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(54) Hinge for doors of domestic appliances.

Scharnier für Türen von Haushaltsgeräten

Charnière pour portes d'appareils ménagers

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(73) Proprietor: **Nuova Star S.p.A.**
40069 Zola Predosa (BO) (IT)

(72) Inventor: **Vanini, Marco**
40134 Bologna (IT)

(74) Representative: **Firmati, Leonardo**
Bugnion S.p.A.
Via di Corticella, 87
40128 Bologna (IT)

(56) References cited:
EP-A1- 0 858 767
EP-A1- 2 298 983
EP-A1- 2 636 355
EP-A2- 0 919 776
EP-A2- 2 284 344

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EP 2 912 984 B1

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Description

[0001] This invention relates to a hinge for doors of domestic appliances.

[0002] More specifically, this invention relates to a hinge for doors of dishwashers.

[0003] Hinges of known types are disclosed in documents EP 2 298 983, EP 919 776 and EP 2 284 344.

[0004] In the field of electrical domestic appliances, and, therefore, also dishwashers, there has been an unstoppable effort during recent years towards achieving increasingly higher energy efficiency classes.

[0005] In other words, the aim is to improve the energy efficiency of the electrical domestic appliances, basically by a reduction in energy consumption.

[0006] In the specific case of dishwashers, the reduction in energy consumption is obviously linked with the reduction of the temperature of the washing water and also the temperature for drying the washed dishes.

[0007] In effect, it is the heating devices, consisting basically of electrical resistors, which determine the high level of electricity absorption during the step for washing dishes.

[0008] Whilst the lower temperature of the water can be compensated effectively, in terms of both operating and energy efficiency, by means of a longer washing cycle or a greater effectiveness of the jets, in contrast, with regard to the drying of the dishes, its is difficult to compensate for the reduced temperature of the drying air.

[0009] The consequence of such a reduction in temperature would therefore be that at the end of the cycle the dishes would no longer be as dry as they would be with traditional washes.

[0010] In order to overcome such a poor drying efficiency, some manufacturers have considered causing, at the end washing cycle, a circulation of air which is able to at least partly compensate for the lack of a heated flow of air.

[0011] The most practical system is without doubt to open the door at the end of the washing cycle, when the dishes are still hot, in such a way as to facilitate final drying, circulating air in the dishwasher which is drier than that which is present.

[0012] For this purpose, some manufacturers have made opening systems equipped with motor-driven hinges and devices, which can be activated by the dishwasher's electronic unit and which is able to cause a partial opening of the door.

[0013] Document EP 2 636 355 discloses an opening system provided with hinges and a motor-driven device which can be activated by an electronic control unit of the diswasher.

[0014] Document EP 919 776 discloses a hinge for household electric appliances comprising first and second counterbalancing means, the latest being designed to exert an antagonistic force proportionally increasing in correspondence of the passage from a closing position to an extreme opening position. Document EP 2 284 344 discloses a hinge for doors of electrical household appliances comprising a damper.

[0015] These systems, although effective, are not free from drawbacks.

[0016] A first drawback connected to the use of the motor-driven systems and devices described above is due to their high cost.

[0017] Further drawbacks of the prior art systems are the complexity of installation and their difficult maintenance.

[0018] The aim of the present invention is, therefore, to overcome the disadvantages indicated above and provide an alternative to the prior art devices described above.

[0019] Another aim of this invention is to provide a hinge for doors of dishwashers which is inexpensive to manufacture, efficient to operate and easy to maintain.

[0020] This invention accordingly provides a hinge for doors or wings comprising the features described in any of the appended claims.

[0021] The technical features of the invention, with reference to the above aims, can be easily inferred from the appended claims, in particular claim 1, and preferably any of the claims that depend, either directly or indirectly, on claim 1.

[0022] The advantages of the invention are more apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred, non-limiting example embodiment of the invention and in which:

- Figure 1 is a schematic side elevation view of a preferred embodiment of a hinge according to this invention;
- Figures 2 to 4 are respective schematic side elevation views of the hinge of Figure 1 in three different configurations of use.

[0023] With reference to Figure 1, the reference numeral 1 denotes in its entirety a preferred embodiment of the hinge according to this invention.

[0024] The hinge 1, paired with another one, is designed to be mounted, on a dishwasher, not illustrated, to connect the frame to a door in such a way that the latter is movable relative to the frame between a closed position and an open position.

[0025] With reference to the accompanying drawings, the hinge 1 comprises a first element 2 adapted for fixing to the above-mentioned, not illustrated, door of the dishwasher, and a second element 3, at least in part of a box-shaped type, adapted for fixing to the above-mentioned, not illustrated, frame of the dishwasher.

[0026] The first element 2 is pivoted to the second element 3 by a pin 4 to allow reciprocal rotation of the elements 2, 3 about a respective axis of rotation A1.

[0027] The axis of rotation A1 defines the axis of rotation of the above-mentioned, not illustrated, door relative to the above-mentioned frame, also not illustrated.

[0028] The first and second elements 2 and 3 are kinematically connected to each other by a connecting lever 5.

[0029] At a first end of it 5a, the connecting lever 5 is pivoted to the first element 2 by a pin 6 in such a way as to rotate at least partly relative to the first element 2 itself about a respective axis A2.

[0030] The hinge 1 also comprises a helical spring 7 and a drive rod 8 of the spring 7, both supported by the second, box-shaped element 3.

[0031] The drive rod 8 is engaged at the bottom by a hook 9.

[0032] The hook 9 is pivoted on the lever 5 at its second end 5b, opposite the above-mentioned first end 5a.

[0033] The drive rod 8 of the spring 7 is advantageously positioned inside the spring 7 itself and is connected to the top thereof, for example by a stop element 7a in such a way as to compress it, according to substantially known methods.

[0034] In other words, the drive rod 8 has an upper end that is longitudinally opposite the end that is hooked to the lever 5, the upper end being designed to engage an upper end coil of the spring 7 in such a way as to compress the spring 7.

[0035] The spring 7 and the rod 8 extend principally along a direction of extension B of the second element 3.

[0036] The spring 7 constitutes first elastic means for the hinge 1.

[0037] The second, box-shaped element 3 has a bracket 10 with a flat extension perpendicular to the plane of the figures, a hole 11 being made on the bracket 10 for the passage of the drive rod 8.

[0038] At the hole 11, and coaxial with it, a tapered friction element 12 is housed. The friction element 12, of substantially known type, comprises an upper tapered portion 12a and a lower cylindrical portion 12b inserted in the hole 11.

[0039] On the upper tapered portion 12a a cylindrical collar 13 is fitted, on an upper edge of which the bottom end of the spring 7 rests.

[0040] The tapered upper portion 12a is divided into two lateral fingernail-shaped protrusions adapted to superficially engage, and apply a frictional action on, the two opposite faces 8a, 8b of the rod 8.

[0041] A slot 14 is made on the lever 5.

[0042] The slot 14 with its peripheral edge slidably engages with a guide pin 15, integral with the second element 3.

[0043] The slot 14 defines a first cam made on the lever 5.

[0044] The hinge 1 also comprises a rocker 16 pivoted on the second element 3 so as to oscillate about a respective axis A3.

[0045] The rocker 16 comprises a first portion 16a engaged with a helical spring 17 and a second portion 16b designed to engage with the lever 5, as illustrated in Figures 1 to 3.

[0046] The helical spring 17 is stably interposed between the above-mentioned first portion 16a of the rocker and a projection 18 protruding from a bottom wall 3a of the second element 3.

[0047] A pin 19, also projecting from the bottom wall 3a, defines an end of stroke stop element for the rocker 16 in its oscillation about the axis A3.

[0048] The rocker 16 defines, for the hinge 1, pushing means designed to determine, as will be described more fully below, the relative moving away from the above-mentioned first and second element 2, 3 starting from a closed position of the door.

[0049] The helical spring 17 defines, for the hinge 1, second elastic means designed to activate the rocker 16.

[0050] With reference to the accompanying drawings, the lever 5 has, in the proximity of its end 5b, a second cam 20.

[0051] As illustrated in Figures 1 to 3, the second cam 20 is designed to engage with the second portion 16b of the rocker 16.

[0052] More specifically, at its second portion 16b, the rocker 16 comprises a roller 21 defining the follower in the coupling with the second cam 20.

[0053] In use, in the configuration illustrated in Figure 1 which shows a closed condition of the above-mentioned and not illustrated door of the dishwasher corresponding to a condition of minimum distance between the first and second element 2, 3, the spring 17 is in a preloaded condition. The maintaining of the stable closing configuration of the dishwasher door is ensured by a suitable closing hook of substantially known type and not illustrated, advantageously of the electro-mechanical type.

[0054] For this reason, in the configuration illustrated in Figure 1, the rocker 16, through the roller 21, applies on the connecting lever a force F, generated by the compression of the helical spring 17.

[0055] When, using, for example, a command and control unit of the dishwasher, the above-mentioned and not illustrated hook for closing the door is disengaged, the force F pushes, using the connecting lever 5, the first element 2 and, consequently, the door, not illustrated, which is integral with it, to adopt an open configuration, illustrated in Figure 2.

[0056] As clearly illustrated in Figure 1, the second cam 20 made on the lever 5 has a protrusion 20a such as to form a stop zone for the follower consisting of the roller 21.

[0057] The second cam 20, in particular with the protrusion 20a of its profile, in conjunction with the follower 21, defines means for limiting the opening of the door, the limiting means being designed to brake the relative moving away of the first and second element 2, 3 and stopping them in a reciprocal position of partial opening of the door, as illustrated in Figure 2. The above-mentioned limiting means also comprise the pin 19 designed to define an end of stroke stop position for the rocker 16.

[0058] Advantageously, the partial opening of the door determined by the above-mentioned limiting means is defined by a mutual angle of opening between the first

and the second element, of between 5 and 15 sexagesimal degrees.

[0059] Still more advantageously, the partial opening of the door is defined by a mutual angle of opening between the first and second element, of between 8 and 10 sexagesimal degrees.

[0060] In the preferred embodiment illustrated in the accompanying drawings, the above-mentioned partial opening is defined by an angle of approximately 8 sexagesimal degrees.

[0061] In practice, the elastic force F determined by the preloading of the spring and applied to the door of the dishwasher to determine a partial opening is able to generate a flow of air inside the dishwasher. The circulation of air facilitates the drying of the dishes which have just been washed.

[0062] Starting from the open configuration partly illustrated in Figure 2, a force by the user is needed to proceed to a greater opening of the door. In other words, after overcoming the obstacle consisting of the above-mentioned protrusion 20a of the profile of the second cam 20, a resistance which is advantageously overcome with approximately 7° of opening (in the case illustrated, that is, up to approximately 15°), the rocker 16 remains disengaged from the connecting lever 5, with the relative first portion 16a pushing into contact with the pin 19 of the helical spring 17.

[0063] Figure 3 shows the position of last contact of the follower 21 with the second cam 20 of the lever 5.

[0064] Figure 4 illustrates a configuration of the hinge 1, corresponding to a fully open position of the door of the dishwasher, with the first and second element 2, 3 open to each other by approximately 90°.

[0065] Between the position illustrated in Figure 3 and that in Figure 4, that is, between approximately 15° and approximately 90°, the pushing element defined by the rocker 16 is disengaged.

[0066] During the closing movement of the door, in particular during the passage from the open configuration partly illustrated in Figure 2 to the configuration illustrated in Figure 1, the action exerted by the user causes the loading of the spring 17. In effect, when the second element 3 moves towards the first element 2, the connecting lever 5 applies, with the second cam 20, a thrust action on the follower roller 21 and, through the rocker 16, causes the squashing of the second spring 17. The action of the above mentioned, and not illustrated, hook for closing the door maintains the preloading condition of the second spring 17 until the dishwasher door is closed. In this condition, the pushing means is ready to act for the next opening of the door, in the manner described above.

[0067] With reference to the connecting lever 5, during its movement relative to the second, box-shaped element 3, the upper end 5b of the lever 5 remains substantially equidistant from the wall 3b of the second element 3, parallel to rod 8. This guarantees that during its sliding relative to the second, box-shaped element 3 the drive rod 8 remains parallel to itself and is basically translated along the direction B.

[0068] The fact that the rod 8 is translated along the direction B, that is to say, without making an angle with that direction, means that the frictional action applied to it by the tapered friction element 12 is constant and regular.

[0069] In other words, thanks to the presence of the cam 14 and the relative guide pin 15, the rod 8 remains with its faces 8a, 8b parallel to the friction surfaces of the friction means, thereby guaranteeing a regular frictional action without jamming. Jamming might also occur if the rod 8 moved at an angle in such a way as, for example, to strike one of the fingernail-shaped protrusions on the friction element 12.

[0070] Advantageously, so as not to dissipate, due to the friction, the elastic energy which accumulated by the spring 17 and intended for pushing of the door when opening, the rod 8 has, at its lower zone close to the hook 9, a reduced thickness relative to that of the remaining part.

[0071] In other words, thanks to the thinning, not illustrated, of the rod 8 in its lower zone, the faces 8a, 8b of the rod 8 do not enter into contact with the element 11 during the pushing exerted by the rocker 16.

[0072] In that way, the frictional action of the hinge is achieved for the entire opening-closing stroke with the exception of the first stretch, that is to say, for example with reference to the preferred embodiment illustrated, between 0° and 8°.

[0073] The hinge 1 according to this invention offers many obvious advantages. A first advantage is due to the simple and inexpensive construction which enables the door to be provided with the opening force without any electric drive unit.

[0074] Another advantage is its compact and easy construction.

[0075] The hinge 1 according to this invention achieves the preset aims, providing an effective, practical and inexpensive alternative to the prior art devices.

[0076] The invention described has evident industrial applications and can be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted for technically equivalent elements.

Claims

1. A hinge for dishwasher doors, comprising a first element (2) and a second element (3) pivoted to each other and movable relative to each other in tilting fashion, a connecting lever (5) between the first and the second element (2, 3); the lever (5) pivoting on the first element (2); the first and second elements (2, 3) being fixable one to a frame and the other to a door of a dishwasher, for moving the door relative to the frame between a closed position and an open

position, the second element (3) comprising first elastic means (7) connected to the lever (5) to resist the weight force of the door during its opening, the hinge also comprising pushing means (16) and second elastic means (17) to actuate the pushing means (16), **characterised in that** the pushing means (16) are designed to move the first and second element (2, 3) away from each other, starting from the closed position of the door.

2. The hinge according to claim 1, wherein the lever (5) has a first cam (14) which determines its relative movement relative to the first element (2), **characterised in that** the connecting lever (5) is operatively interposed between the pushing means (16) and the first element (2) to transmit to the latter the force necessary to determine the moving away from the second element (3).

3. The hinge according to claim 1 or 2, **characterised in that** the pushing means (16) are shaped in a rocker fashion, are pivoted on the second element (3) and have a first portion (16a) engaged with the second elastic means (17) and a second portion (16b) designed to engage with the second lever (5).

4. The hinge according to claim 3, **characterised in that** the connecting lever (5) has a second cam (20) designed to engage with the pushing means (16), the second portion (16b) of the pushing means (16) comprising a cam follower (21) engaging with the second cam (20).

5. The hinge according to any one of claims 1 to 4, **characterised in that** it comprises means for limiting the opening of the door, designed to slow down the moving away from each other of the first and second elements (2, 3) and to stop the elements in a reciprocal position of partial opening of the door.

6. The hinge according to claim 4 or 5, **characterised in that** the limiting means are defined by the profile of the second cam (20) in conjunction with the cam follower (21).

7. The hinge according to claim 5 or 6, **characterised in that** in the position of partial opening of the doors the first and second element (2, 3) form an angle between 5° and 15°.

8. The hinge according to claim 5 or 6, **characterised in that** in the position of partial opening of the doors the first and second element (2, 3) form an angle between 8° and 10°.

9. The hinge according to any one of claims 3 to 8 when dependent on claim 2, **characterised in that** the first cam (14) of the connecting lever (5) is made with a slot shape and is designed to engage with a relative guide pin (15) emerging from the second element (3).

10. A door for dishwashers, **characterised in that** it comprises a hinge according to any one of claims 1 to 9.

Patentansprüche

1. Scharnier für Türen von Geschirrspülmaschinen, umfassend ein erstes Element (2) und ein zweites Element (3), die zueinander geschwenkt werden und relativ zueinander kippbar bewegbar sind, sowie einen Verbindungshebel (5) zwischen dem ersten und dem zweiten Element (2, 3), wobei der Hebel (5) auf dem ersten Element (2) schwenkt, wobei das erste und das zweite Element (2, 3) jeweils an einem Rahmen bzw. an einer Tür einer Geschirrspülmaschine fixiert werden können, um die Tür relativ zum Rahmen zwischen einer geschlossenen Position und einer offenen Position zu bewegen, wobei das zweite Element (3) erste elastische Mittel (7) umfasst, die mit dem Hebel (5) verbunden sind, um der Gewichtskraft der Tür während deren Öffnung zu widerstehen, wobei das Scharnier auch Drückmittel (16) und zweite elastische Mittel (17) umfasst, um die Drückmittel (16) zu betätigen, **dadurch gekennzeichnet, dass** die Drückmittel (16) ausgestaltet sind, um das erste und das zweite Element (2, 3) ausgehend von der geschlossenen Position der Tür voneinander wegführend zu bewegen.

2. Scharnier nach Anspruch 1, wobei der Hebel (5) einen ersten Nocken (14) aufweist, der dessen relative Bewegung relativ zum ersten Element (2) bestimmt, **dadurch gekennzeichnet, dass** der Verbindungshebel (5) betriebswirksam zwischen den Drückmitteln (16) und dem ersten Element (2) eingesetzt ist, um auf dieses die Kraft zu übertragen, die notwendig ist, um dieses vom zweiten Element (3) wegführend zu bewegen.

3. Scharnier nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Drückmittel (16) als Stopper ausgebildet sind, auf dem zweiten Element (3) geschwenkt werden und einen ersten Abschnitt (16a) aufweisen, der mit den zweiten elastischen Mitteln (17) im Eingriff ist, und einen zweiten Abschnitt (16b), ausgestaltet, um mit dem zweiten Hebel (5) in Eingriff zu gelangen.

4. Scharnier nach Anspruch 3, **dadurch gekennzeichnet, dass** der Verbindungshebel (5) einen zweiten Nocken (20) aufweist, der ausgestaltet ist, um mit den Drückmitteln (16) in Eingriff zu gelangen, wobei der zweite Abschnitt (16b) der Drückmittel (16) einen Nockenstößel (21) umfasst, der mit dem zweiten No-

cken (20) in Eingriff gelangt.

5. Scharnier nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** es Mittel zum Begrenzen der Öffnung der Tür umfasst, ausgestaltet, um die voneinander wegführende Bewegung des ersten und des zweiten Elements (2, 3) zu verlangsamen und um die Elemente in einer gegenseitigen Position der teilweisen Öffnung der Tür zu stoppen.

6. Scharnier nach Anspruch 4 oder 5, **dadurch gekennzeichnet, dass** die Begrenzungsmittel durch das Profil des zweiten Nockens (20) in Verbindung mit dem Nockenstößel (21) definiert sind.

7. Scharnier nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** das erste und das zweite Element (2, 3) in der Position der teilweisen Öffnung der Türen einen Winkel zwischen 5° und 15° bilden.

8. Scharnier nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** das erste und das zweite Element (2, 3) in der Position der teilweisen Öffnung der Türen einen Winkel zwischen 8° und 10° bilden.

9. Scharnier nach einem der Ansprüche 3 bis 8, wenn abhängig von Anspruch 2, **dadurch gekennzeichnet, dass** der erste Nocken (14) des Verbindungshebels (5) schlitzförmig ausgebildet und ausgestaltet ist, um mit einem entsprechenden Führungszapfen (15), der aus dem zweiten Element (3) hervortritt, in Eingriff zu gelangen.

10. Tür für Geschirrspülmaschinen, **dadurch gekennzeichnet, dass** sie ein Scharnier nach einem der Ansprüche 1 bis 9 umfasst.

Revendications

1. Charnière pour portes de lave-vaisselle, comprenant un premier élément (2) et un second élément (3) pivotant l'un par rapport à l'autre et mobiles l'un par rapport à l'autre de façon basculante, un levier de raccordement (5) entre le premier et le second élément (2, 3) ; le levier (5) pivotant sur le premier élément (2) ; les premier et second éléments (2, 3) pouvant être fixés, l'un sur un châssis et l'autre à une porte d'un lave-vaisselle pour déplacer la porte par rapport au châssis entre une position de fermeture et une position d'ouverture, le second élément (3) comprenant des premiers moyens élastiques (7) reliés au levier (5) pour résister à la force massique de la porte lors de son ouverture, la charnière comprenant aussi des moyens de poussée (16) et des seconds moyens élastiques (17) servant à actionner les moyens de poussée (16), **caractérisée en ce que** les moyens de poussée (16) sont conçus pour éloigner les premier et second éléments (2, 3) l'un de l'autre, en partant de la position de fermeture de la porte.

2. Charnière selon la revendication 1, dans laquelle le levier (5) comporte une première came (14) déterminant son mouvement relatif par rapport au premier élément (2), **caractérisée en ce que** le levier de raccordement (5) est fonctionnellement interposé entre les moyens de poussée (16) et le premier élément (2) pour transmettre à ce dernier la force nécessaire pour déterminer l'éloignement du second élément (3).

3. Charnière selon la revendication 1 ou 2, **caractérisée en ce que** les moyens de poussée (16) présentent une forme à balancier, peuvent pivoter sur le second élément (3) et comportent une première partie (16a) pouvant se mettre en prise avec les seconds moyens élastiques (17) et une seconde partie (16b) conçue pour se mettre en prise avec le second levier (5).

4. Charnière selon la revendication 3, **caractérisée en ce que** le levier de raccordement (5) comporte une seconde came (20) conçue pour se mettre en prise avec les moyens de poussée (16), la seconde partie (16b) des moyens de poussée (16) comprenant un poussoir de came (21) se mettant en prise avec la seconde came (20).

5. Charnière selon l'une quelconque des revendications de 1 à 4, **caractérisée en ce qu'**elle comprend des moyens, servant à limiter l'ouverture de la porte, conçus pour ralentir l'éloignement réciproque des premier et second éléments (2, 3) et pour arrêter les éléments dans une position réciproque d'ouverture partielle de la porte.

6. Charnière selon la revendication 4 ou 5, **caractérisée en ce que** les moyens de limitation sont définis par le profil de la seconde came (20) conjointement au poussoir de came (21).

7. Charnière selon la revendication 5 ou 6, **caractérisée en ce que** dans la position d'ouverture partielle des portes, le premier et le second élément (2, 3) forment un angle compris entre 5 et 15°.

8. Charnière selon la revendication 5 ou 6, **caractérisée en ce que** dans la position d'ouverture partielle des portes, le premier et le second élément (2, 3) forment un angle compris entre 8 et 10°.

9. Charnière selon l'une quelconque des revendications de 3 à 8 lorsqu'elle dépend de la revendication 2, **caractérisée en ce que** la première came (14) du levier de raccordement (5) est fabriquée en forme

de fente et est conçue pour se mettre en prise avec une cheville de guidage (15) relative dépassant du second élément (3).

10. Porte pour lave-vaisselles, **caractérisée en ce qu'**elle comprend une charnière selon l'une quelconque des revendications 1 à 9.

FIG. 2

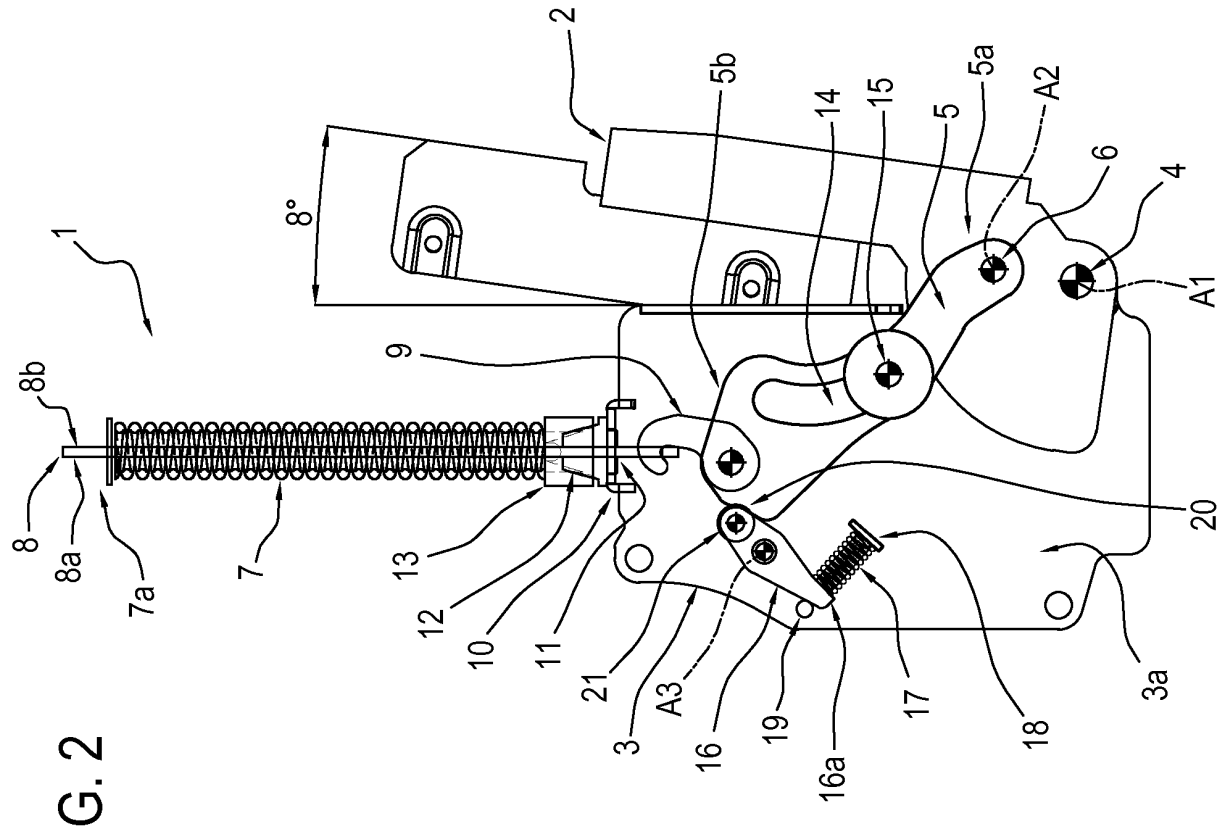

1
2
8°
5b
14
15
5
5a
A2
6
4
A1
9
8b
8
8a
7a
7
13
12
10
11
21
A3
3
16
19
16a
17
18
3a
20

FIG. 1

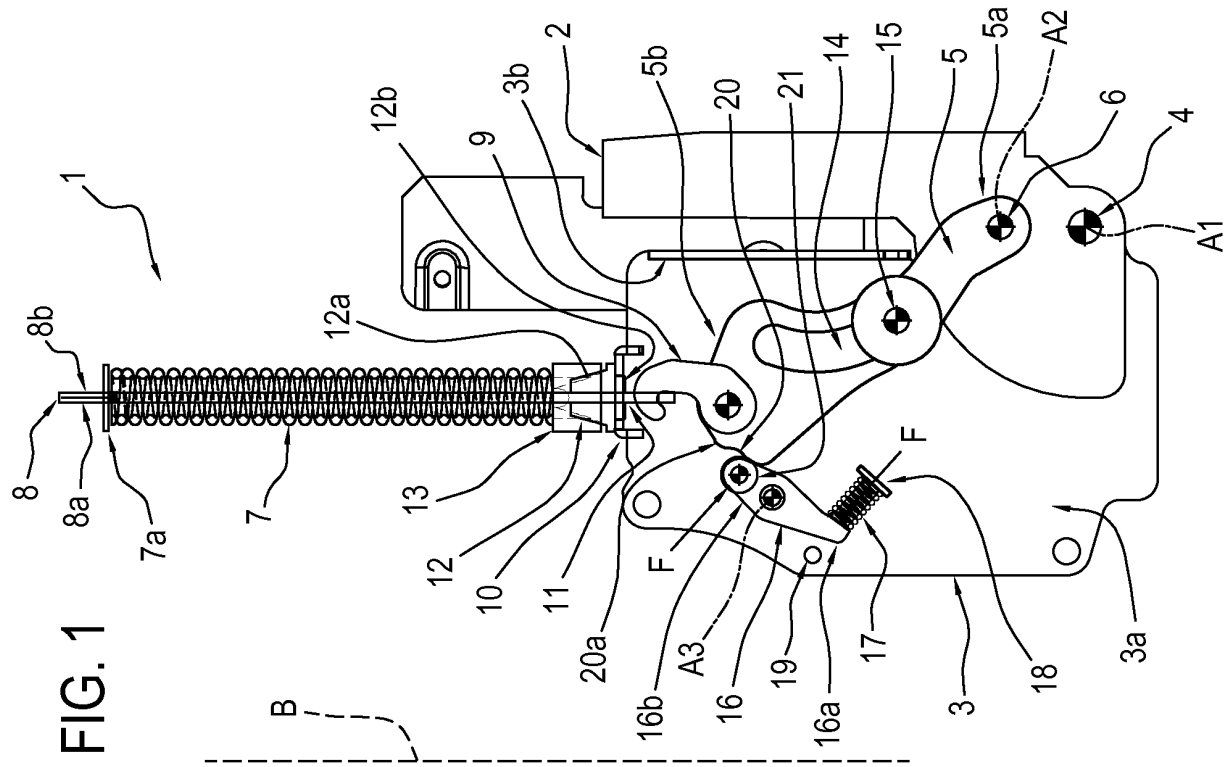

1
12b
3b
2
5b
20
21
14
15
5
5a
A2
6
4
A1
9
12a
8b
8
8a
7a
7
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11
F
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16b
A3
16
19
16a
17
3
18
3a
B

FIG. 3

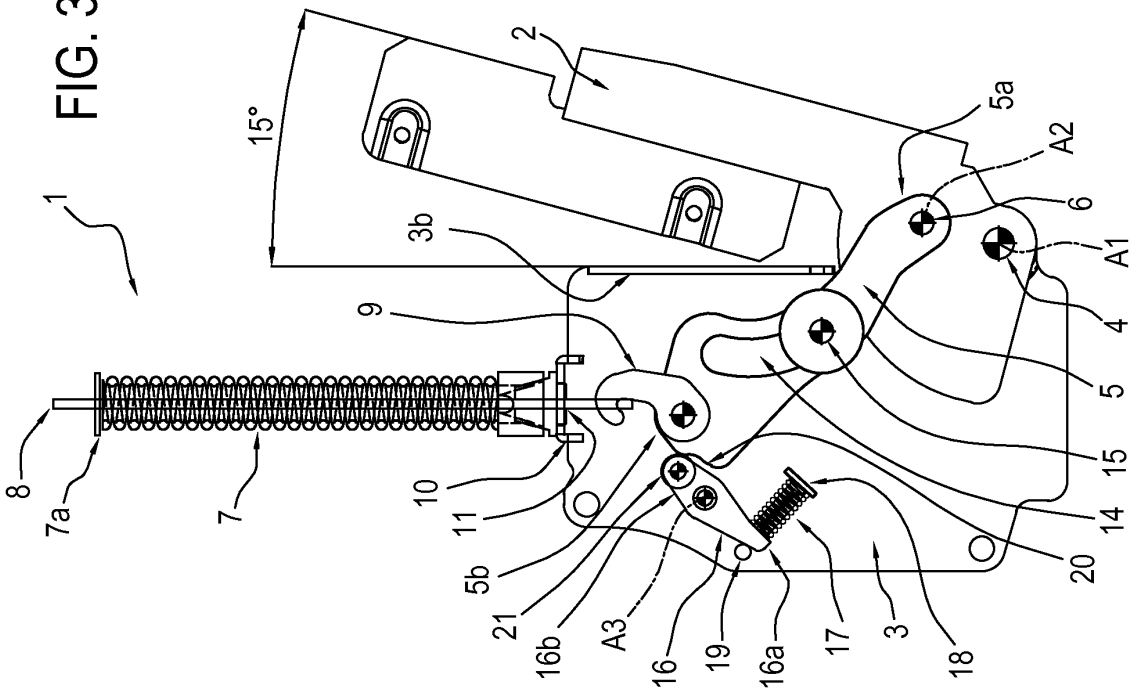
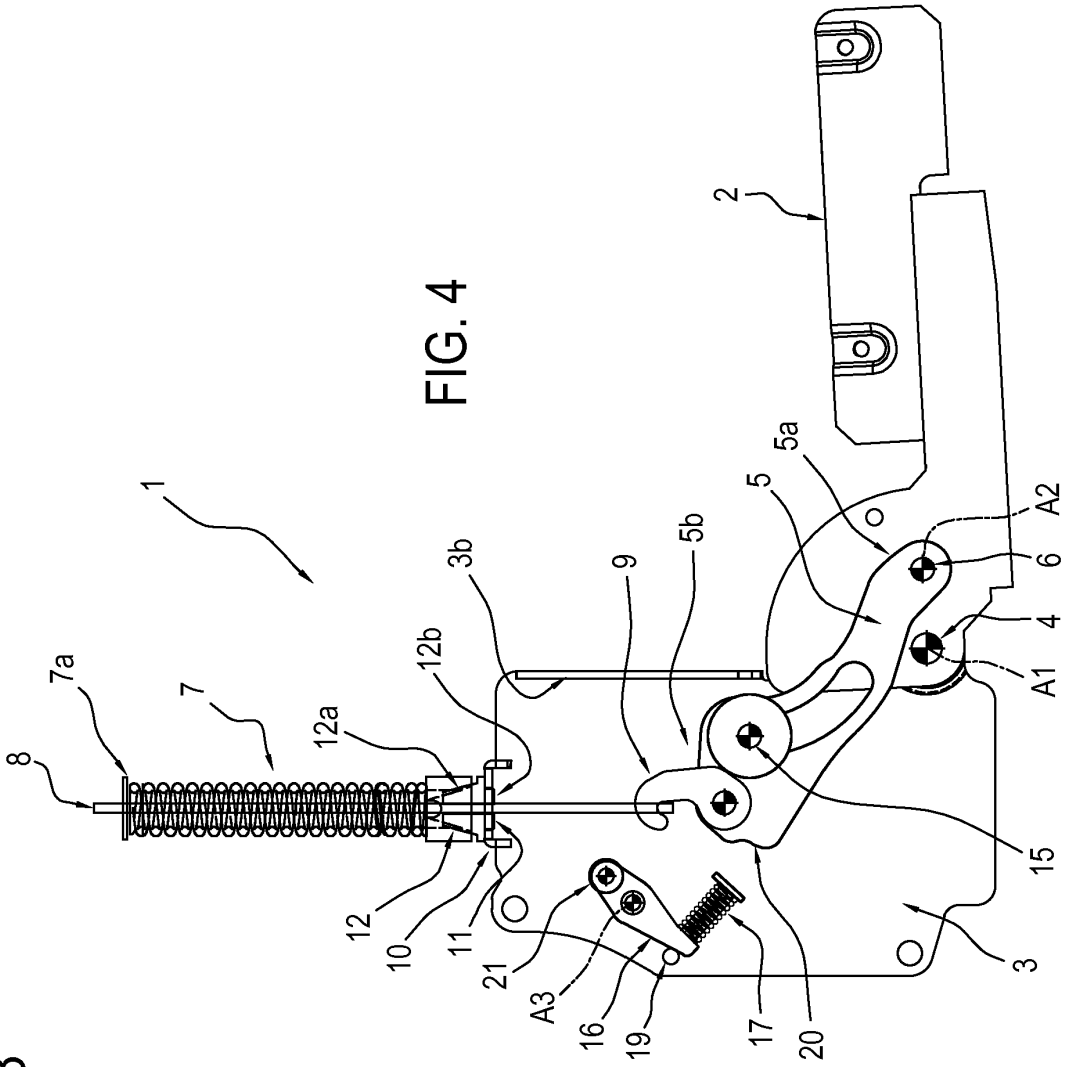

1
15°
2
5a
A2
6
A1
4
3b
9
5
15
14
20
8
7a
7
10
11
5b
21
16b
A3
16
19
16a
17
3
18

FIG. 4


1
2
5a
5
A2
6
4
A1
3b
9
5b
12b
7a
7
12a
8
15
12
10
11
21
A3
16
19
17
20
3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2298983 A **[0003]**
- EP 919776 A **[0003] [0014]**
- EP 2284344 A **[0003] [0014]**
- EP 2636355 A **[0013]**