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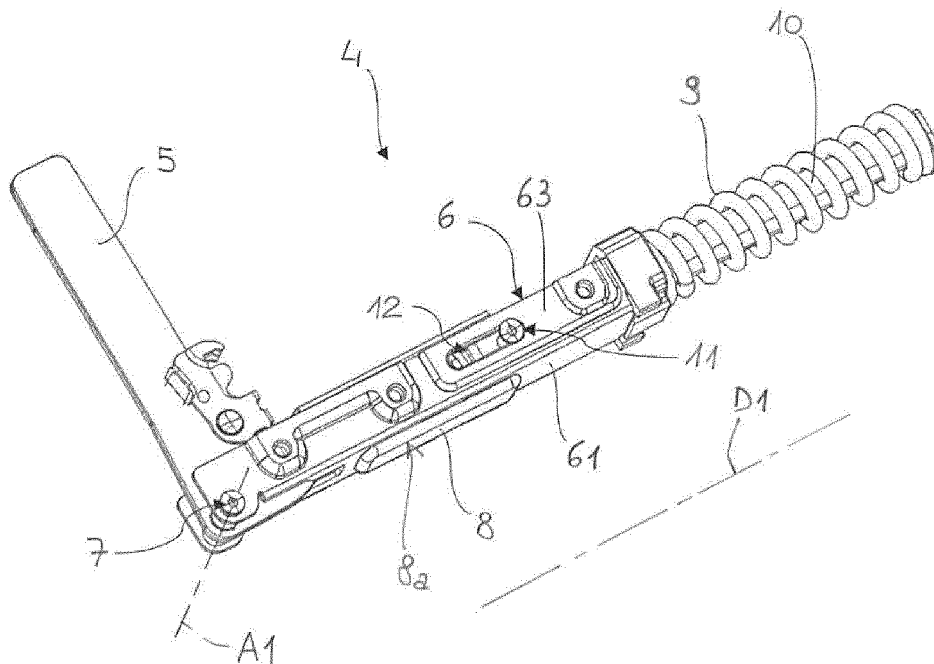
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HINGE FOR DOORS OF ELECTRICAL HOUSEHOLD APPLIANCES

- (57)

Described is a hinge for doors of household appliances, comprising a box-shaped element (6) extending longitudinally along a first predetermined direction (D1) and having a U-shaped transversal cross-section, a first lever (5) pivoted on the box-shaped element (6)
- by means of a pivot (7), one between the box-shaped element (6) and the first lever (5) being fixable to a frame (2) and the other being fixable to a door (3), to make the door (3) movable in a tilting fashion relative to the frame (2) between a closed position and an open position.

FIG. 2



Description

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

[0002] This invention also relates to a method for adjusting the position of the pivot of a hinge for doors of household appliances.

[0003] This specification describes the hinge according to the invention with reference to an oven purely by way of a non-limiting example.

[0004] In the ovens of known type, the hinges used normally comprise a box-shaped structure connected by a kinematic mechanism to a lever, with the lever and the box-shaped structure designed to open mutually in a tilting fashion. The box-shaped structure and the lever are designed so as to be connected one to a door and the other to a frame of the oven. More in detail, one between the box-shaped structure and the lever is fixed to the frame of the oven at a side of the access opening of the latter, whilst the other is fixed to an edge of the door, which in this way is made movable in a tilting fashion relative to the above-mentioned frame.

[0005] Elastic elements act on the above-mentioned lever which influence the movement of the door during both opening and closing.

[0006] When the oven door is rotated away from its closed position, the above-mentioned elastic elements oppose, firstly, the detachment of the door from the supporting frame of the oven and, secondly, the subsequent rotational movement of the door and its consequent lowering to the end of stroke position, in which the access opening of the oven is fully open.

[0007] During the second step of the opening movement, the door, under the combined action of its weight, which favours the descent, and of the elastic elements, which exert a braking action, it performs a gradual rotation.

[0008] In the frequent case in which the box-shaped element is housed in a suitable cavity made in the frame of the oven, the position of the pivot axis of the hinge relative to the oven is determined by the size of the box-shaped body, and even more precisely by the distance between the pin forming the pivot of the lever and the lower surface of the box-shaped element, the lower surface of which rests on the above-mentioned cavity of the frame, suitably shaped to match.

[0009] It is often the case that during the production of an oven the position of the pivot axis must be adjusted for a multitude of reasons, for example due to an aesthetic review of the oven or even modification of the thickness of the panel, normally vitreous, of the oven.

[0010] However, such adjustments, even if in the range of a few millimetres, result in the drawback of having to substantially redesign the hinge in its entirety, even replacing the moulds for forming the sheets forming the box-shaped element.

[0011] Similarly, when the box-shaped element is also inserted in the door, a change in the materials or shape

of the door may require dimensional modifications, even slight, of the box-shaped structure, modifications which, as just described above, may involve a lengthy and expensive re-design of the entire hinge.

[0012] The aim of this invention is to provide a hinge for doors of household appliances which overcomes the drawbacks of the prior art hinges.

[0013] More specifically, the aim of this invention is to provide a hinge for doors of household appliances which allows a practical adjustment of the position of the pivot axis of the door.

[0014] A further aim of this invention is to provide a hinge for doors of household appliances which allows a practical adaptation to dimensional and/or position modifications in the housings in which it is intended to be inserted.

[0015] Another aim of the invention is to provide a hinge for doors of electrical household appliances, which is at the same time effective but also simple and inexpensive to make and practical to install.

[0016] Yet another aim of the invention is to provide a practical and effective method for adjusting the position of the pivot of a hinge for doors of household appliances relative to the frame of the household appliance or relative to the door.

[0017] According to the invention, these aims and others are achieved by a hinge for doors of electrical household appliances and by a method comprising the technical features described in the accompanying claims.

[0018] The technical features of the invention, according to the above-mentioned aims, are clearly described in the appended claims and its advantages are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate non-limiting example embodiments of it, and in which:

- Figure 1 is a schematic perspective view from above of an oven provided with a door connected to it by two hinges made in accordance with this invention;
- Figures 2 to 4 are relative schematic perspective views of three different embodiments of the hinge for electric household appliances according to this invention;
- Figures 5 to 7 are respective schematic side elevation views of the hinges of Figures 2 to 4;
- Figure 8 is a schematic perspective view of a detail of the hinge of Figure 2;
- Figure 9 is a schematic side elevation view of the detail of Figure 8.
- Figure 10 is a schematic front elevation view of the detail of Figure 8.

[0019] The numeral 1 in Figure 1 denotes in its entirety an oven comprising a frame 2 to which a door 3 is connected by two hinges 4 which enable it to be rotated in a tilting fashion about a horizontal axis A.

[0020] Figures 2 to 5 illustrate different embodiments of the hinges 4 made according to the invention.

[0021] Each of the two hinges 4 comprises a first lever 5, fixable to a respective edge of the door 3, and a box-shaped element 6, fixable to the frame 2 of the oven 1 at a respective side of the opening of an access of the latter.

[0022] The first lever 5 is fixable to the door 3 either directly or by interposing a respective box-shaped body not illustrated.

[0023] The box-shaped element 6 has an elongate shape and extends longitudinally along a predetermined direction D1.

[0024] Although different possible applications of the hinge according to the invention foresee that the first lever 5 is fixed to the frame of the oven whilst the box-shaped element 6 is fixed to the edge of the door 3, hereinafter in this description exclusive reference will be made to the above-mentioned installation method wherein the lever 5 is fixed to the door 3 and the box-shaped body 6 is fixed to the frame 2.

[0025] With reference to the accompanying Figures 2 to 4, the first lever 5 is pivoted on the box-shaped element 6 by means of a pivot 7 to make the door 3 movable in a tilting fashion relative to the frame 2, between a closed end position and an open end position, not illustrated in detail.

[0026] The pivot 7 has a central axis A1 defining a pivot axis for the door 3 relative to the frame 2.

[0027] Advantageously, the box-shaped element 6 has a transversal cross section which is substantially U-shaped.

[0028] Unlike the hinges normally used in ovens, the hinge 4 according to the invention, as illustrated in Figures 2 to 7, has the box-shaped element 6 with its concavity facing upwards.

[0029] More specifically, with reference to Figure 1 wherein the oven 1 is shown with the door 3 open, the box-shaped element 6 whether it is inserted in the frame 2 or it is inserted in the door 3, would still have its concavity facing upwards.

[0030] In other words, the lever 5 protrudes mainly from the concave side of the box-shaped body 6, that is to say, its concave part defined by the U-shaped profile of its transversal cross-section.

[0031] With reference to Figure 8, reproducing the box-shaped element 6 relative to the embodiment of Figure 2 but representing the maximum shape of the box-shaped element 6 of all the embodiments illustrated, the box-shaped element 6 has a bottom wall 61 and two side walls 62, 63 emerging from the bottom wall 61.

[0032] Advantageously, the side walls 62, 63 emerging from the bottom wall 61 are parallel to each other.

[0033] As illustrated in Figures 2 and 3, the hinge 4 has a drawn portion 8 formed on the above-mentioned bottom wall 61 of the box-shaped body 6.

[0034] As clearly illustrated in Figures 8 to 10, the drawn portion 8 protrudes on the side opposite the bottom wall 61 with respect to the above-mentioned side walls 62, 63 of the box-shaped body 6.

[0035] With reference to Figures 2 to 6, the drawn portion 8 protrudes from the box-shaped body 6 on the opposite side of the box-shaped body 6 from that from which the first lever 5 protrudes.

[0036] The above-mentioned circumstance that the lever 5 protrudes mainly from the concave side of the box-shaped body 6 means that the lever 5 extends basically emerging from the concave side and that, when the hinge 1 is, for example, mounted with the box-shaped body 6 inserted in the frame 2 of the oven 1, the bottom wall 61 comes into contact with a corresponding surface of the frame 2, discharging on it the weight of the door 3.

[0037] Thus, as explained in detail below, thanks to the above-mentioned arrangement of the box-shaped body 6 with the concavity facing upwards, its bottom wall 61 is, in use, positioned at the bottom and therefore when the box-shaped body 6 is, for example, inserted inside the oven the drawn portion 8 determines with its height, the vertical position of the door 3 relative to the opening of the oven 1.

[0038] According to the embodiments illustrated in Figures 2 to 4, the drawn portions 8 have the shape of a parallelepiped with a main direction of extension parallel to the above-mentioned first predetermined direction D1.

[0039] According to alternative embodiments, not illustrated, the drawn portions 8 have a cylindrical shape, with the axis of the cylinder perpendicular to the bottom wall 61 of the box-shaped body 6.

[0040] With reference to the embodiment illustrated in Figure 3, the hinge 4 has a drawn portion 8 with a depth greater than that illustrated in Figure 2.

[0041] With reference to the embodiment illustrated in Figure 4, the hinge 4 has two drawn portions 8 made on the above-mentioned bottom wall 61 of the box-shaped body 6. As illustrated in Figures 5 to 7, regardless of their actual number, the drawn portion(s) 8 present in the hinge 4, define a flat supporting and contact surface P for the hinge 4.

[0042] More specifically, according to the embodiments illustrated, each drawn portion 8 has a respective flat face 8a which contributes to defining the flat supporting and contact surface P.

[0043] Alternative embodiments, not illustrated but falling within the scope of this invention, comprise drawn portions 8 without a flat face but which in their entirety, by points, equally define the above mentioned flat supporting surface P.

[0044] Once the hinge 4 is installed in the oven 1, the relative flat supporting and contact surface P is designed to abut against a corresponding surface, not illustrated, of the frame 2 of the oven 1, designed to guarantee a precise positioning of the hinge 4 and of the above-mentioned pivot axis A1.

[0045] More specifically, the above-mentioned and not illustrated surface against which the flat surface P of the hinge must make contact defines a lower surface of a cavity for housing the box-shaped element 6, a cavity made in the frame 2 of the oven.

[0046] As illustrated in Figure 5, representing a side elevation view of the embodiment of Figure 2, the drawing depth of the drawn portion 8 determines a distance D between the axis A1 of the pivot 7 and the flat supporting and contact surface P.

[0047] On the other hand, as illustrated in Figure 6, representing a side elevation view of the embodiment of Figure 3, the drawing depth of the drawn portion 8 determines a distance D', greater than D, between the axis A1 of the pivot 7 and the flat supporting and contact surface P.

[0048] Advantageously, the variation of the drawing depth of the drawn portion 8 allows the position of the pivot axis A1 to be varied.

[0049] In effect, since the flat supporting and contact surface P defined by the drawn portion 8 is positioned in contact with a fixed and defined surface (the above-mentioned and not illustrated lower surface of the housing cavity of the box-shaped element 6), the adoption of hinges 4 with different distances D, D' determines a consequent different position of the pivot axis A1 relative to the frame 2 of the oven 1.

[0050] In other words, different drawing depths allow different positions of the pivot axis A1 of the door 3 to be obtained.

[0051] With reference to Figure 7, representing a side elevation view of the embodiment of Figure 4, the drawing depth of the two drawn portions 8 determines a distance D" between the axis A1 of the pivot 7 and the flat supporting and contact surface P. The distance D" is purely by way of example and illustrated substantially coinciding with the distance D shown in Figure 5 solely for the purpose of illustrating how the same distance can be obtained without distinction with one or more drawn portions 8.

[0052] As illustrated in Figures 2 to 4, the hinge 4 comprises a first helical spring 9 housed outside the box-shaped element 6 and a compression rod 10 which is positioned coaxially inside the first spring 9 and which defines a guide for the first spring 9.

[0053] The first spring 9 defines, for the hinge 4, elastic means designed to apply an elastic action on the first lever 5.

[0054] The compression rod 10 comes out from the first spring 9 inside the box-shaped element 6 to couple, by means of a pin 11, to a connecting rod, of known type and not illustrated, acting as tie rod, connected to the first lever 5.

[0055] The pin 11 slides advantageously, with relative side ends, in respective slots 12 made in the side walls 62, 63 of the box-shaped element 6.

[0056] As stated, the invention also relates to a method for adjusting the distance between the pivot 7 of a hinge 4 for doors of household appliances and a relative flat supporting and contact surface P.

[0057] The method comprises the steps of:

- providing a box-shaped element 6 of a hinge, ex-

tending longitudinally along a first predetermined direction D1 and having a U-shaped transversal cross-section, with the box-shaped element 6 having a bottom wall 61 and two side walls 62, 63 emerging parallel to each other from the bottom wall 61;

- providing a first lever 5 designed to be pivoted on the box-shaped element 6 by means of a pivot 7, with the pivot 7 inserted in respective holes made on the side walls 62, 63 at a predetermined distance from the bottom wall 61;
- making on the box-shaped element 6 at least one drawn portion 8 made on the relative bottom wall 61 and emerging on the opposite side to the above-mentioned side walls 62, 63.

[0058] The drawn portion 8 is configured to define a flat supporting and contact surface P for the hinge 4 located in a relative housing in the frame 2 or in the door 3 of an oven 1.

[0059] More specifically, the flat supporting and contact surface P is defined by a flat face 8a of the drawn portion 8.

[0060] In the case of several drawn portions 8 made in a box-shaped body 6, the respective flat faces 8a of the different drawn portions 8 are coplanar with each other and contribute in their entirety to forming the above-mentioned flat supporting and contact surface P.

[0061] The step of making the above-mentioned at least one drawn portion 8 comprises the step of adjusting the drawing depth to define a predetermined distance between the flat supporting and contact surface P and the central axis A1 of the pivot 7.

[0062] Advantageously, the above-mentioned step of preparing the box-shaped element 6 comprises the step of shearing a metal sheet by means of a punch.

[0063] Moreover, the step of adjusting the depth of the drawn portion 8 is performed by selecting an insert, not illustrated, to be applied to the above-mentioned punch, not illustrated, the insert being shaped to match the drawn portion 8.

[0064] The above mentioned and not illustrated insert is removable in order to be replaced when the drawing thickness required for the drawn portion 8 varies.

[0065] In other words, after preparing a punch for cutting the box-shaped body 6, a suitable insert is positioned on the punch for determining, during the cutting, the drawing of a relative portion and the defining of a respective drawn portion 8.

[0066] This insert is removable and can be replaced by others of different heights or shapes such as to allow respective drawn portions 8 of different depths to be made.

[0067] In that way, as a function of the desired final distance D, D', D" in the box-shaped body 6, a respective insert is selected and inserted in the punch for cutting the metal sheet.

[0068] The invention also relates to an electrical household appliance which uses hinges 4 described

above and, more specifically, a pair of hinges 4.

[0069] The hinge, the electrical household appliance and the related method according to the invention achieve the preset aims and allow important advantages to be achieved.

[0070] A first advantage linked to the invention is due to the fact that the making of a drawn portion in the bottom wall of the box-shaped body allows easy variation, as a function of the depth of the drawing, of the distance of the axis of the pivot, that is to say, the axis of rotation of the door, from the plane of maximum dimensions of the box-shaped element, that is to say, that plane which, in use, will make contact with a corresponding reference surface present in the frame of the oven or in the door.

[0071] The variation of the drawing depth of the drawn portion is also easily obtainable by replacing an insert to be inserted in the punch used to obtain, by cutting sheet metal, the box-shaped body of the hinge.

[0072] That fact, that is to say, simply replacing an insert protruding from the punch, avoids having to redesign the hinge, the box-shaped body and, therefore, also the punch, in the event of having to modify even by a few millimetres the position of the fulcrum of the hinge, which, during production of an electrical household appliance, may occur with a certain frequency.

[0073] Another advantage linked to the invention is due to the fact that, thanks to the above-mentioned possibility of varying the distance of the axis of the pivot relative to the above-mentioned plane of maximum dimensions of the hinge, it is possible to easily use the hinge even with different electrical household appliances even of different suppliers, without having to design a new hinge for a modification even of just a few millimetres.

[0074] Yet another advantage linked to the invention is due to the fact that the box-shaped element of the hinge, precisely because of the possibility of varying the depth of the drawn portion(s), and therefore varying its transversal size, is easily adaptable both for housing in the frame of the electric household appliance and for housing in the door.

Claims

1. A hinge for doors of electrical household appliances, comprising

- a box-shaped element (6) extending longitudinally along a first predetermined direction (D1) and having a U-shaped transversal cross-section, said box-shaped element (6) having a bottom wall (61) and two side walls (62, 63) emerging from said bottom wall (61);
- a first lever (5) pivoted on said box-shaped element (6) by means of a pivot (7) and protruding mainly from a concave part of said box-shaped element (6); one of either said box-shaped element (6) or said first lever (5) being fixable to a

frame (2) and the other of either said box-shaped element (6) or said first lever (5) being fixable to a door (3), to make the door (3) movable in a tilting fashion relative to the frame (2) between a closed position and an open position, **characterised in that** said box-shaped element (6) has at least one drawn portion (8), formed on said bottom wall (61) and configured to define a flat surface (P) for supporting and making contact with said hinge, said at least one drawn portion (8) emerging from opposite side relative to said side walls (62, 63) and from opposite side relative to said first lever (5) emerging from said box-shaped body (6).

2. The hinge according to claim 1, **characterised in that** said drawn portion (8) has a rectangular shape with a main direction of extension parallel to said first predetermined direction (D1).

3. The hinge according to claim 1, **characterised in that** said drawn portion (8) is cylindrical in shape.

4. The hinge according to claim 2 or 3, **characterised in that** it comprises a plurality of drawn portions (8), said drawn portions (8) of said plurality defining in their entirety a flat surface (P) for supporting and making contact with said hinge.

5. The hinge according to any one of claims 2 to 4, **characterised in that** said drawn portion (8) has a flat face (8a) defining said surface (P) for supporting and making contact.

6. An electrical household appliance (1) comprising a frame (2), a door (3) and a pair of hinges (4) according to any one of the preceding claims, wherein, in each hinge (4) of said pair, said box-shaped element (6) is fixed to said frame (2) and said first lever (5) is fixed to said door (3), to make the door (3) movable in a tilting fashion relative to the frame (2) between a closed position and an open position.

7. An electrical household appliance (1) comprising a frame (2), a door (3) and a pair of hinges (4) according to any one of claims 1 to 5, wherein, in each hinge (4) of said pair, said box-shaped element (6) is fixed to said door (3) and said first lever (5) is fixed to said frame (2), to make the door (3) movable in a tilting fashion relative to the frame (2) between a closed position and an open position.

8. A method for adjusting the distance between the pivot of a hinge for doors of household appliances and a relative flat supporting and contact surface, comprising the following steps:

- providing a box-shaped element (6) of a hinge

(4), extending longitudinally along a first predetermined direction (D1) and having a U-shaped transversal cross-section, said box-shaped element (6) having a bottom wall (61) and two side walls (62, 63) emerging parallel to each other from said bottom wall (61);
- providing a first lever (5) designed to be pivoted on said box-shaped element (6) by means of a pivot (7), said pivot (7) being inserted in respective holes made on said side walls (62, 63) at a predetermined distance (D, D', D'') from said bottom wall (61);
- making on said box-shaped element (6) at least one drawn portion (8) made on said relative bottom wall (61) and configured to define a flat surface (P) for support and contact for said hinge (4), said at least one drawn portion (8) emerging on the opposite side to said side walls (62, 63);
- said step of making said at least one drawn portion (8) comprising the step of adjusting the drawing depth to define a predetermined distance (D, D', D'') between said flat support and contact surface (P) and said pivot (7).

9. The method according to claim 8, **characterised in that** said step of providing said box-shaped element (6) comprises the step of shearing off a metal sheet by means of a punch, **and in that** said step of adjusting the drawing depth of said drawn portion (8) is carried out by selecting an insert to be applied to said punch and shaped to match said drawn portion (8), said insert being removable in order to be replaced when the required drawn thickness varies.

FIG. 1

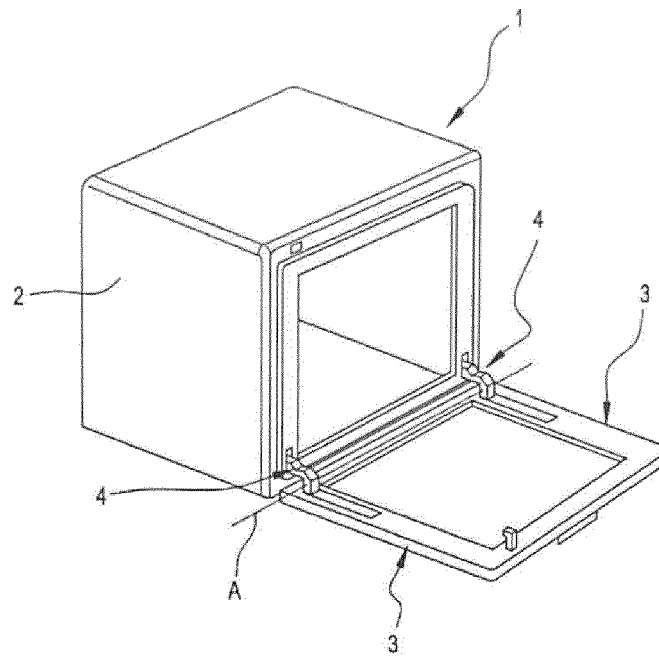


FIG. 2

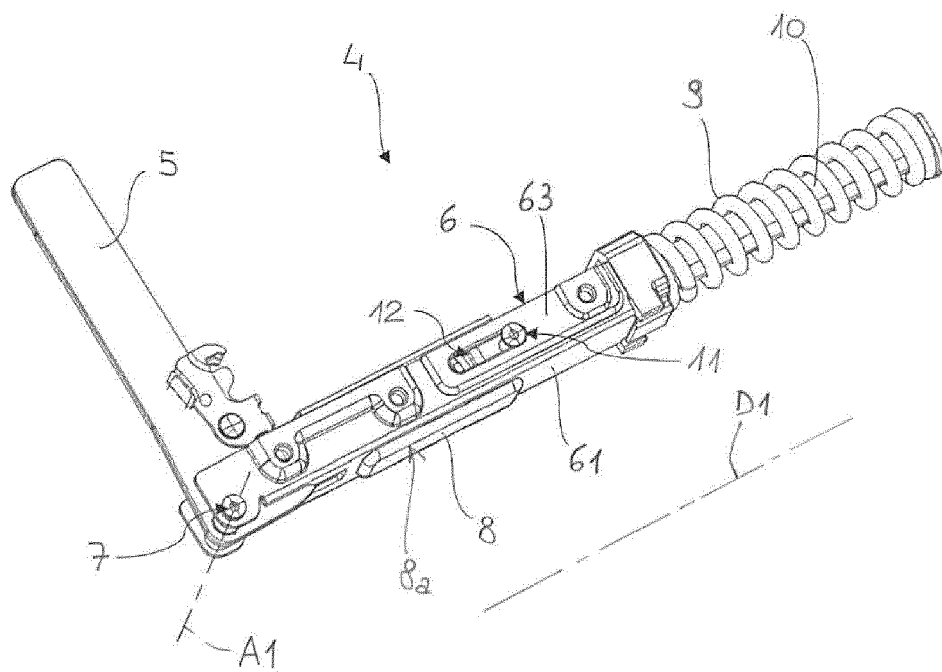


FIG. 3

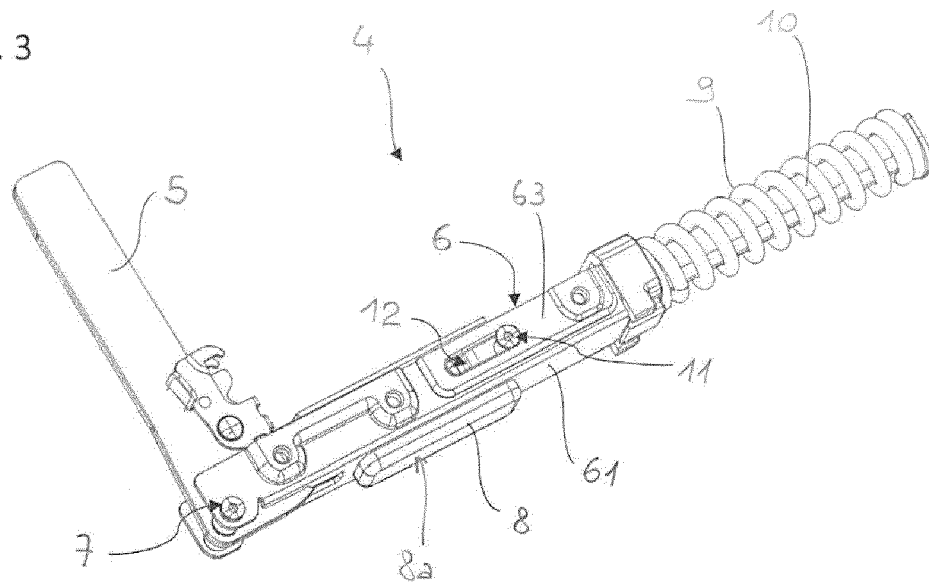


FIG. 4

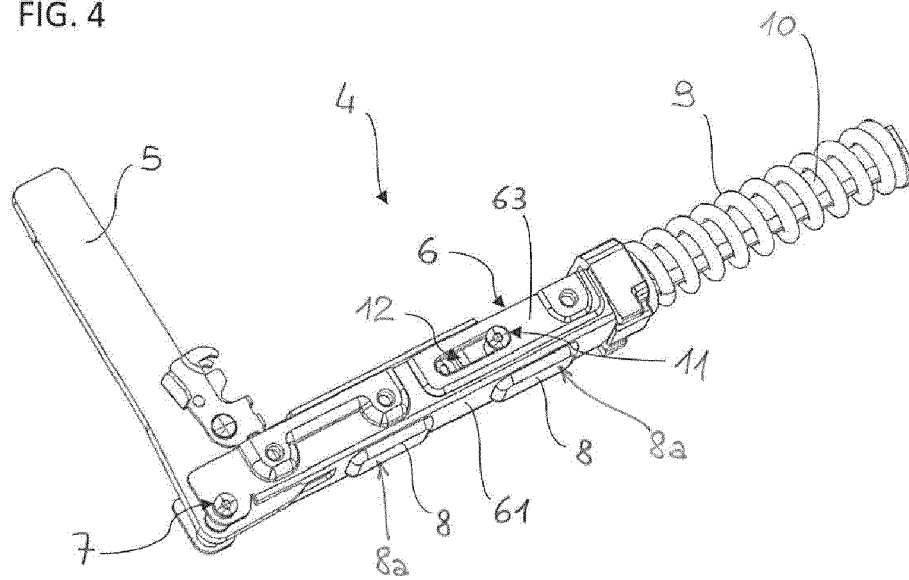


FIG. 5

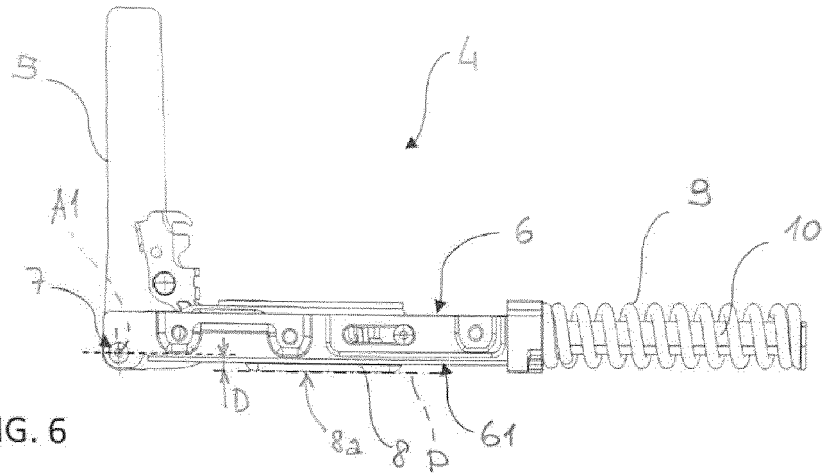


FIG. 6

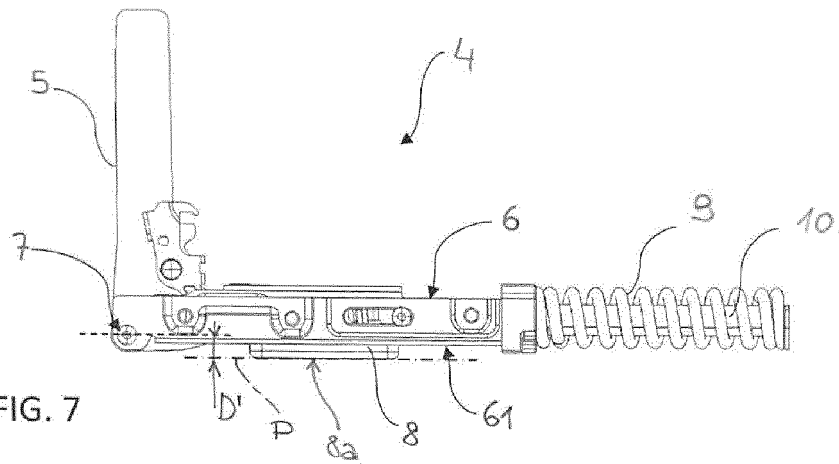
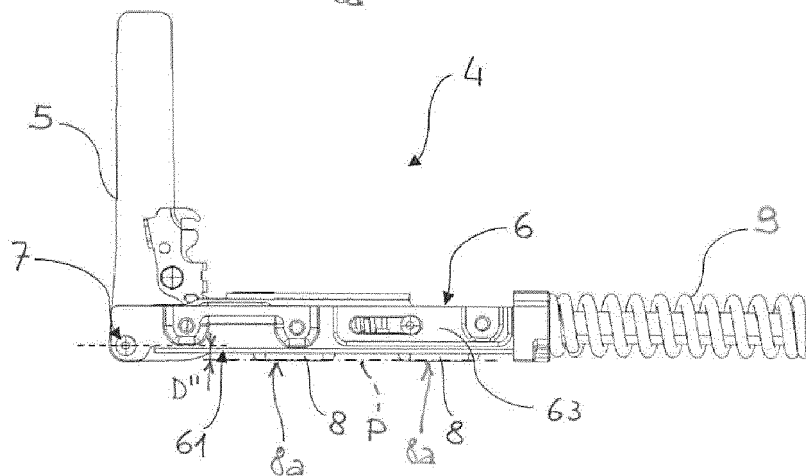
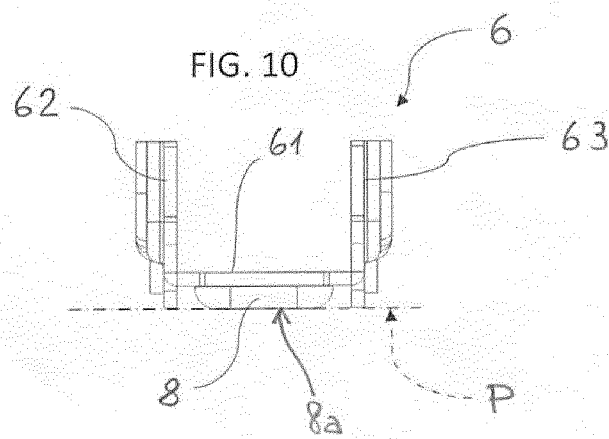
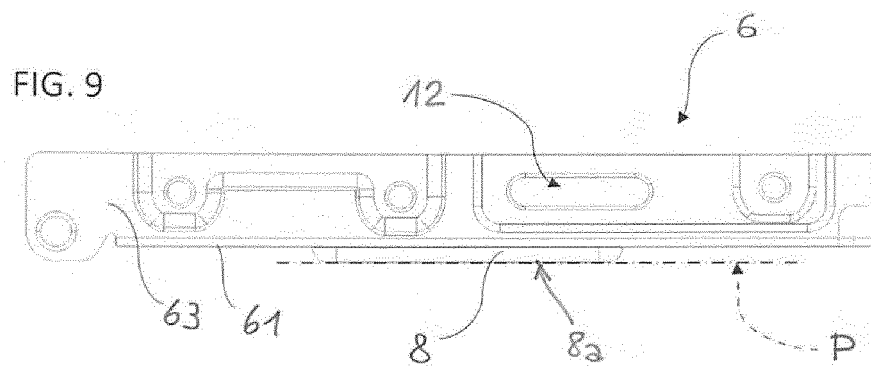
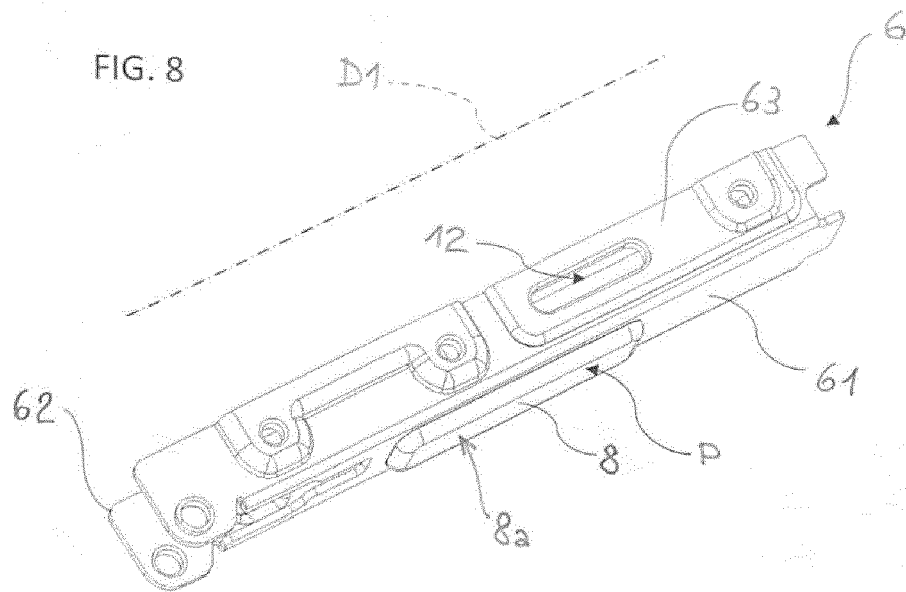


FIG. 7







EUROPEAN SEARCH REPORT

Application Number

EP 23 20 4472

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* paragraphs [0054] - [0056]; figures 2-5 *	2, 5, 8, 9	
A	----- US 2013/312222 A1 (ELKASEVIC SUAD [US] ET AL) 28 November 2013 (2013-11-28) * paragraphs [0021], [0022], [0024], [0030] - [0032]; figures 2, 5, 6 *	1-7	
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05F E05D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 February 2024	Examiner Klemke, Beate
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	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 23 20 4472

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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27-02-2024

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