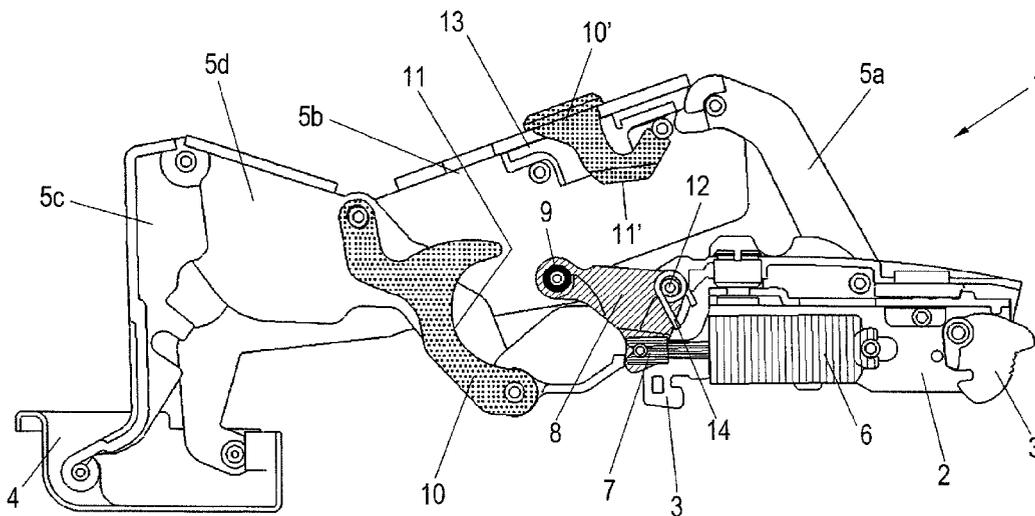




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 (54) Title: MULTI-LINK HINGE WITH DAMPING



(57) Abrégé/Abstract:

The invention relates to a multi-link hinge (1) for furniture, with a fastening element (2) which can be secured indirectly or directly to a furniture body and is connected to a pivotable door bearing (4) via a plurality of link levers (5a-5d) connected to one another in a scissors-like manner, wherein a linear damper (6) which damps both a closing movement and an opening movement of the door bearing (4) is provided. The multi-link hinge (1) is distinguished in that the linear damper (6) is ineffective in a central portion of the pivoting range of the door bearing (4).

Abstract

The invention relates to a multi-link hinge (1) for furniture, with a fastening element (2) which can be secured indirectly or directly to a furniture body and is connected to a pivotable door bearing (4) via a plurality of link levers (5a-5d) connected to one another in a scissors-like manner, wherein a linear damper (6) which damps both a closing movement and an opening movement of the door bearing (4) is provided. The multi-link hinge (1) is distinguished in that the linear damper (6) is ineffective in a central portion of the pivoting range of the door bearing (4).

Multi-Link Hinge With Damping

The invention relates to a multi-link hinge for a piece of furniture, comprising a fastening element which can be secured indirectly or directly to a furniture body and which is connected to a pivotable door bearing via a plurality of link levers that are connected to one another in a scissors-like manner, wherein a linear damper is provided which dampens both a closing movement and an opening movement of the door bearing.

Multi-link hinges are often used for furniture doors, especially for kitchen furniture doors. The arrangement of the hinge as a multi-link hinge allows a combined rotational and pivoting movement, e.g. in order open a door from a closed front of several doors that are arranged adjacent to each other and especially in order to enable the opening of said doors by more than 90° without striking adjacent doors. Such a multi-link hinge is frequently provided with a spring in order to pretension the hinge in a closed position and to thus support secure and flush closing of the door.

It is disadvantageous in such a multi-link hinge that a door arranged on the fastening part can be slammed in an uncontrolled manner, which is even supported by the spring.

In order to prevent this effect, a multi-link hinge with an integrated linear damper is known from the specification DE 20 2007 004 621 U1, by means of which a closing movement of the multi-link hinge is dampened.

When a furniture door linked via a multi-link hinge is opened up to the maximum opening angle, the door or the components within the hinge, e.g. the link lever, strikes a limit stop in an unbraked manner. This can lead to strong loading of the material,

reaching up to the destruction of the hinge or the connection between the multi-link hinge and the furniture body or the furniture door.

5 In order to prevent this, a multi-link hinge is known from the specification EP 2 093 361 A2, in which a linear damper or also a rotational damper dampens both the closing and also the opening movement. The damper interacts with at least one of the link levers. Said interaction is arranged in such a way that the damper is actuated effectively from a specific opening angle which lies in the range of half the opening angle, both during a closing and also an opening movement. The damping apparatus thus finally acts over
10 the entire opening angle, which can lead to an unusual actuating perception during the movement of the door in a middle opening angle range.

The present invention therefore seeks to provide a multi-link hinge of the kind mentioned above which dampens both an opening and closing movement with a linear
15 damper, wherein a movement of a door linked by the multi-link hinge can occur as freely as possible in a middle opening angle range.

Accordingly, there is described a multi-link hinge for a piece of furniture, comprising: a fastening element securable directly or indirectly to a furniture body and which is
20 connected to a pivotable door bearing via a plurality of link levers that are connected to one another in a scissors-like manner via seven shafts, wherein a linear damper dampens both a closing movement and an opening movement of the door bearing, characterized in that the linear damper is ineffective in a central portion of a pivoting range of the door bearing, wherein at least one first energy storage unit pretensions the
25 multi-link hinge in a closed position, and wherein at least one second energy storage unit is adapted to move the linear damper to an initial damping position after the linear damper is actuated to dampen the closing movement or the opening movement of the door bearing, wherein the linear damper is actuated directly or indirectly by at least one of the plurality of link levers, the at least one of the plurality of link levers being in
30 engagement with the linear damper only outside of the central portion of the pivoting range.

A portion of the pivoting range beneath the first opening angle of the hinge is provided in which the linear damper dampens a closing movement and a portion of the pivoting range above the second opening angle in which the linear damper dampens an opening movement. A central portion in which the linear damper is ineffective and the mounted furniture door can move freely is situated in accordance with the invention
5 between the two portions in which the linear damper is effective. As a result, the furniture door can be moved smoothly in said central portion of the pivoting range, as is also expected intuitively by the user.

10 In an embodiment of the multi-link hinge, indirect actuation can occur via lever kinematics. The actuation of the linear damper by the link lever ensures that the damping mechanism can be integrated very well in the hinge. The coupling of the link lever only outside of the central portion leads to free mobility of the furniture door.

15 The at least one link lever actuating the linear damper preferably comprises at least one driver for the actuation of the linear damper. The driver can be integrally formed on the link lever, which allows simple design. The driver can be formed alternatively on an actuating element which is fixed to the link lever. The driver is releasably fixed to the link lever in an especially preferred way, as a result of which the desired damping
20 function can be easily retrofitted or an undesirable damping function can also be removed again by the user.

Two actuating elements are further preferably provided, which are fixed to two different link levers, wherein a first one of the actuating elements directly or indirectly actuates
25 the linear damper during the closing movement and the second one of the actuating elements actuates the linear damper directly or indirectly during the opening movement. As a result, the different damping functions (during closing and opening) can be influenced individually through the configuration of the drivers. An influence on the characteristics of the damping can occur in such a way that the driver is arranged
30 as a control cam.

In the embodiments of the multi link hinge, the first energy storage unit ensures complete closure of the furniture door. The second energy storage unit ensures that the linear damper assumes its initial position after relief and is ready for a further damping process. If the first and the second energy storage unit are present, the second energy storage unit generates a lower force component in the opening direction than the first energy storage unit in the closing direction, in order to thus ensure that the function of the first energy storage unit is not compromised by the presence of the second energy storage unit.

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In further embodiments of the multi-link hinge, the damping of the closing movement is effective at an opening angle of less than 50° and/or the damping of the opening movement is effective at an opening angle which at most is 35° lower than the maximum opening angle of the multi-link hinge. In a further preferred aspect, the central portion of the pivoting range extends over an angular range of at least 30° and preferably at least 60° . In these embodiments, the non-dampened central portion of the pivoting range is large enough in any case so that an expected movement behaviour of the furniture door is produced during opening and closing.

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The invention will be explained below by reference to two embodiments shown in the eight drawings, wherein:

Figs. 1 to 4 show a multi-link hinge in a first embodiment in different opening positions, and

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Figs. 5 to 8 show a multi-link hinge in a second embodiment in different opening positions.

The following described illustrations of Figs. 1 to 8 show two embodiments of a multi-link hinge in accordance with the invention, each in a schematic sectional view. In all illustrations, the same reference numerals relate to similar or similarly acting elements.

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Figs. 1 to 4 show a first embodiment of a multi-link hinge, which will be referred to below for reasons of simplicity as hinge 1. In Fig. 1, the hinge 1 is shown in a closed position, in Fig. 2 in a central opening position with an opening angle of approximately 90°, in Fig. 3 with an opening angle of approximately 130°, and in Fig. 4 with a maximum opening angle of 165°.

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The hinge 1 comprises a fastening element 2 which can be fixed to a furniture body. Latching means 3 are provided for this purpose on the fastening element 2, which can be latched onto a fastening plate which is not shown here and which can be fixed by means of screws to the furniture body. The hinge 1 further comprises a door bearing 4 which is connectable to a furniture door. The door bearing 4 is conventionally arranged as a pot bearing. Alternative embodiments are possible, e.g. for screwing onto the furniture door.

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The door bearing 4 is connected to the fastening element 2 via a plurality of different link levers 5a to 5f, such that it performs relative to said fastening element a combined rotational and pivoting movement upon actuation of the hinge 1. The fastening element 2 is arranged in an approximately U-shaped manner and is open in the direction of the fastening plate (not shown).

20

A linear damper 6 is arranged in the enclosed region, in which a damper rod 7 travels into a cylinder. The cylinder is pivotably connected at its end facing away from the damper rod 7 to the fastening element 2. The damper rod 7 is subjected to damping when travelling into the cylinder of the linear damper 6.

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- 6 -

A lever kinematic system 8 is further arranged on the fastening element 2, which kinematic system – in the simplest of cases – comprises a shaft and a lever limb. In the present case, a lever kinematic system 8 is used in form of a substantially L-shaped deflection lever. A lever kinematic system 8 with several levers and shafts can
5 be necessary depending on the used damper (traction or pressure damper) or hinge configuration in order to temporarily produce the coupling between the damper movement and the link lever movement.

The damper rod 7 is connected at its end to a limb of the deflection lever. The
10 deflection lever is also pivotably mounted on the fastening element 2, wherein a second energy storage unit 14 (a leg spring in this case) is provided, which acts on the deflection lever in such a way that the damper rod 7 travels out of the cylinder of the linear damper 6 when the second free limb of the deflection lever is not subjected to a force.

15 A roller 9 or alternatively a protruding cross bolt is attached to the free limb of the deflection lever. If said deflection lever is moved at its free end on the roller 9 or the cross bolt in the direction of the fastening plate (downwardly in the drawings), the damper rod 7 travels into the cylinder of the linear damper 6.

20 In order to produce a damping effect during the closing of the furniture door, a first actuating element 10 is attached to one of the link levers (5a to 5d), and in this case the link lever 5d, which comprises a driver 11 which comes into engagement with the roller 9 of the deflection lever beneath a specific opening angle of the hinge 1. In the
25 simplest of cases, which is also implemented in the illustrated embodiment, the driver 11 is formed as a control cam. Both the starting point of the closing damping and also its force progression can be determined by the shape of the control cam. The starting point of the closing damping describes the opening angle of the hinge from which a rotational movement of the flexible lever and consequently a movement of the damper
30 rod 7 and thus an effective damping commences during a closing movement. The

- 7 -

roller 9 is not in contact with the control cam above said opening angle, as can be seen for example in the open position of approximately 90° in Fig. 2. In alternative embodiments of the hinge 1, the driver 11 can also consist of a coupling mechanism which temporarily connects to the lever kinematic system 8 in the opening and closing range to be dampened.

When the furniture door is opened beyond said starting point of the closing damping, it can subsequently be moved in a respectively free manner in a central portion of the pivoting range. Said central portion extends over a few 10 degrees, and more than 60° in the present case.

During further opening of the furniture door, opening damping commences at an opening angle which in the illustrated case lies approximately 35° before the maximum opening position. Fig. 3 shows the hinge 1 at an opening angle at which the opening damping has just started.

The opening damping is also realised by means of the linear damper 6. A second actuating element 10' is provided for this purpose, which in the present case is fixed to the link lever 5b. Said second actuating element 10' comprises a driver 11', which is also arranged in this case as a control cam which comes into contact with the roller 9 at the starting angle for the opening damping and moves said roller - as in the case of damping for the closing movement - in the direction of the fastening plate of the hinge 1 (downwardly in the drawings), through which the damper rod 7 is moved into the cylinder of the linear damper 6. In the illustrated case, the further control cam is substantially straight. As a result of the interaction of the second actuating element 10' with the deflection lever, damping is achieved up to the maximum opening position of approximately 165° in this case, as shown in Fig. 4.

The actuating elements 10 and 10' for the closing and opening damping are preferably arranged on different link levers 5a to 5f. In the case of suitable kinematics of a link

lever, it is also possible to arrange both actuating elements 10 and 10' on this one link lever.

5 Figs. 5 to 8 show an alternative embodiment of the multi-link hinge 1 represented in Figs. 1 to 4. The multi-link hinge 1 shown in these drawings does not differ with respect to its basic configuration from the one shown in Figs. 1 to 4.

10 The hinge 1 is again shown in different opening positions. The hinge 1 is shown in a closed position in Fig. 5, and in Fig. 6 in a central opening position with an opening angle of approximately 90° in which the roller 9 is not in contact with any of the control cams 11 and 11'. Fig. 7 shows the hinge 1 at an opening angle of approximately 130° , and Fig. 8 at a maximum opening angle of 165° .

15 In contrast to the embodiment of Figs. 1 to 4, the shaping of the further actuating element 10' differs in this case, via which the linear damper 6 is actuated during the opening of the multi-link hinge 1. The further actuating element 10' is formed in both cases in such a way that it can be retrofitted in a simple way and preferably without tools. The second actuating element 10' is an integral shaped part made of plastic for example, which can be clipped in a snap-on fashion onto or into the respective link
20 lever 5b. Openings in the link levers or also the inserted rotational shafts can be used for fixing.

25 It is also possible in alternative embodiments to rigidly connect the actuating element 10 and/or 10' to the respective link levers 5a to 5d. It is also possible to use the link levers 5a to 5d as actuating elements 10 and/or 10' themselves, in that one of their surfaces or edges of the driver 11 or 11' is arranged as a control cam.

List of reference numerals

	1	Multi-link hinge
5	2	Fastening element
	3	Latching means
	4	Door bearing
	5a to 5d	Link lever
	6	Linear damper
10	7	Damper rod
	8	Lever kinematic system
	9	Roller
	10, 10'	Actuating element
	11, 11'	Driver
15	12	Shaft
	13	First energy storage unit
	14	Second energy storage unit

EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

- 5 1. A multi-link hinge for a piece of furniture, comprising:
a fastening element securable directly or indirectly to a furniture body and which
is connected to a pivotable door bearing via a plurality of link levers that are
connected to one another in a scissors-like manner via seven shafts, wherein a
linear damper dampens both a closing movement and an opening movement of
10 the door bearing, characterized in that the linear damper is ineffective in a
central portion of a pivoting range of the door bearing,
wherein at least one first energy storage unit pretensions the multi-link hinge in
a closed position, and
wherein at least one second energy storage unit is adapted to move the linear
15 damper to an initial damping position after the linear damper is actuated to
dampen the closing movement or the opening movement of the door bearing,
wherein the linear damper is actuated directly or indirectly by at least one of the
plurality of link levers, the at least one of the plurality of link levers being in
engagement with the linear damper only outside of the central portion of the
20 pivoting range.
2. The multi-link hinge according to claim 1, wherein the linear damper is actuated
indirectly by a lever kinematic system.
- 25 3. The multi-link hinge according to claim 1 or 2, wherein the at least one of the
plurality of link levers actuating the linear damper directly or indirectly comprises
at least one driver for the actuation of the linear damper.
- 30 4. The multi-link hinge according to claim 3, wherein the at least one driver is
formed integrally on at least one of the plurality of link levers.

5. The multi-link hinge according to claim 3 or 4, wherein the at least one driver is formed on an actuating element, wherein the actuating element is fixed to at least one of the plurality of link levers.

5

6. The multi-link hinge according to claim 5, wherein the actuating element is releasably fixed to at least one of the plurality of link levers.

7. The multi-link hinge according to claim 5 or 6, wherein two actuating elements are provided which are fixed to two different link levers of the plurality of link levers, wherein a first one of the actuating elements actuates the linear damper directly or indirectly during the closing movement and the second one of the actuating elements actuates the linear damper directly or indirectly during the opening movement.

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8. The multi-link hinge according to any one of the claims 3 to 7, wherein the at least one driver is arranged as a control cam.

9. The multi-link hinge according to any one of the claims 2 to 8, wherein the lever kinematic system comprises a separate shaft which is fixed to the fastening element.

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10. The multi-link hinge according to any one of the claims 1 to 9, wherein the dampening of the closing movement is effective at an opening angle of less than 50°.

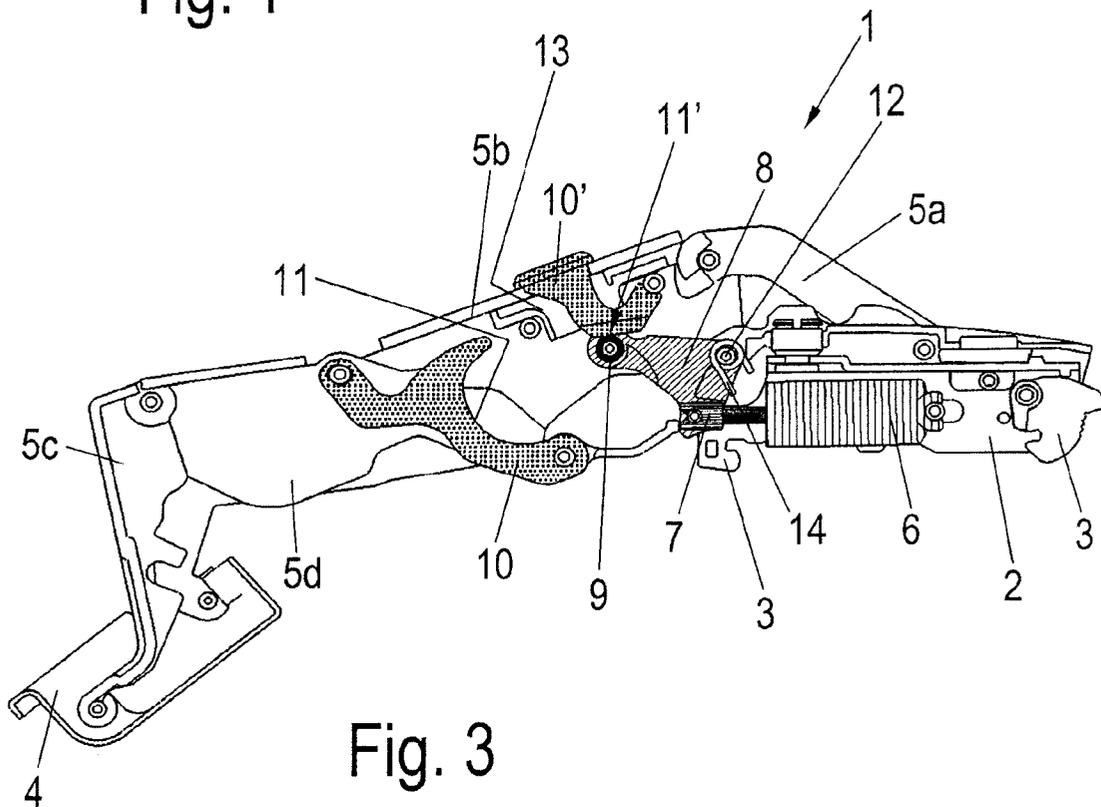
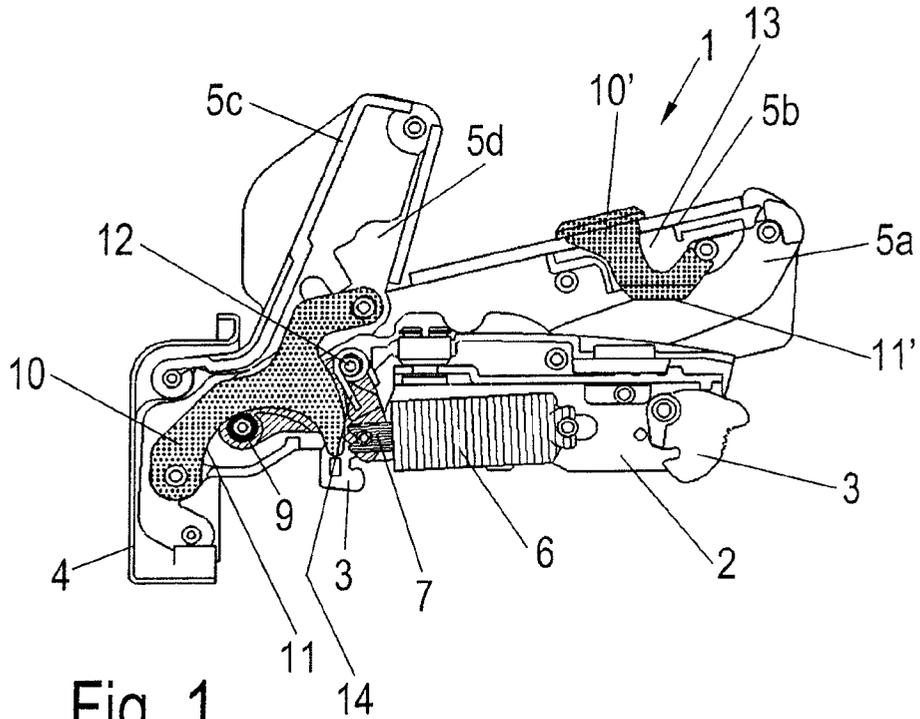
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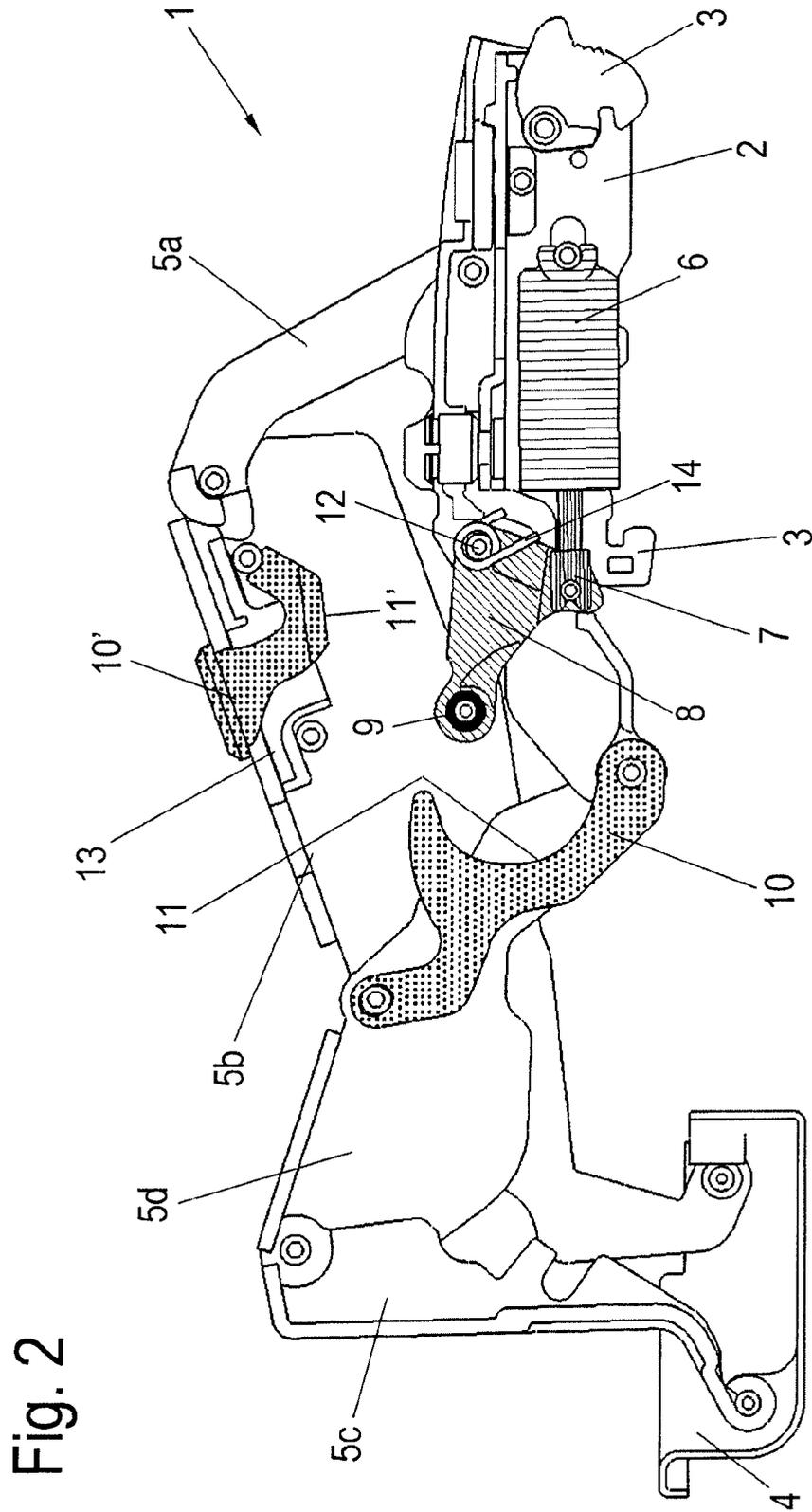
11. The multi-link hinge according to any one of the claims 1 to 10, wherein the dampening of the opening movement is effective at an opening angle which is at most 35° lower than the maximum opening angle of the multi-link hinge.

30

12. The multi-link hinge according to any one of the claims 1 to 11, wherein the central portion of the pivoting range extends over an angular range of at least 30°.

5 13. The multi-link hinge according to any one of claims 1 to 11 wherein the central portion of the pivoting range extends over an angular range of at least 60°.





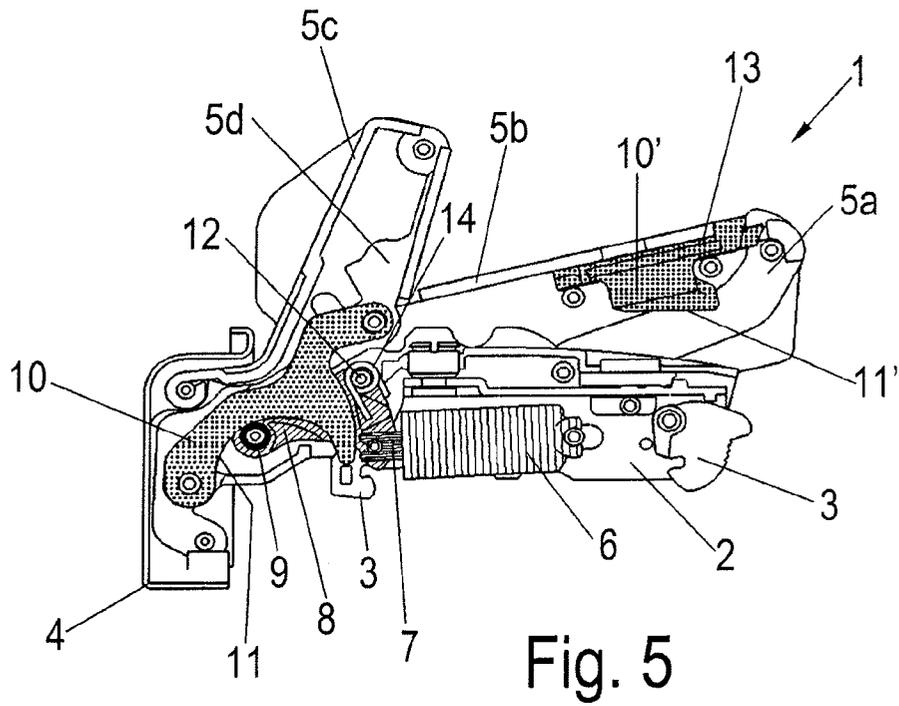
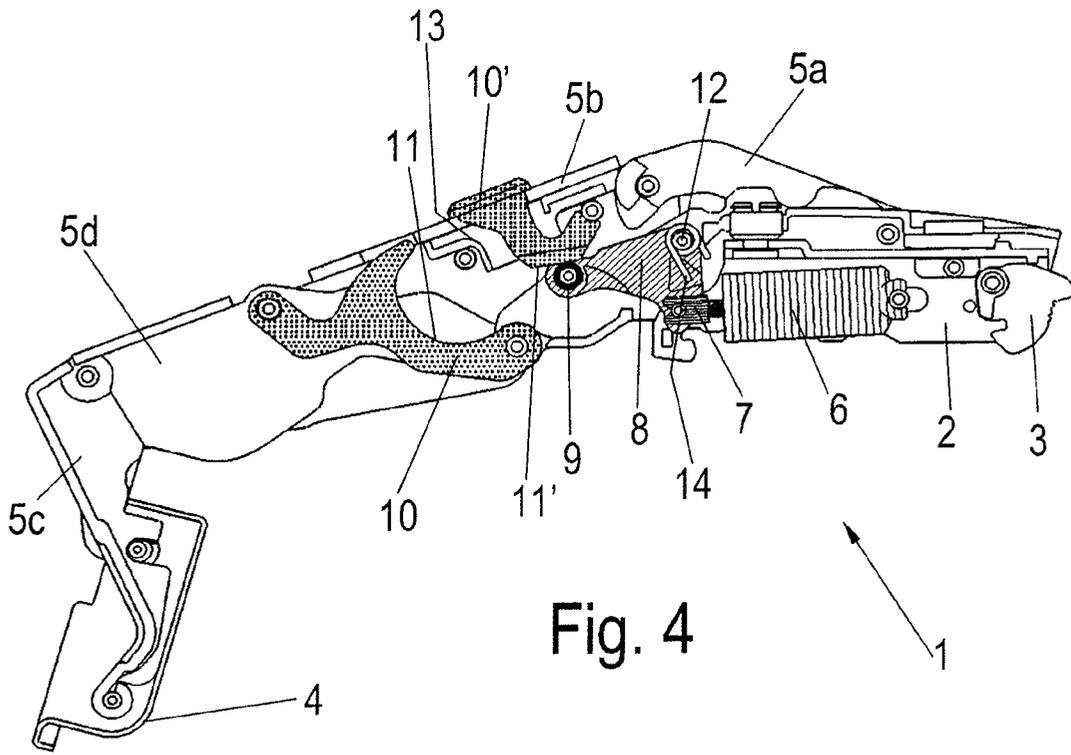


Fig. 7

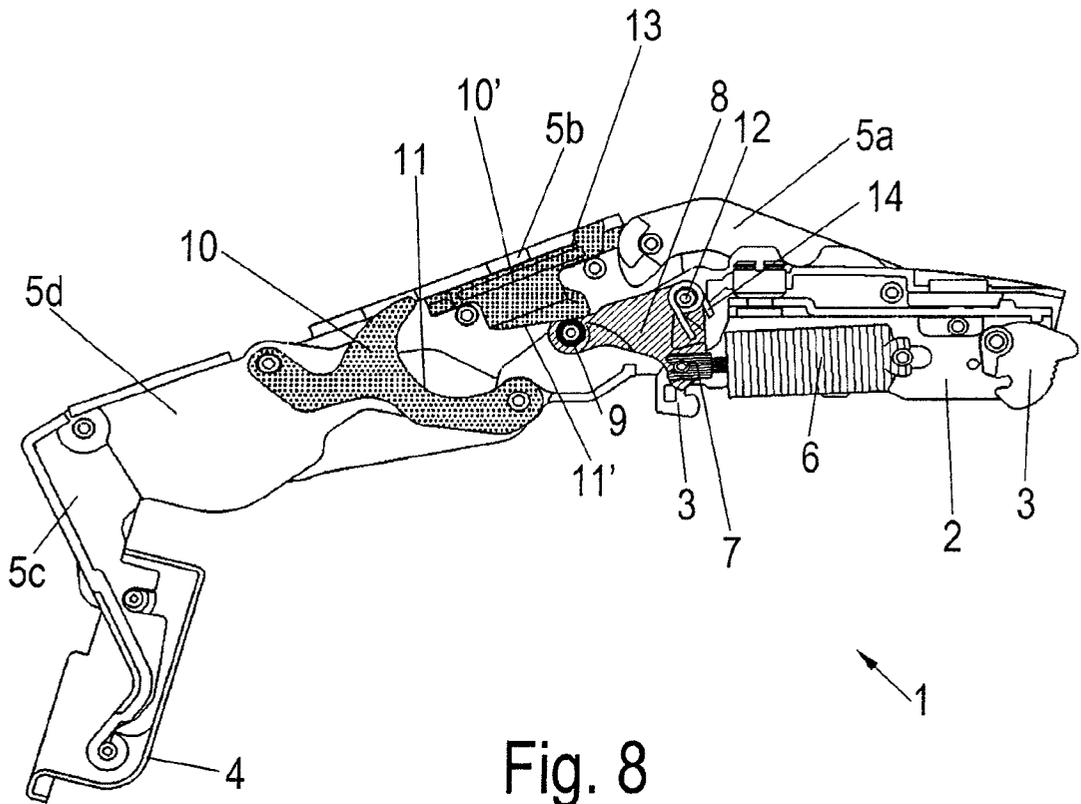
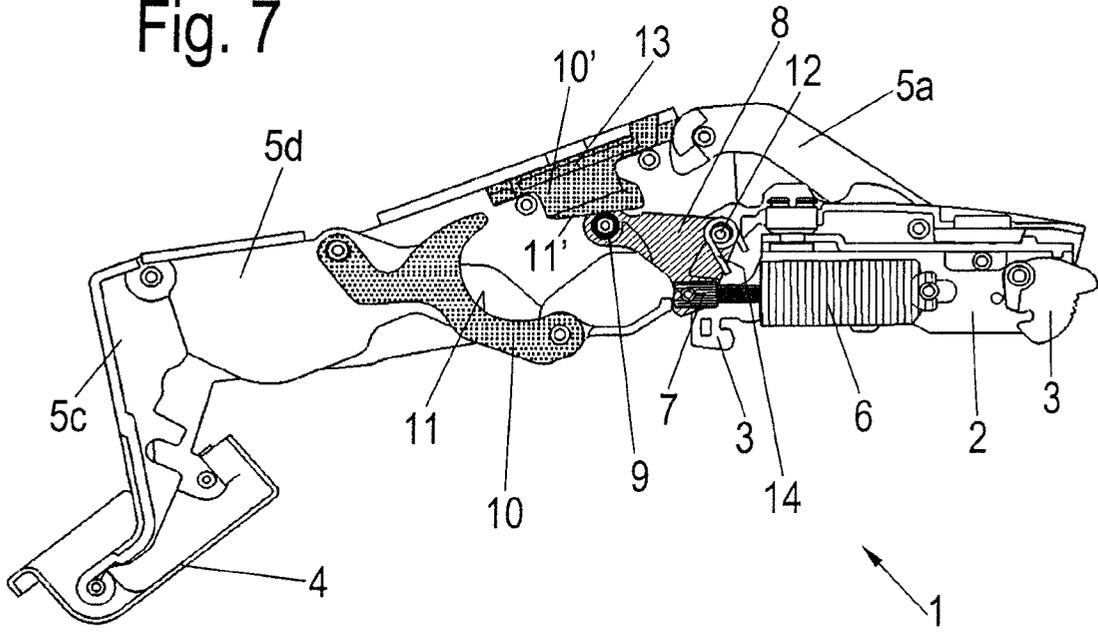


Fig. 8

