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(54) **A snap-action hinge with damper**

(57) A snap-action hinge (1) for opening and closing furniture doors comprises a hinge cup (3) operatively articulated to a hinge arm (4) through an upper connecting rod (11) and a lower connecting rod (12), a base plate (7) designed to be fixed to the shoulder of a piece of furniture (F) as well as a damping device (2) designed to

be actuated by the cup (3) during a last section of the closing movement of the hinge (1) to slow down the movement of the cup (3) and the hinge arm (4) towards one another. Advantageously, said damping device (2) is hooked to the upper connecting rod so as to be supported canti-levered above said hinge arm (18).

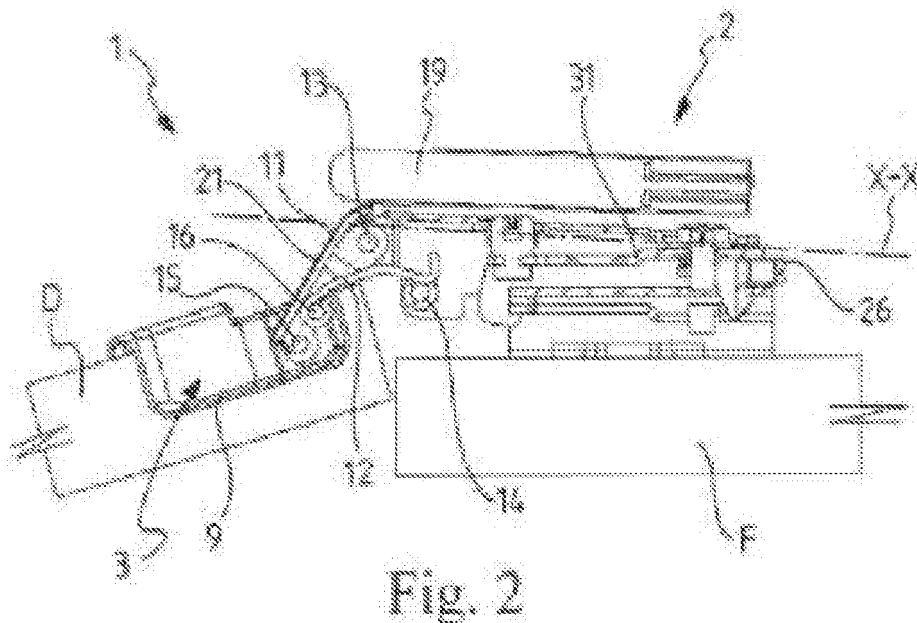


Fig. 2

Description

[0001] The present invention refers to a snap-action hinge, in accordance with the preamble of claim 1, particularly but not exclusively a snap-action hinge to be used in furniture to ensure the correct opening and closing movement of the doors.

[0002] More specifically the present invention concerns a snap-action hinge to allow furniture doors and wings to be opened and closed comprising a cup part designed to be embedded in the door, a hinge arm designed to be attached to the shoulder of a piece of furniture, articulated connection means for operatively connecting together the hinge arm and the hinge cup, elastic means for ensuring that the hinge snaps shut.

[0003] In the field of furniture there is an increasing need to have hinges with standard shapes and sizes, capable of correcting supporting the doors and, at the same time of ensuring effective snap-action closing of the doors even after a high number of repeated actuations.

[0004] In addition to the aforementioned requirement, which now constitutes an essential feature, there is also a great need to prevent the doors from banging when they are closed. For this purpose, for some time there has been the solution of foreseeing, in combination with the hinges, suitable dampers that are able to dampen and slow down the closing movement of the doors. Basically, it is wished for the furniture door to have a snap-action closing movement thanks to the action exerted upon it by a spring during the closing movement and, at the same time, it is wished for the closing movement of the door to be restrained, i.e. slowed down, by the action of a damper.

[0005] Generally, the dampers used are of the type with a damped piston and they can be fixed to the furniture in positions such as to be able to be directly actuated by the doors during the last portion of their closing movement. This solution, although simple and effective suffers from the negative aesthetic impact due to the presence of dampers that remain in view, even if inside the furniture. Moreover, the application to the furniture of these dampers means that there is a need to carry out further drilling and assembly work with respect to what is generally required.

[0006] In order to avoid the aforementioned problems it has been attempted to integrate the dampers in the hinge, fixing the fluid-operated dampers directly to the hinge arm, for example as described and illustrated in document US 2004/0205935.

[0007] Although useful in terms of the damping that can be obtained, the attachment of the damper onto the hinge arm is not very practical, since it requires that the hinge arm be configured so as to make it suitable for attachment with the damper, as well as not very stable since it offers an attachment point that is necessarily distanced from the attachment base through which the hinge arm is fixed to the furniture.

[0008] The problem at the basis of the present invention is to devise a snap-action hinge that has structural and functional features such as to allow stable attachment of the damper to the hinge, to satisfy the aforementioned requirements and to avoid the aforementioned drawbacks with reference to the prior art.

[0009] Such a problem is solved by a snap-action hinge for furniture with a damper applied in accordance with claim 1.

[0010] The idea for a solution forming the basis of the present invention is to operatively associate the articulated connection means of the hinge with the damping device suitable for restraining the movement of the hinge cup and the hinge arm towards one another during the last portion of the closing movement of the hinge from the configuration with the hinge open to the configuration with the hinge closed, so that the damping device is directly supported by such connection means.

[0011] Further features and advantages of the hinge for furniture according to the present invention will become clearer from the description provided below of some preferred example embodiments thereof, given for indicating and not limiting purposes, with reference to the attached figures, in which:

- figure 1 represents a perspective view of a hinge according to the invention in open configuration;
- figure 2 represents a plan longitudinal section view of the hinge of figure 1;
- figure 3 represents a perspective view of the hinge according to the invention in closed configuration;
- figure 4 represents a plan longitudinal section view of the hinge of figure 3;
- figure 5 represents a perspective view of the hinge of figure 1 with the damping device shown exploded;
- figure 6 represents a plan longitudinal section view of the hinge of figure 5;
- figure 7 represents an exploded plan longitudinal section view of the damping device of the hinge of figure 1;
- figure 8 represents a plan longitudinal section view of the hinge according to the invention in an intermediate step of the closing movement of the hinge;
- figure 9 represents a perspective view of the hinge of figure 1 in an intermediate step of the closing movement of the hinge;
- figure 10 represents a perspective view of a different embodiment of a hinge according to the invention in open configuration;
- figure 11 represents a side plan view of the hinge of figure 10 in open configuration;
- figure 12 represents a plan longitudinal section view of the hinge of figure 10 in an intermediate step of the closing movement of the hinge itself and
- figure 13 represents a plan longitudinal section view of the hinge of figure 10 in closed configuration.

[0012] With reference to figures 1 to 9, reference nu-

meral 1 generically indicates a snap-action hinge for opening and closing a door D of a piece of furniture F.

[0013] The hinge 1 comprises:

- a hinge cup 3 designed to be embedded in a circular hole formed in the inner part of the door D,
- a hinge arm 4 to be fixed to a shoulder of the furniture F,
- articulated connection means for articulatingly connecting the rear end 8 of the cup 3 to a first end 5 of the hinge arm 4, so that the cup 3 and the hinge arm 4 are articulated to each other to be movable between a closed hinge configuration (Figures 3 and 4) and an open hinge configuration (Figures 1 and 2), and vice-versa, in which the door D is respectively closed and open with respect to the remaining part of the piece of furniture F, and
- elastic means (not illustrated for the sake of simplicity of representation) suitable for acting between said cup 3 and said hinge arm 4 to push the hinge 1 towards the aforementioned hinge closed configuration (Figures 3 and 4) during a last section of the movement from the hinge open configuration (Figures 1,2) to the hinge closed configuration (Figure 4).

[0014] The hinge is fixedly connected to the shoulder of the piece of furniture F through a base plate 7, to which the hinge arm 4 is fixed through interposition of an intermediate block 31.

[0015] The intermediate block 31 is equipped with engagement means designed to hook onto the base plate 7, in a per sé conventional way, and with centring and adjustment elements through which it is possible to ensure the attachment and correct positioning of the hinge arm 4 with respect to the base plate 7 below, as well as designed to allow the position of the hinge arm 4 to be adjusted with respect to the base plate 7 in the longitudinal direction X-X along which the hinge arm itself extends. Since the aforementioned engagement means and the centring and adjustment elements are well known to the man skilled in the art, in the present description and they will not further described in detail.

[0016] In the example, the hinge arm 4 is in the form of a C-shaped profile, of predetermined longitudinal axis X-X, formed from a flat upper wall from which two respective flanks extend. When the hinge arm 4 is engaged with the base plate 7 below by means of the intermediate block 31, the open side of the "C" faces towards the base plate itself. This configuration of the hinge arm 4 is totally conventional for a man skilled in the art.

[0017] The intermediate block 31 is configured so as to insert into the "C" defined by the hinge arm 4, forming a shape coupling with it suitable for allowing the hinge arm 4 to carry out a limited relative displacement in the longitudinal direction X-X with respect to the intermediate block 31. In accordance with what has been described earlier, the correct positioning of the hinge arm 4 with respect to the base plate 7 below is obtained by acting

suitably on the aforementioned centring and adjustment elements of the intermediate block 31.

[0018] Associated with the intermediate block 31 there is a release button 26, by acting upon which it is possible to unhook the intermediate block 31 and the hinge arm 4 from the base plate 7.

[0019] The cup part 3 extends as a prolongation of the hinge arm 4 in the aforementioned axial direction X-X starting from the rear end 8 and it is defined by a bottom 9 from which a side wall extends. According to a manufacturing standard, the cup 3 has a bulk such as to be able to be housed in a hole having a diameter of 35 mm or, alternatively, it is possible for the cup to have dimensions such as to be able to be housed in a hole having a diameter of 26 mm, the values of the diameters of the holes equal to 26 mm or 35 mm being currently universally used values. More specifically, the cup 3 along the axis X-X has a length equal to the size indicated above whereas in the transverse direction Y-Y it has an internal width defined between two opposite side walls 17 substantially arranged parallel to the axis X-X.

[0020] The hinge cup 3, at its front end (in other words the opposite end to the rear end at which it is hinged to the hinge arm 4) has a front wall 23 extending between the aforementioned two opposite side walls 17.

[0021] In the examples illustrated, the cup 3 is equipped with an upper attachment flange 6 that passes in front of the actual cup shaped part and is equipped with holes, in the example two holes, each designed to receive a respective attachment means, for example a screw or an expansion dowel, to ensure that the cup 3 is attached to the inner part of the door D. It should be specified that, in some embodiments the cup of the hinge can be without the attachment flange 6. Furthermore, the shape of the cup 3 can differ from that of the example described above.

[0022] In the illustrated embodiments, the aforementioned articulated connection means comprise an upper connecting rod 11 and a lower connecting rod 12 respectively pivoted at 13 and 14 to the hinge arm 4 and respectively pivoted at 15 and 16 to the cup 3. As can be seen from the figures, the pins 13 and 14 extend in the transverse direction Y-Y between the opposite flanks of the hinge arm 4, whereas the pins 15 and 16 extend in the transverse direction Y-Y between the opposite side walls 17 of the cup 3.

[0023] According to the present invention the hinge 1 is equipped with a damping device 2 designed to be actuated during the last section of the closing movement of the hinge 1, from the hinge open configuration (Figures 1 and 2) to the hinge closed configuration (figures 3 and 4), to slow down the movement of the cup 3 and the hinge arm 4 towards one another.

[0024] In the example considered the damping device 2 comprises a body 18 and an actuation element 19 which are operatively associated so as to be mutually movable with respect to one another in contrast to a damping action that opposes the relative movement of the actuation

element 19 with respect to the body 18.

[0025] With reference to the damping device 2, it should be noted that it is operatively associated with the aforementioned articulated connection means to be supported by them.

[0026] In accordance with the illustrated preferred embodiment, the damping device 2 is associated with the articulated connection means of the hinge so that the body 18 is substantially aligned with the hinge arm 4 in the aforementioned longitudinal direction X-X and, at the same time, it is oriented so that the actuation element 19 projects from the body 18 in the direction of the cup 3.

[0027] As a consequence of the structure, the arrangement and the orientation described above of the damping device 2, an end portion 20 of the actuation element 19 projects from the body 18 and interferes with the cup 3 during the last section of the closing movement of the hinge 1, going from an advanced end stop position (Figures 1 and 2) to a withdrawn end stop position (Figures 3 and 4) with respect to the body 18.

[0028] As an alternative to what has been described above, during the last section of the closing movement of the hinge 1, the end portion 20 of the actuation element 19 can come to directly interfere with the inner part of the door D to which the cup 3 is fixed or, in accordance with a further variant, it can come to interfere in part with the door and in part with the cup 3.

[0029] The damping device 2 comprises elastic means (not depicted) that act upon the actuation element 19 to push it with a predetermined elastic load towards the aforementioned advanced end stop position. Concerning this, it should be noted that the aforementioned predetermined elastic load is suitable for overcoming the damping action that is generated in the damping device 2 between the actuation element 19 and body 18 during the relative movement of the actuation element 19 with respect to the body 18 from the aforementioned withdrawn end stop position (Figures 3 and 4) towards the advanced end stop position (Figures 1 and 2).

[0030] In the illustrated embodiment, the damping device 2 is operatively associated with the articulated connection means thanks to the fact that the body 18 of the damping device 2, more specifically a front appendix thereof 21, is directly fixed to the aforementioned articulated connection means of the hinge 1 so as to be able to effectively counteract the action exerted on it by the actuation element 19 during the backward movement thereof from the advanced end stop position to the withdrawn end stop position. Basically, the damping device is fixed to the aforementioned articulated connection means of the hinge 1 to prevent the body 18 of the damping device from moving back in the aforementioned axial direction X-X, during the last step of the closing movement of the hinge, in other words when the actuation element 19 is pushed towards the position withdrawn from the cup 3 and/or from the door D of the piece of furniture F.

[0031] More specifically, the body 18 has an end por-

tion 21, in this case a tongue, which is configured so as to be directly fixed in a removable manner to the upper connecting rod 11, as illustrated in figures 1 and 2.

[0032] In accordance with the illustrated embodiment, the tongue 21 has extension and configuration such as to substantially match up with the shape of the upper connecting rod 11, so as to adhere to it, and it has front and rear hooking elements 22, 24 thanks to which it is able to fasten with snap action onto the upper connecting rod 11.

[0033] In the illustrated embodiment, the tongue 21 and the body 18 of the damping device are made in a single piece formed by shearing, bending and possible further machining by cold plastic deformation from a metal foil. In particular, the tubular portion of the body 18 is obtained by bending two flaps of the foil substantially in a half-circumference or, alternatively, by bending a flap to form substantially a complete circumference.

[0034] With respect to the part that forms the tubular body, the front portion of the damping device, in other words the tongue 21 is therefore configured so as to substantially match up with the profile of the upper connecting rod 11.

[0035] As an alternative to what has been described above, the tongue 21 can be made as a separate piece from the tubular body 18 of the damping device 2, just as it can be made integrally, at least in part, with the upper connecting rod 11.

[0036] It should be highlighted that, in accordance with the preferred embodiment illustrated in figures 1 to 9, when the damping device 2 is operatively associated with the articulation means, in other words when the tongue 21 is hooked onto the upper connecting rod 11, the tubular portion of the body 18 that extends substantially as a prolongation of the tongue 21 is substantially supported cantilevered above the hinge arm 4, without however coming into contact with it.

[0037] Moreover, with reference to the operation of the hinge 1, it has been possible to see that, during the last section of the closing movement of the hinge, the damping device, with respect to the hinge arm 4, performs a relative movement of substantial oscillation in the plane of the hinge arm itself, since the distance between the hinge arm 4 and the rear part of the damping device 2, in other words the end of the tubular body 18 distal from the tongue 21, temporarily increases (as illustrated in figures 8 and 9), to then go back to the initial value when the hinge is completely closed. This is due to the fact that, during the closing of the hinge 1, the angular position of the upper connecting rod 11 varies with respect to the hinge arm 4. Indeed, as it is possible to observe from figures 1 to 9, the upper connecting rod 11 is more perpendicular with respect to the hinge arm 4 when the hinge 1 is in the closed configuration (figure 4) than when the hinge is in the open configuration (figure 2).

[0038] As a consequence of the aforementioned oscillating movement that the damping device 2 is able to perform with respect to the hinge arm 4, the overall damp-

ing effect of the closing movement of the hinge is particularly fluid and damped, avoiding jarring and the like.

[0039] In accordance with different embodiments, the body 18 of the damping device 2 can have one or more portions resting or directly fixed to the hinge arm 4, for example at the rear part of the damping device 2.

[0040] Furthermore, the rear part of the damping device 2, in other words the end of the tubular body 18 distal from the tongue 21, can be rested or hooked onto the aforementioned rear button 26 by acting upon which it is possible to obtain the unhooking of the intermediate block 31 and of the hinge arm 4 from the base plate 7. Indeed, the resting on the button 26 carried out by a portion of the body 18 can constitute a safety to prevent the sudden actuation of the button 26 itself.

[0041] With reference to the damping device 2, it should be noted that the body 18 of the damper 2 can be replaced with a functionally equivalent guide means, in other words an element capable of supporting and guiding the sliding of the actuation element 19 from the advanced end stop position to the withdrawn position, and vice-versa.

[0042] Figures 10 to 13 illustrate a further embodiment of a hinge 101 in accordance with the invention. The parts of the hinge 101 that are structurally and/or functionally the same as those of the hinge 1 described previously will not be described again for the sake of keeping it brief, referring back to what has already been described in relation to the hinge 1.

[0043] With reference to the hinge 101 it is put in evidence how the damping device 2 is supported by the upper connecting rod 11 so that, at least during the aforementioned last section of the closing movement of the hinge from the hinge open configuration (figures 10,11) to the hinge closed configuration (figure 13), said body 18 is movable between a first position, in which the body 18 extends above the hinge arm 4 when the hinge 101 is in the hinge closed configuration (figure 13), and a second position, in which the aforementioned body 18 passes out in front of the hinge arm 4, more specifically the first end 5 of the hinge arm 4, so as to extend at least partially substantially as a continuation of the hinge arm 4 above the upper connecting rod 11 when the hinge 101 is in the hinge open configuration (figures 10,11).

[0044] Figure 12 illustrates an intermediate condition in which, during the closing movement of the hinge 101, the door D of the piece of furniture interferes with the rear end of the body 18 of the damping device 2, thus beginning the damping action. Indeed, considering the action exerted by the door D against the body 18, the actuation element 19 acts against the upper part of the hinge arm 4 passing from the advanced end stop position to the withdrawn end stop position illustrated in figure 13, in which only the front end of the actuation element 19 projects from the body 18 of the damping device 2.

[0045] Preferably, when the hinge 101 is in the hinge closed configuration (figure 13), the body 18 of the damping device 2 extends in a direction substantially perpen-

dicular to the hinge arm 4.

[0046] In accordance with the embodiment illustrated in figures 10 to 13, the body 18 of the damping device 2 is connected to the aforementioned end portion 21, which is fixed to the upper connecting rod 11 through an elastically deformable intermediate portion 102 designed to allow the aforementioned relative movement of the body 18 with respect to the end portion 21 during the passage of the body 18 from the first to the second position, and vice-versa.

[0047] Alternatively, the body 18 of the damping device can be connected to the aforementioned end portion 21 through interposition of articulation means designed to allow a relative displacement of the body 18 itself with respect to the end portion 21 during the passage of the body 18 from the first to the second position, and vice-versa.

[0048] As can be appreciated from what has been described, the snap-action hinge for furniture to which a damper according to the present invention is applied allows the technical problem forming the basis of the present invention to be avoided, at the same time overcoming the drawbacks referred to in the introductory part of the present description with reference to the prior art. Indeed, according to the invention, the damping device 2 is directly supported by the articulation means of the hinge, in a stable manner and avoiding disadvantageous lever arms.

[0049] Another advantage of the hinge for furniture according to the present invention is its unusual structural simplicity and ease of manufacture, as well as the possibility of using such a hinge as a spare part for furniture using standard type hinges.

Claims

1. A snap-action hinge with damper for opening and closing furniture doors, said hinge comprising:

- a hinge cup (3) designed to be embedded in a door (D) of a piece of furniture (F),
- a base plate (7) designed to be attached to a shoulder of said piece of furniture (F),
- a hinge arm (4) extending in a predetermined longitudinal direction and adjustably secured to said base plate (7),
- articulated connection means (11, 12, 13, 14, 15, 16) for articulately connecting a rear end (8) of the hinge cup (3) to a first end (5) of said hinge arm (4), said hinge cup (3) and said hinge arm (4) being articulated to each other to be movable between a closed hinge configuration and an open hinge configuration in which the door (D) is closed and open relative to the rest of the piece of furniture (F) respectively,
- elastic means which are operable to push said hinge towards said closed hinge configuration

during a last section of the closing motion of the hinge from the open hinge configuration to the closed hinge configuration, and

- a damping device (2) comprising a body (18) and an actuating member (19) which are operably associated to be mutually movable relative to each other against a braking action that damps their relative motion,

wherein said damping device is in such position that, during said last section of the closing motion of the hinge from the open hinge configuration to the closed hinge configuration, said actuating member (19) is operably actuated by the hinge cup (3) and/or the hinge arm (F) to move relative to the body (18) and brake the mutual motion of the hinge cup (3) and the hinge arm (4) towards each other and wherein said articulated connection means include:

- an upper connecting rod (11) pivotally attached to the hinge arm (4) and the cup (3) at a first pivot (13) and at a second pivot (15) respectively,

- a lower connecting rod (12) pivotally attached to the hinge arm (4) and the cup (3) at a third pivot (14) and at a fourth pivot (16) respectively,

characterized in that said damping device (2) is fixed to said upper connecting rod (11) to be supported by said upper connecting rod (11).

2. A hinge as claimed in claim 1, wherein said damping device (2) is fixed in a removable manner to said upper connecting rod (11).
3. A hinge as claimed in claim 1 or 2, wherein said damping device (2) is hooked to said upper connecting rod (11).
4. A hinge as claimed in any one of claims 1 to 3, wherein an end portion (21) overhangs said body (18) of said damping device (2), which portion is designed to at least partially conform the profile of said upper connecting rod (11).
5. A hinge as claimed in claim 4, wherein said end portion (21) has hook-like members (22, 24) for hooking to said upper connecting rod (11).
6. A hinge as claimed in claim 4 or 5, wherein said end portion (21) of said damping device (2) is formed of one piece with said tubular body (18).
7. A hinge as claimed in claim 4 or 5, wherein said body (18) of said damping device (2) is supported by a support comprising said end portion (21).
8. A hinge as claimed in any one of claims 1 to 7, where-

in said damping device (2) extends parallel to said hinge arm (4).

9. A hinge as claimed in any one of claims 1 to 8, wherein said damping device (2) extends above said hinge arm (4) and is supported in a cantilever fashion by said articulated connection means (11) without being in contact with said hinge arm (4).
10. A hinge as claimed in any one of claims 1 to 5, wherein said damping device (2) is supported by said upper connecting rod (11) so that, at least during said last section of the closing movement of the hinge from the hinge open configuration to the hinge closed configuration, said body (18) is movable between a first position, in which said body (18) extends above said hinge arm (4) when said hinge is in the hinge closed configuration, and a second position, in which said body (18) passes out in front of said hinge arm so as to at least partially extend as a substantial continuation of said hinge arm (4) above said first connecting rod (11) when said hinge is in the hinge open configuration.
11. A hinge as claimed in claim 10, wherein said body extends in a direction substantially perpendicular to said body (18) when said hinge is in the hinge closed configuration.
12. A hinge as claimed in claim 4 or 6 and claim 10 or 11, wherein said body (18) is connected to said end portion (21) through an elastically deformable intermediate portion (102) designed to allow a relative movement of said body (18) with respect to said end portion (21) in the passage of said body from the first to the second position, and vice-versa.
13. A hinge as claimed in claim 4 and claim 10 or 11, wherein said body (18) is connected to said end portion (21) through articulation means designed to allow a relative movement of said body (18) with respect to said end portion (21) during the passage of said body (18) from the first to the second position, and vice-versa.

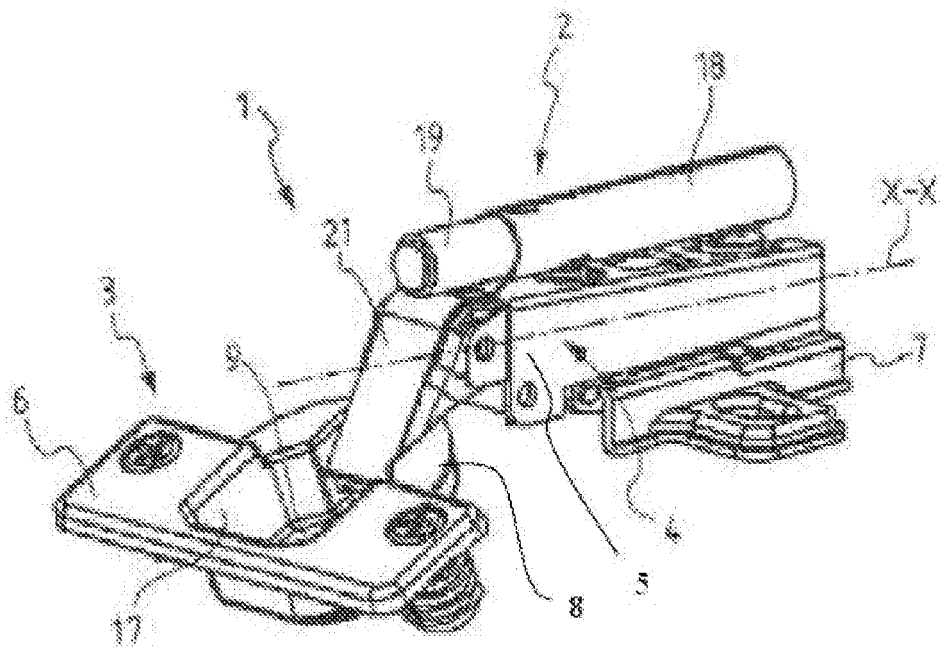


Fig. 1

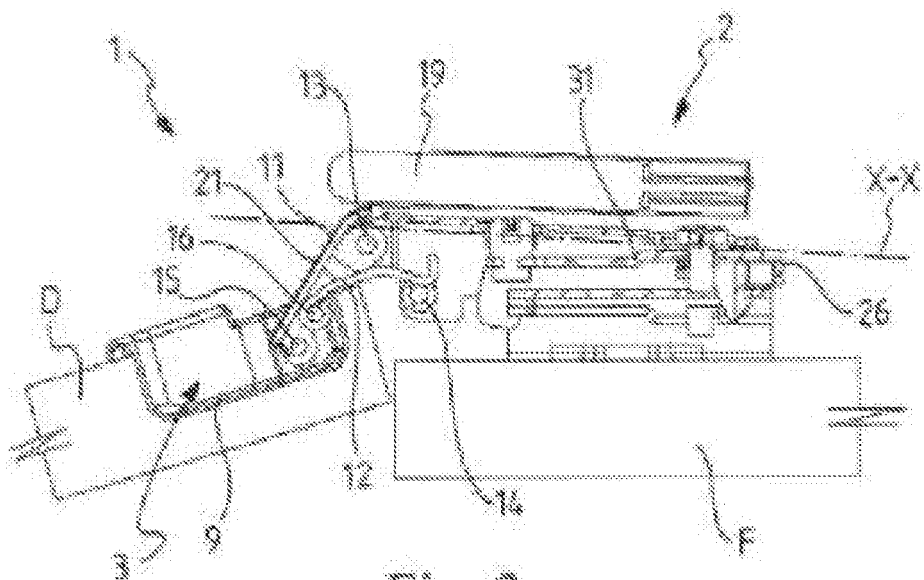


Fig. 2

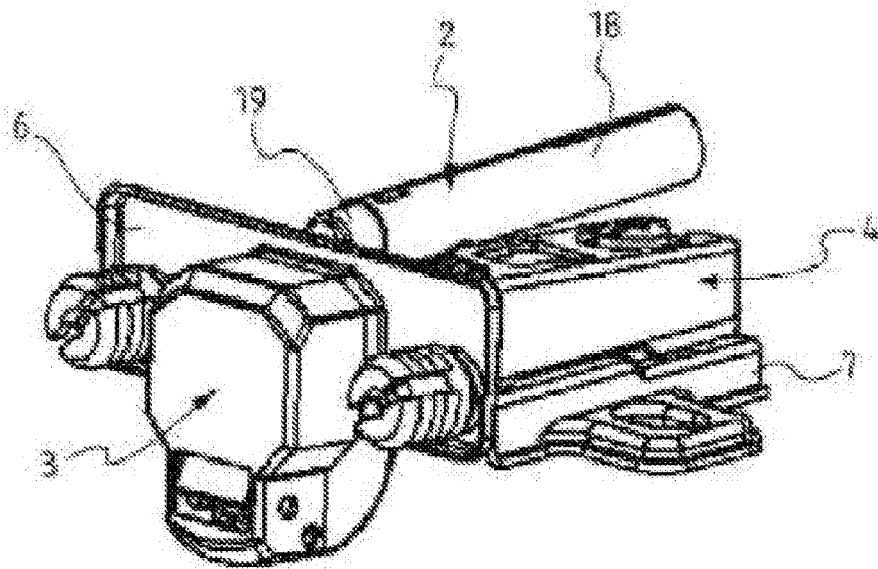


Fig. 3

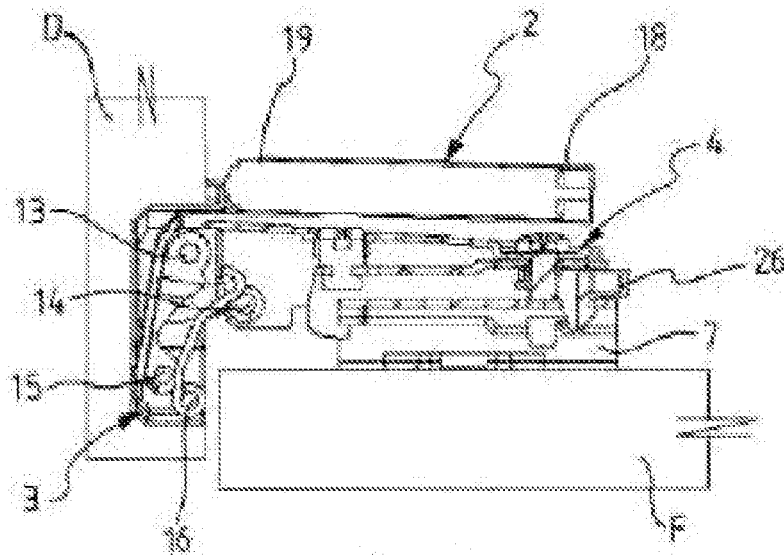


Fig. 4

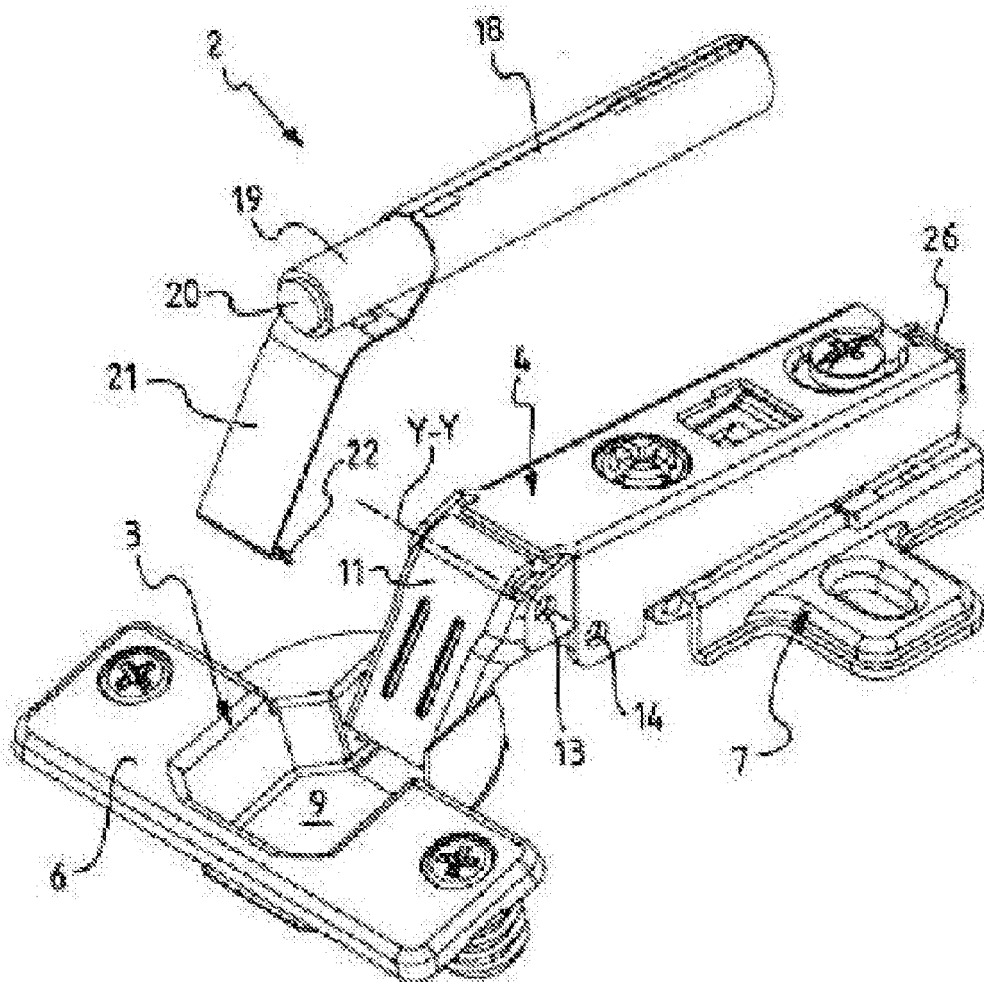


Fig. 5

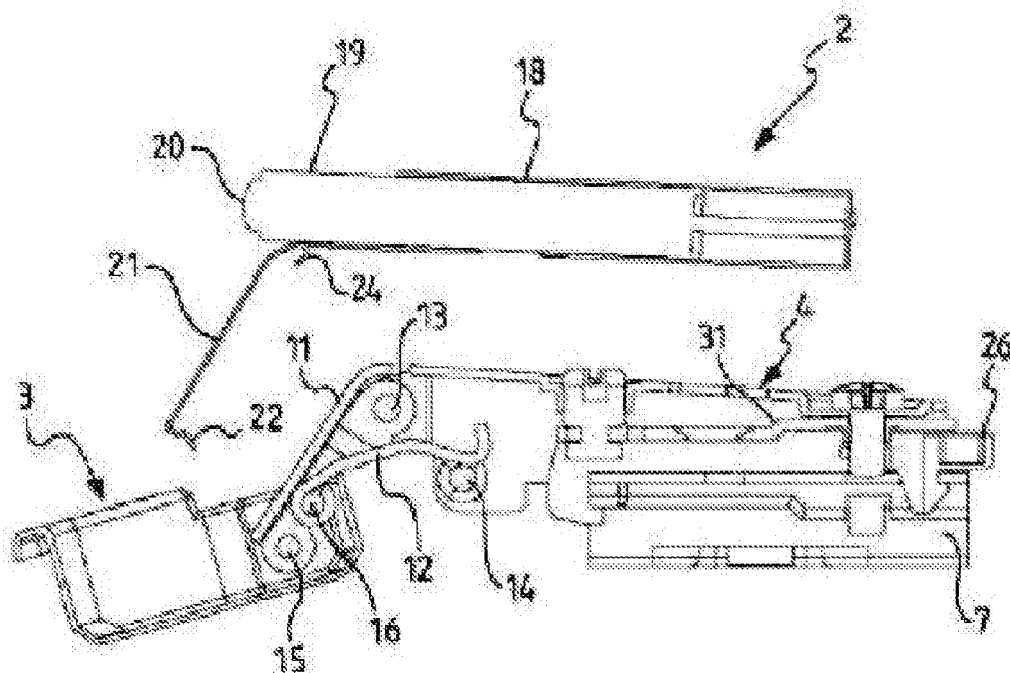


Fig. 6

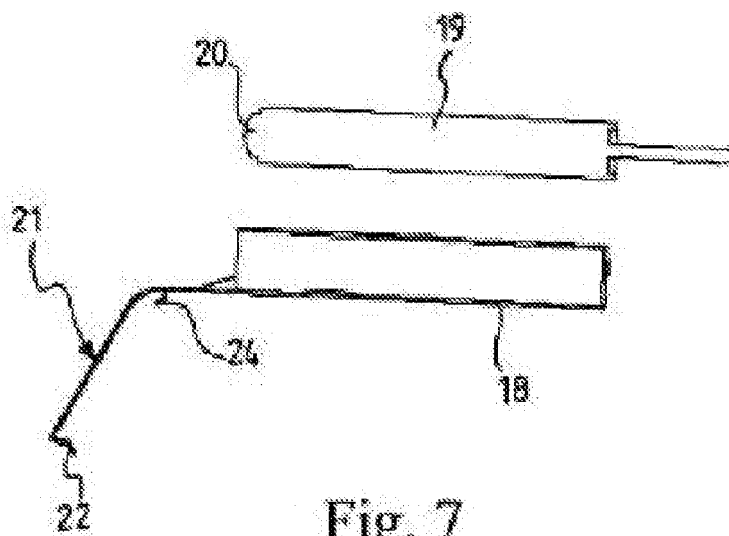


Fig. 7

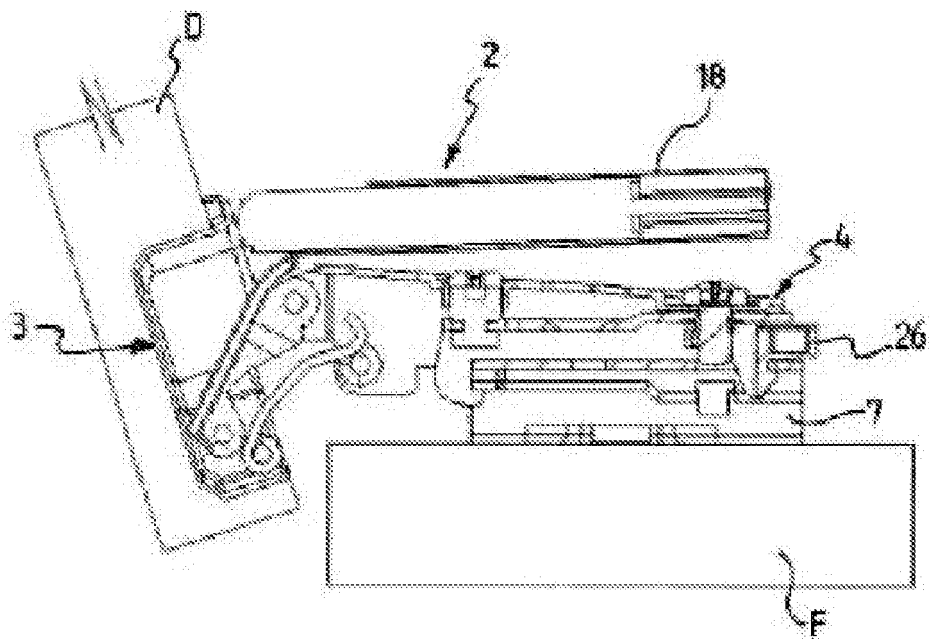


Fig. 8

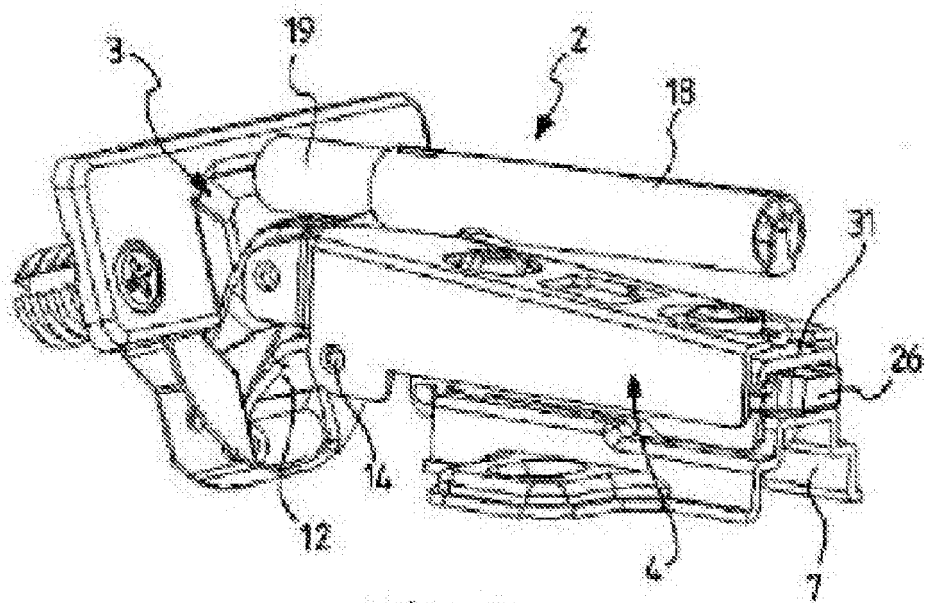
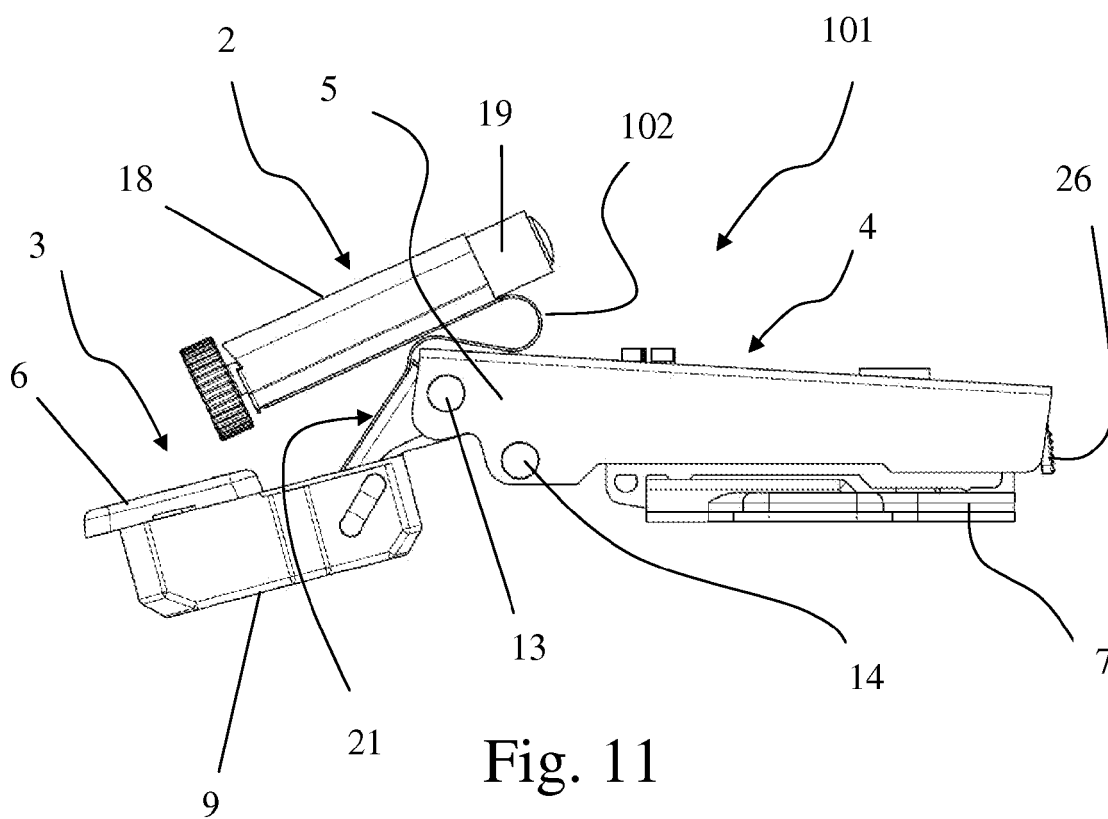
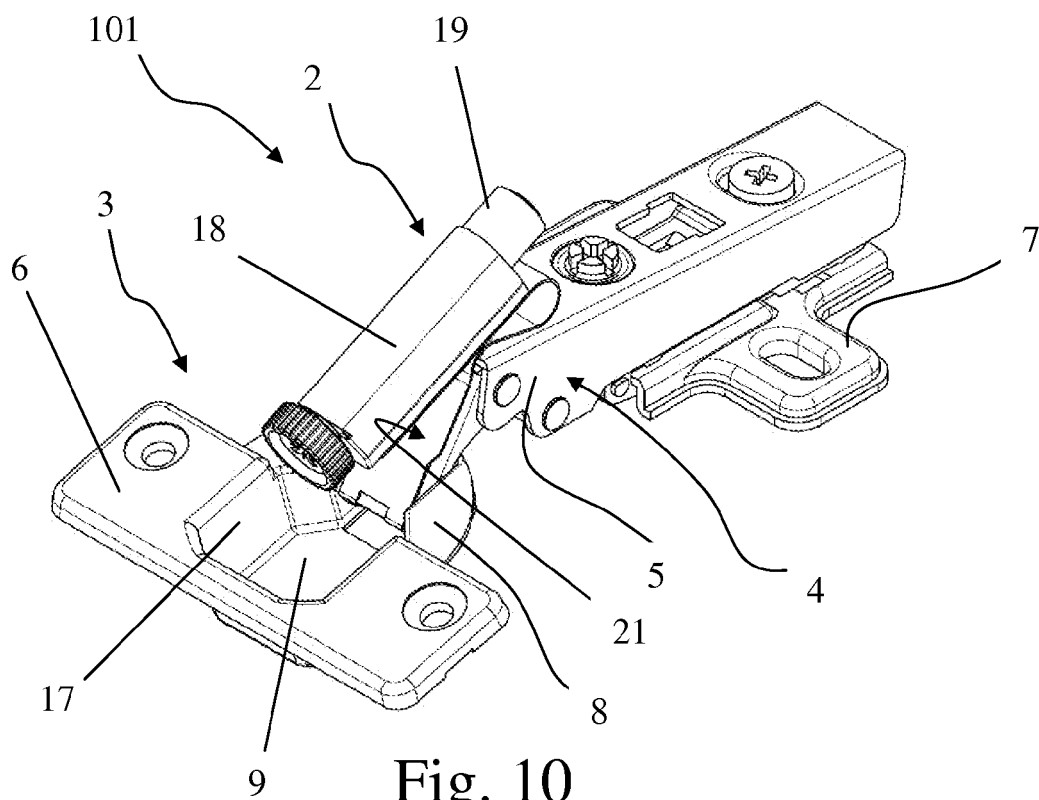


Fig. 9



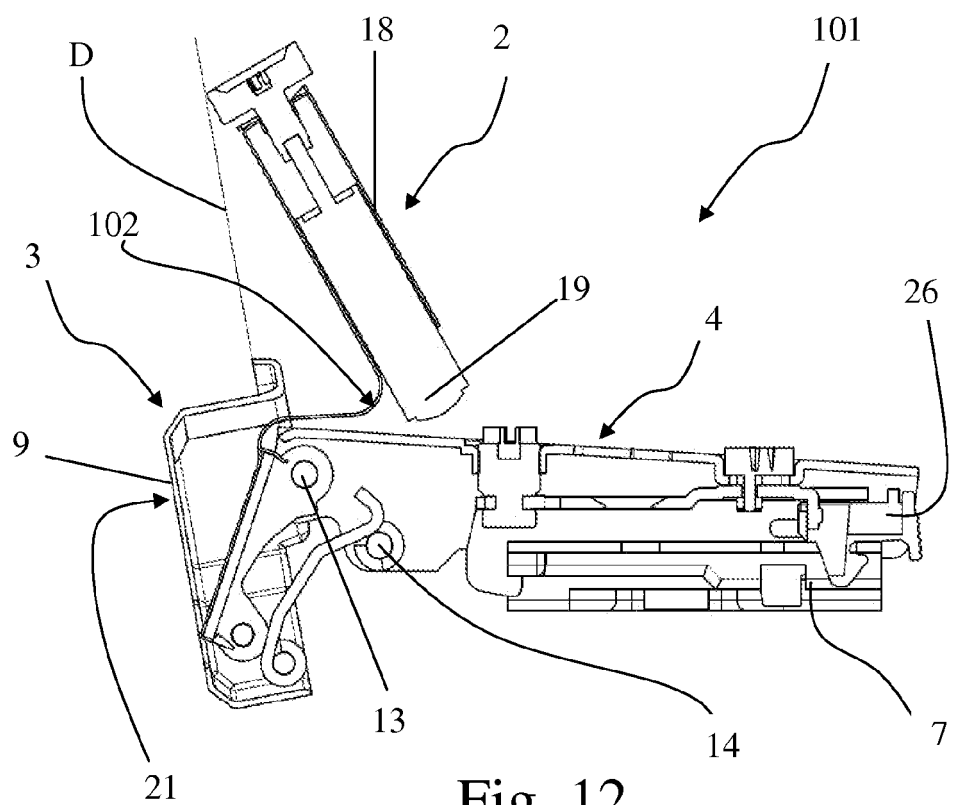


Fig. 12

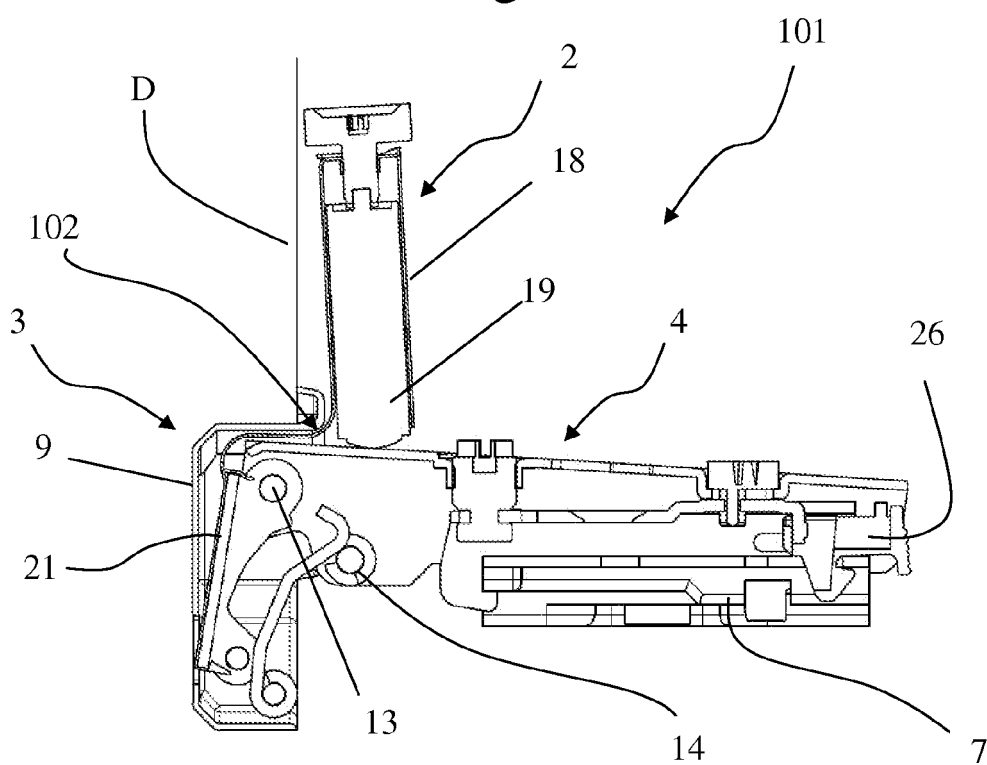


Fig. 13

REFERENCES CITED IN THE DESCRIPTION

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