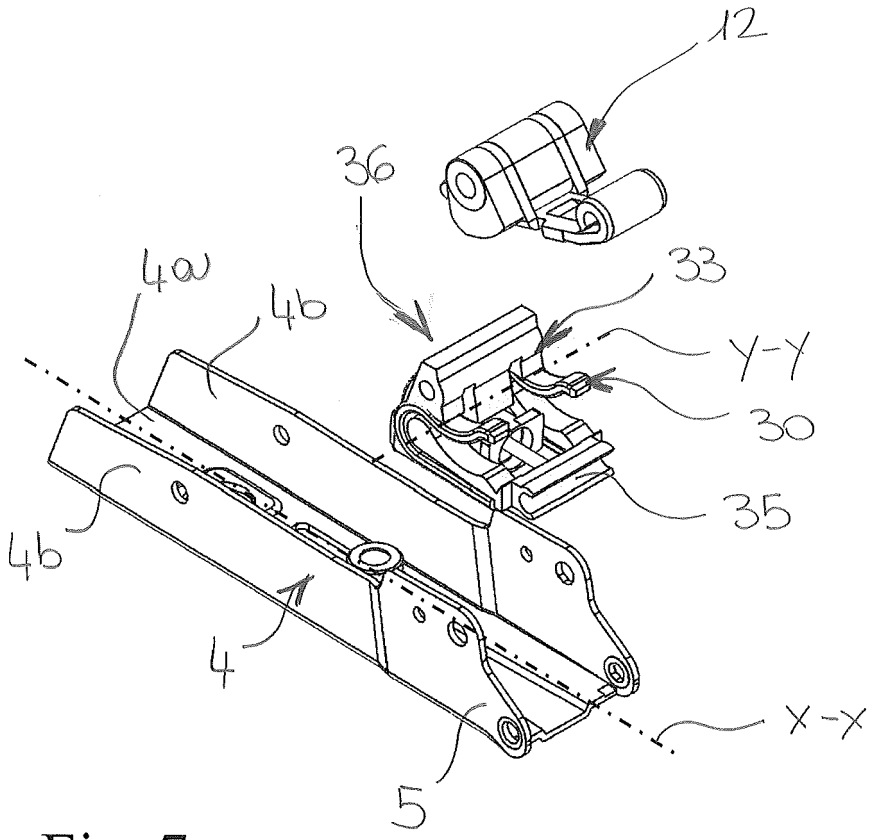


Fig. 7

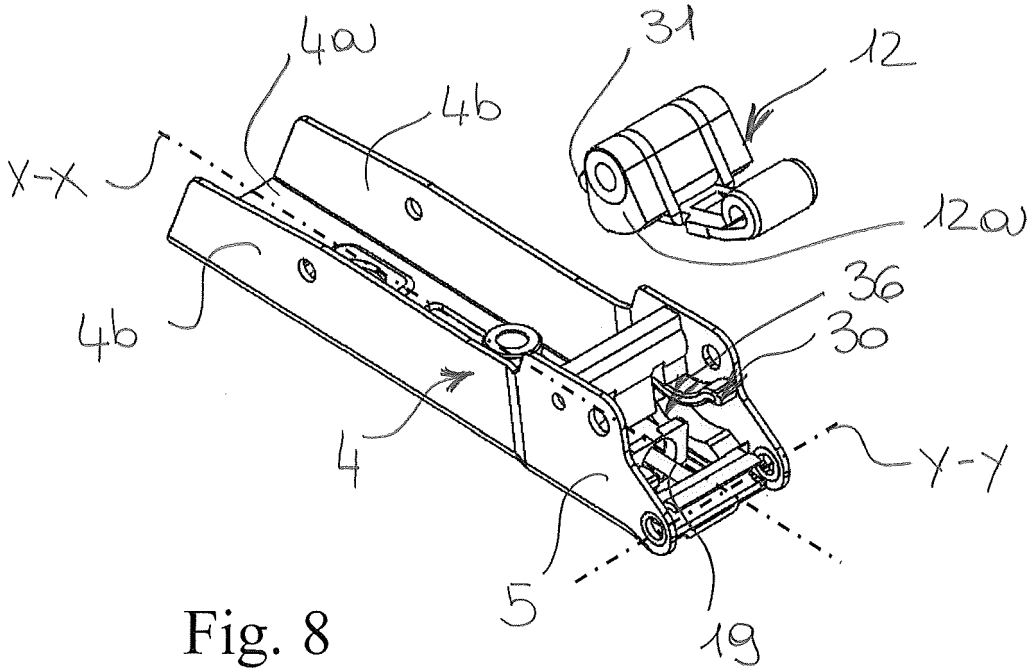


Fig. 8

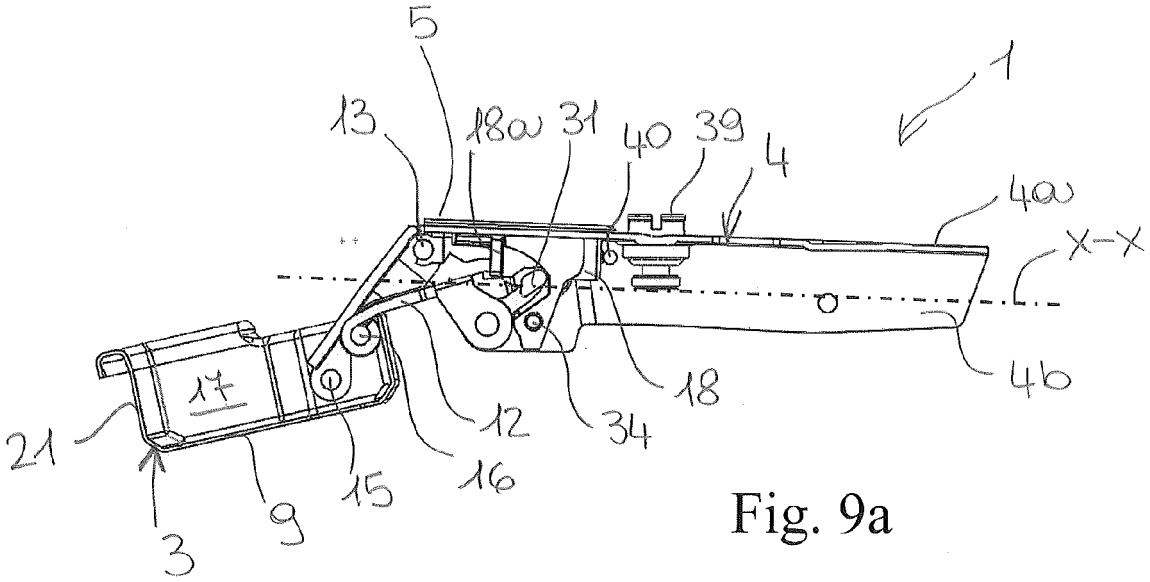


Fig. 9a

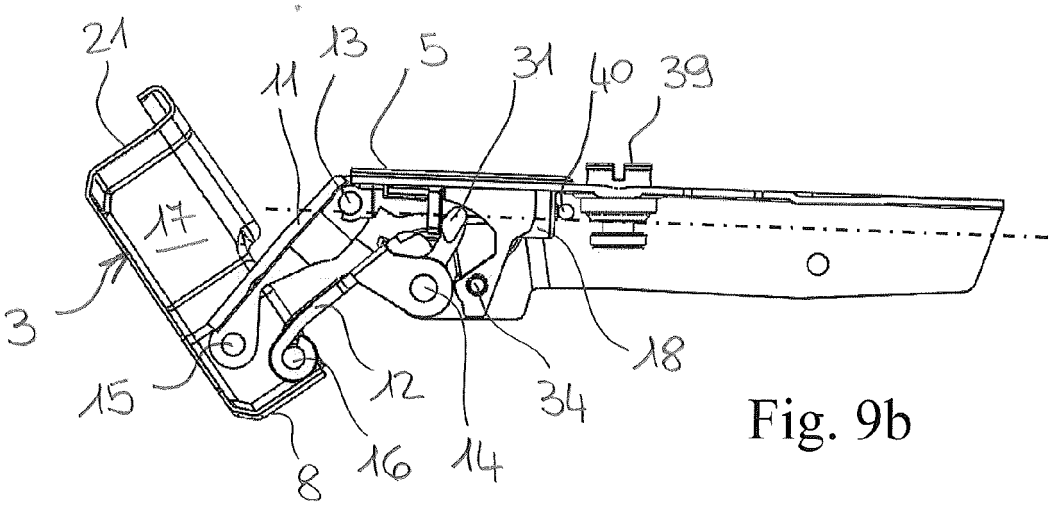


Fig. 9b

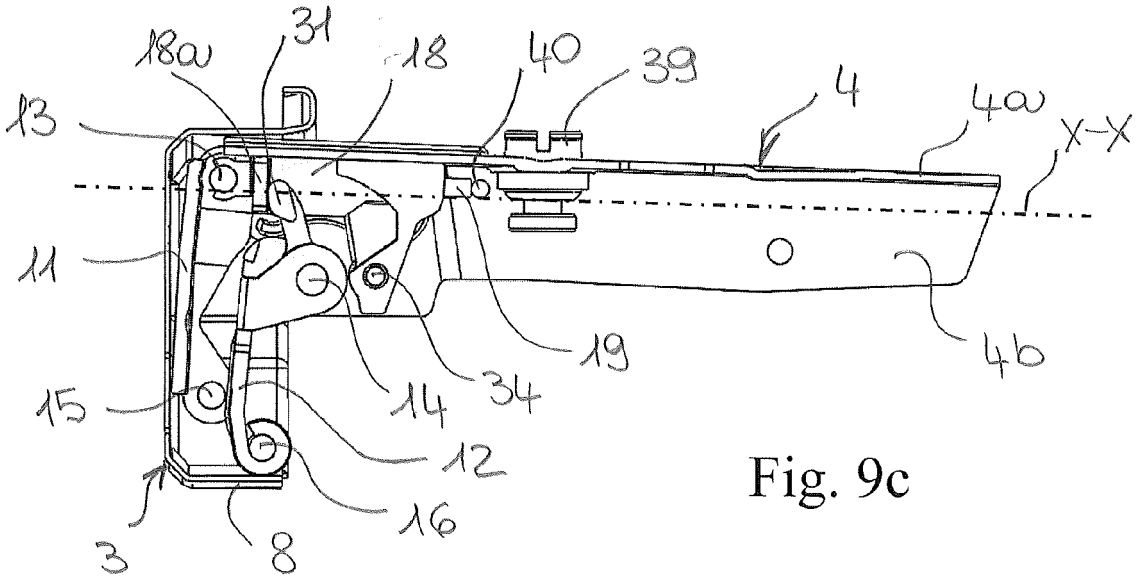


Fig. 9c

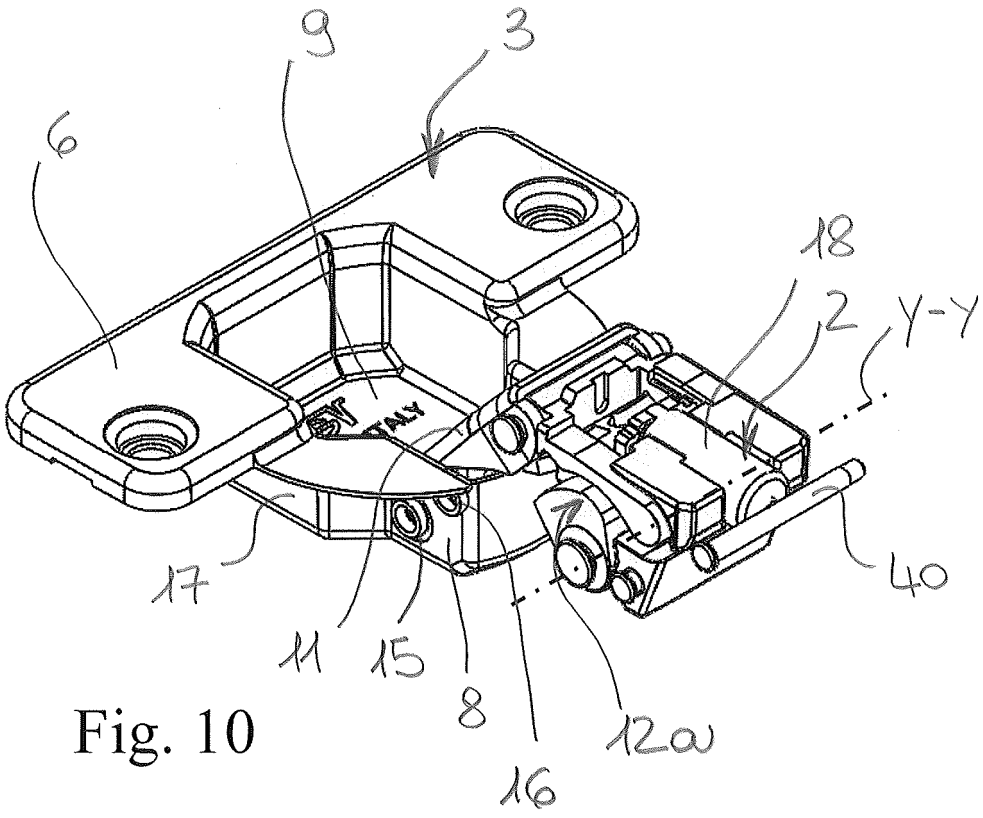


Fig. 10

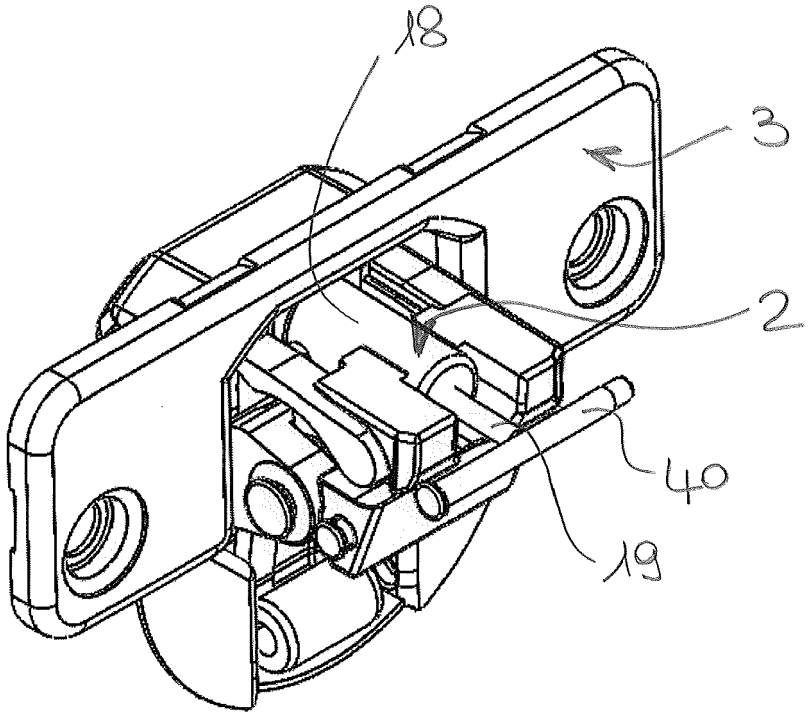


Fig. 11

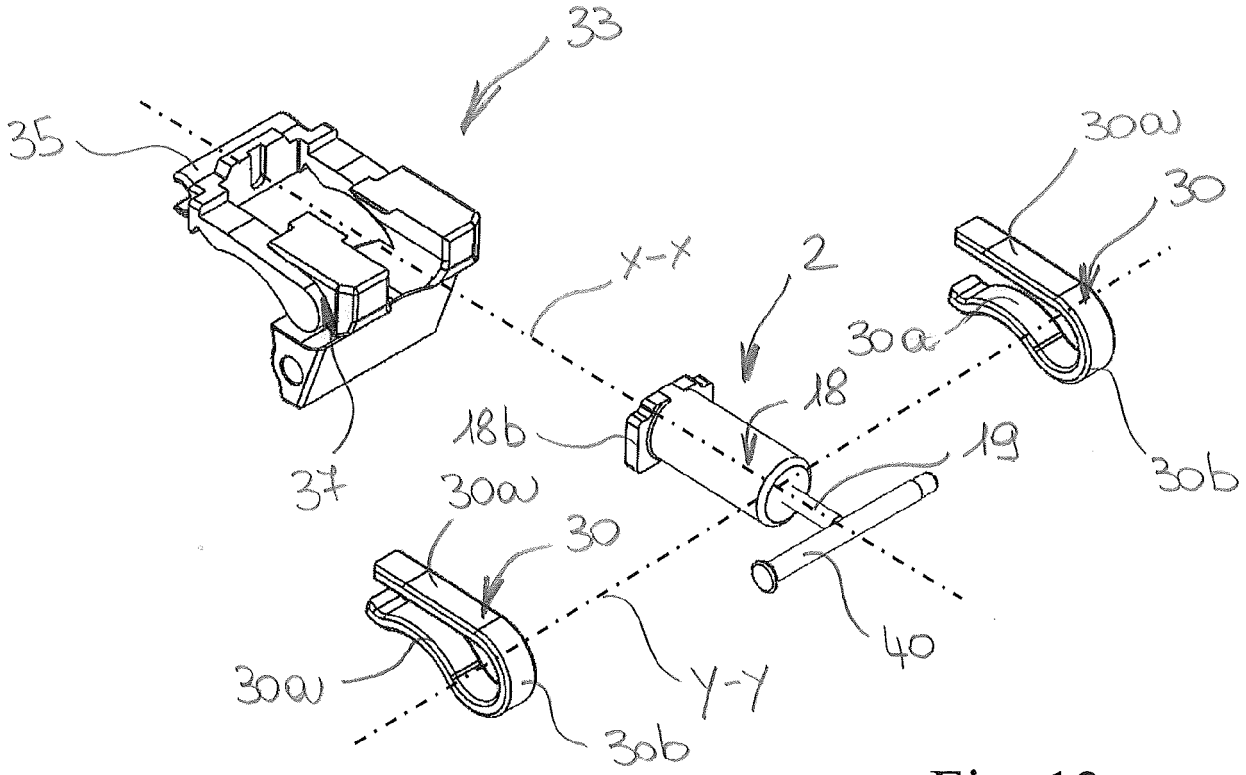
33
35
30a
30
X-X
2
30a
18
18b
19
37
30b
30a
30
40
30a
Y-Y
30b

Fig. 12

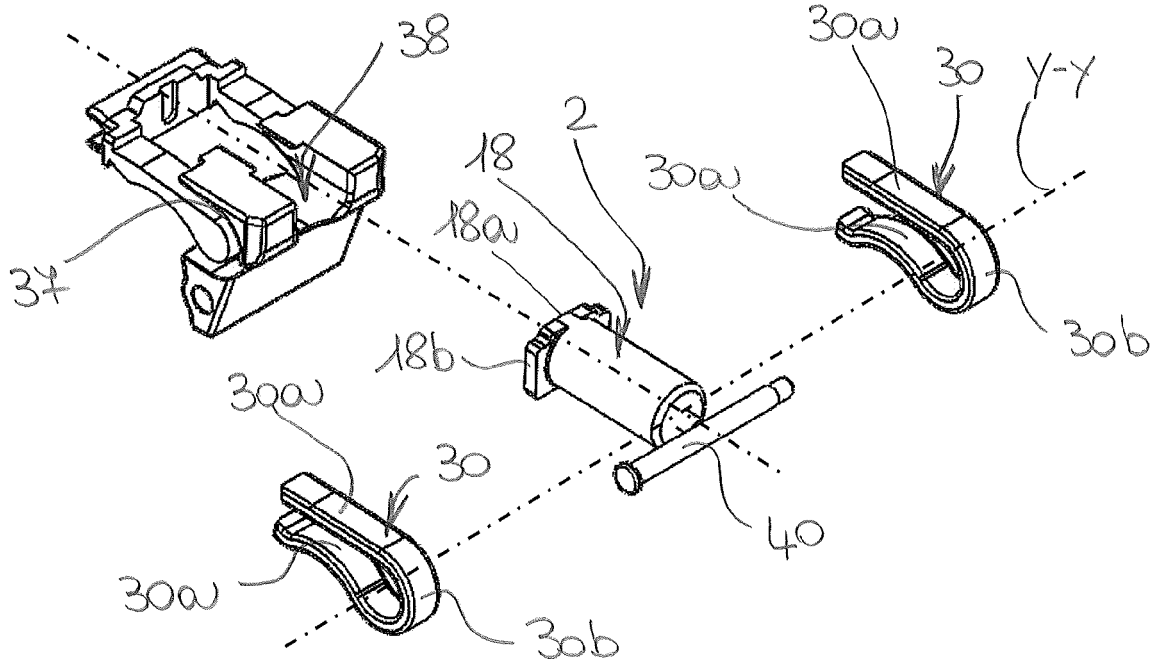
38
30a
30
Y-Y
18
2
30a
18a
18b
30a
30
40
30a
30b

Fig. 13

Europäisches Patentamt
European Patent Office
Office européen des brevets

# EUROPEAN SEARCH REPORT

Application Number
EP 20 19 7051

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X<br>Y | CN 106 761 096 A (FOSHAN TIANSI HARDWARE CO LTD) 31 May 2017 (2017-05-31)<br>* figures * | 1,2,<br>6-12,14<br>13 | INV.<br>E05D11/10<br>E05F5/00 |
| X | EP 2 176 485 A1 (ZIMMER GUENTHER [DE]; ZIMMER MARTIN [DE])<br>21 April 2010 (2010-04-21)<br>* paragraph [0022] - paragraph [0032]; figures * | 1,6,12 | |
| Y,D<br>A | EP 3 290 624 B1 (LIANG YELIN [CN])<br>1 May 2019 (2019-05-01)<br>* abstract; figures * | 13<br>1-12,<br>14-16 | |

| TECHNICAL FIELDS SEARCHED (IPC) |
|---|
| E05D<br>E05F |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 11 January 2021 | Witasse-Moreau, C |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 19 7051

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-01-2021

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| CN 106761096 A | 31-05-2017 | NONE | |
| EP 2176485 A1 | 21-04-2010 | DE 102007031175 B3 | 09-10-2008 |
| | | EP 2176485 A1 | 21-04-2010 |
| | | ES 2672147 T3 | 12-06-2018 |
| | | PL 2176485 T3 | 31-07-2018 |
| | | WO 2009003458 A1 | 08-01-2009 |
| EP 3290624 B1 | 01-05-2019 | AU 2016395336 A1 | 07-12-2017 |
| | | BR 112018067803 A2 | 19-02-2019 |
| | | CN 105781291 A | 20-07-2016 |
| | | DK 3290624 T3 | 29-07-2019 |
| | | EP 3290624 A1 | 07-03-2018 |
| | | ES 2739912 T3 | 04-02-2020 |
| | | HR P20191313 T1 | 24-01-2020 |
| | | HU E045826 T2 | 28-02-2020 |
| | | JP 6420019 B2 | 07-11-2018 |
| | | JP 2018518619 A | 12-07-2018 |
| | | KR 20180110049 A | 08-10-2018 |
| | | LT 3290624 T | 11-11-2019 |
| | | PH 12018501878 A1 | 15-05-2019 |
| | | PL 3290624 T3 | 13-07-2020 |
| | | PT 3290624 T | 30-07-2019 |
| | | SI 3290624 T1 | 31-12-2019 |
| | | US 2018135344 A1 | 17-05-2018 |
| | | WO 2017148192 A1 | 08-09-2017 |

EPO FORM P0459

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

## REFERENCES CITED IN THE DESCRIPTION

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

### Patent documents cited in the description


- US 20040205935 A **[0009]**
- EP 3290624 B1 **[0012]**