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(71) Applicant: **Brera Cerniere S.r.l.**
20145 Milano (IT)

(72) Inventors:
- **BRERA, Francesco Attilio Renzo**
  20146 Milano (IT)
- **BRERA, Roberto Piero**
  20123 Milano (IT)

(74) Representative: **Vanosi, Adelio Valeriano**
ADV IP S.r.l.
Corso di Porta Vittoria, 29
20122 Milano (IT)

(54) **HOUSEHOLD APPLIANCE**

(57) A household appliance (1) is disclosed comprising a frame (2) equipped with an openable door (3), the door (3) being hinged to the frame (2) by means of at least one hinge (4), the hinge (4) comprising a base (5) connected to either the frame (2) or the door (3) and a joint (6) connected to the other left free of either the frame or the door, the joint (6) being hinged to the base (5) and to a tie rod (7) which is slidably secured to the base (5), the tie rod (7) being coupled with a tension spring (8) endowed with a first end (8A) secured to the base (5); a second end (8B) of the spring (8) is secured to an intermediate element (9) hinged to the tie rod (7), the intermediate element (9) featuring at least one surface (10) which cooperates, in at least certain joint (6) positions, with a first cam (13) in the base (5) to improve closure of the door (3).

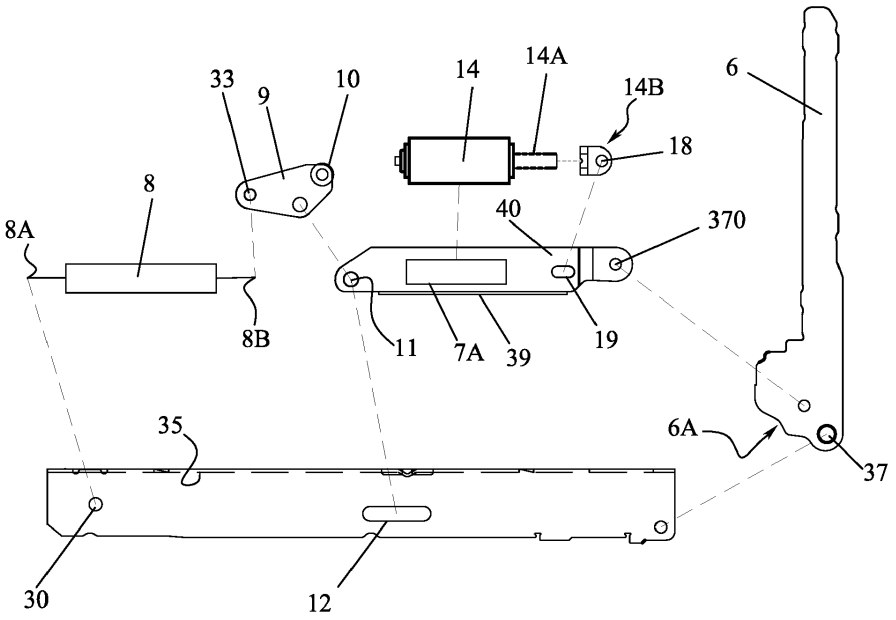

FIG.2

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a household appliance.

[0002] In particular, it relates to a household appliance equipped with at least one openable door, such as an oven, a dishwasher etc.

BACKGROUND ART

[0003] Modern household appliances have internal compartments (for cooking, washing etc.) which must be properly isolated from the external environment during use.

[0004] The necessary presence of at least one access door to the compartment creates a problem in terms of the isolation thereof.

[0005] Indeed, the door must be easy to open and at the same time, when in the closed position, must isolate the compartment properly. For this purpose, one or more seals are envisaged between the compartment opening and the door.

[0006] When the door presses against the seal in the closed position, the compartment is properly isolated.

[0007] To obtain this 'isolation', it is therefore useful for the door to exert a certain force when pressing against the seal. To calibrate this force, historically, action is taken on the main hinge spring, which is made 'stronger'.

[0008] However, this creates problems during opening, since the opening force required increases significantly.

[0009] Furthermore, use of a 'stronger' spring affects the door's movement, which is less smooth. The door is therefore harder to balance.

SUMMARY OF THE INVENTION

[0010] The object of the present invention is to provide a household appliance which is an improvement on the prior art.

[0011] A further object of the invention is to provide a household appliance equipped with a hinge which improves the stability of the door when in the closed condition.

[0012] Yet another object of the present invention is to provide a household appliance which has a properly isolated compartment and is easily opened and well balanced.

[0013] This and other objects are achieved by means of a household appliance according to the technical teachings of the claims annexed hereto.

BRIEF DESCRIPTION OF THE FIGURES

[0014] Further characteristics and advantages of the innovation will become clearer in the description of a preferred but not exclusive embodiment of the device, illustrated - by way of a non-limiting example - in the drawings annexed hereto, in which:

Figure 1 is a schematic, simplified view of a hinge of a household appliance, taken from a side view and in a closed door position;

Figure 2 is a simplified exploded view of the hinge in Figure 1;

Figure 3 is an enlarged schematic view of the detail circled in Figure 1;

Figure 4 shows the hinge in Figure 1 in a different position;

Figure 5 is an enlarged schematic view of the part circled in Figure 4;

Figures 6 and 7 are a simplified view of some variants of the hinge according to the present invention; and

Figure 8 shows a household appliance according to the present invention, equipped with the hinge in Figure 1.

DETAILED DESCRIPTION OF THE INVENTION

[0015] With reference to the figures stated, reference number 1 is used to denote a household appliance as a whole.

[0016] The household appliance 1, better shown in Figure 8, comprises a frame 2 equipped with a openable door 3, the door 3 being hinged to the frame 2 by at least one hinge 4. It should be noted that the door 3 may be supported by two hinges which are either mutually identical or different.

[0017] The household appliance may be, for example, an oven, a dishwasher, etc.

[0018] Inside the frame, there is a compartment 51 defined, which may be accessed by opening the hatch or door 3. Advantageously, between the door and the frame 2, there is a seal 52 envisaged which, when pressed by the door 3, ensures proper isolation of the compartment 51.

[0019] The hinge comprises a base 5 secured to the frame 2 or to the door 3, and a joint 6 secured to the door 3 or to the frame 2.

[0020] The base 5 may be made by shearing and U-bending a simple piece of thick metal sheet (which is appropriately shaped by the said shearing).

[0021] In Figure 1, the base 5 is therefore open underneath and there is a bottom 35 which is located in the upper part of Figure 1, from which two abutments 36 extend, which are preferably mutually parallel.

[0022] The joint 6 is hinged to the base 5. Preferably the hinging can be achieved by means of a third pin 37.

[0023] Furthermore, the joint 6 is hinged at 370 to a tie rod 7 which is slidably secured to the base 5; the tie rod 7 is associated with a tension spring 8, a first end 8A of which is secured to the base 5.

[0024] In one possible configuration, the first end 8A of the spring 8 may be hook-shaped and hooked onto on a base 5 fastening pin 30.

[0025] A second end 8B of the spring 8 is secured to part of the intermediate element 9.

[0026] For example, the second end 8B of the spring may be hook-shaped and may be hooked onto a pin 33 on the intermediate element 9.

[0027] The intermediate element 9 also features at least one surface 10 which cooperates (at least in certain joint 6 positions in which the door is nearing the closing position) with a first cam 13 in the base 5 to improve closure of the door 3.

[0028] The first cam 13 may be simply a portion of the bottom 35 which is folded so as to form a dip whose vertex is facing the open part of the base.

[0029] The shape and height of the cam 13 may be easily changed in the design stage, to adjust the load given to the door in the closed position.

[0030] Obviously, the cam 13 may be any shape and may, for example, have walls which slope, in an identical manner, to the left and to the right of the maximum height point (see Figure 3). Or the walls may be angled differently; a recess may also be envisaged to house the surface 10 of the intermediate element 9 in a stable position, and so forth.

[0031] The tie rod 7 can be connected slidingly to the base 5 by means of the aforesaid first pin 11, which may protrude from the tie rod 7 and may be engaged in first slots 12 in the base 5. Obviously, the slots may be made in the abutments 36.

[0032] Advantageously, the intermediate element 9 and the tie rod 7 are mutually hinged at precisely the said first pin 11, which is therefore common to both elements.

[0033] As can be seen in Figure 2, the tie rod may be made in a similar way to the base 5, by shearing and U-bending an appropriately shaped thick metal sheet. In this case, therefore, the bottom 39 of the tie rod is facing downwards in Figure 2 while an open part of the tie rod is facing upwards, also in Figure 2.

[0034] As can be seen in Figure 6 or 7, the tie rod abutments 40 may be slightly less mutually distant than the abutments of the base, so that the tie rod can be housed precisely between the two abutments 36 of the base. Furthermore, the abutments 40 may be shaped so as to be positioned in mutual proximity near the hinging point with the joint 6, in order to copy the thickness of the joint 6.

[0035] As is clearly visible in Figure 3, the surface 10 of the intermediate element 9 which cooperates with the said first cam 13 may comprise a first roller 10A. This facilitates the sliding of the surface 10 over the cam 13.

[0036] In more detail, from the description of the intermediate element 9, it can be seen that the point A (securing the second end of the spring 8B and the intermediate element 9), the surface 10 of the intermediate element 9, and the said first pin 11 may be spaced apart and advantageously arranged, in a side view, at the vertices of a triangle where the line connecting the surface 10 and the point A forms the base of the triangle.

[0037] Indeed, the mutual position of the point A, of the first pin 11, and of the surface 10 (with or without roller 10A) are configured so that the spring 8 pushes the surface 10 against the hinge bottom 35. For this reason, the intermediate element 9 may assume an essentially triangular conformation with rounded vertices.

[0038] The operation of the invention is easily understood by comparing Figures 1 and 3 with Figures 4 and 5.

[0039] As mentioned, Figures 1 and 3 show the hinge in the closed position (therefore when the door 3 is closed).

[0040] The spring 8 applies traction to the intermediate element that pushes the surface 10 thereof (or rather the roller 10A) against the base bottom 35 to the left of the cam 13.

[0041] When the joint 6 is angularly inclined (by traction during opening of the door 3) the tie rod 6 undergoes a shift towards the right in Figure 5 and the pin 11 is moved away from the end 12A of the slot 12 (compare the position of the pin 11 in the slot 12 in Figure 3 and in Figure 5).

[0042] The rightwards movement of the tie rod 7 is opposed by the action of the spring 8 and significantly, in this step, by the height of the cam 13, which cooperates with the surface 10 of the intermediate element so as to further brake the door 3 during the opening thereof.

[0043] It is clear how, by properly calibrating the position of the cam 13 and its height (as seen above in an extremely simple way), the door 3 may be subject to 'additional traction' during closing which is greater than that exerted by the spring alone.

[0044] When the angular position of the joint is such that the cam 13 has been moved past (to the right in Figure 3 or 5), the operation of the hinge is conventional, and therefore only regulated by the force of the spring and by the hinging position between the tie rod and the joint. This is because the cam 13 is spaced apart from the surface 10.

[0045] It should be noted that the tilt of the intermediate element can be such that the surface 10 is spaced apart from the bottom 35 of the hinge, except when it cooperates with the cam 13, or is such that the surface 10 is always in sliding (or rolling) contact with the bottom 35 of the base.

[0046] In addition to the system described above, the hinge 4 may also feature what is known as a 'soft closing' and/or 'soft opening' system, which may be implemented by equipping the tie rod with a shock absorber or damper equipped with a stem that cooperates with a shaped surface 6A of the joint. The combination of the two systems is particularly effective, especially in the presence of a 'soft closing' system.

[0047] Therefore, as mentioned above, a shock ab-

sorber 14 may be fastened to the tie rod 7.

[0048] The shock absorber may, in turn, comprise a stem 14A equipped with an end 14B which cooperates with a shaped surface 6A of the joint 6 to brake the door 3 during a closing/opening movement.

[0049] The end 14B may also cooperate with a part of the base to slow down the closing/opening movement of the door 3.

[0050] The shock absorber may be fastened to the tie rod 7 by means of at least two fastening pins P (but advantageously by means of four pins P which are shown with a dashed line in Figure 1) and/or by means of at least one window 7A (Figure 2) in the tie rod 7, in which it is engaged by means of an undercut.

[0051] Advantageously, the end 14B of the stem which cooperates with the shaped surface 6A of the joint comprises a second roller 15. In this way the shaped surface 6A of the joint transmits only an axial force in compression to the rod 14A of the damper, thus avoiding breakage of the damper itself to which it would be subject in the absence of the second roll 15.

[0052] For example, the second roller 15 may be associated with the stem 14A by means of a fork element, simply by means of an interference fit (or fastened in some other way) on the stem of the damper.

[0053] There may also be an external spring for resetting the shock absorber 14 fitted on the stem 14A and interposed between a surface 50 of the damper and the fork (or the end 14B) .

[0054] To stabilise the tie rod 7, the latter may be slidably constrained to the base 5 by means of at least a second pin 18 engaged in a slot 19 in the tie rod 7 and in a slot 20 in the base (Fig. 6).

[0055] Therefore in Fig. 6, the pin 18 moves freely in the slot 20 and then cooperates with the point 20A, which is a stop. Having come into contact with point 20A, pin 18 begins to slide into slot 19.

[0056] Advantageously, the second pin 18 is the axle of the second roller 15 and protrudes laterally from the tie rod 7.

[0057] The second pin 18 may be engaged in second slots 20 in the abutments 36 of the base 5 (to limit the axial movement thereof) or it can cooperate with stops 21 made on the base 5.

[0058] In the second case, shown in Figure 7, the tie rod is secured to the base by the pin 11 only, which is engaged in slot 12.

[0059] During opening, the pin 18 comes into contact with the stops 21 or the bottom 20A of the slot 20, braking (or rather cushioning) the door opening movement.

[0060] During closure, the roller 15 comes into contact with the shaped surface 6A of the joint 6 to slow down (or rather cushion) the door closing movement.

[0061] Various embodiments of the innovation have been disclosed herein, but further embodiments may also be conceived using the same innovative concept.

Claims

1. Household appliance (1) comprising a frame (2) equipped with an opening door (3), the door (3) being hinged to the frame (2) by means of at least one hinge (4), the hinge (4) comprising a base (5) connected to one between the frame (2) and the door (3) and one joint (6) connected to the other between the door and the frame, the joint (6) being hinged to the base (5) and to a tie rod (7) slidably connected to the base (5), the tie rod (7) being associated with a tension spring (8) equipped with a first end (8A) connected to the base (5), **characterized in that** a second end (8B) of the spring (8) is constrained to an intermediate element (9) hinged to the tie rod (7), the intermediate element (9) having at least one surface (10) which cooperates, at least for some positions of the joint (6), with a first cam (13) of the base (5) to improve the closing position of the leaf (3).

2. Household appliance according to the preceding claim, wherein the tie rod (7) is slidably connected to the base (5) by means of at least a first pin (11) which protrudes from the tie rod (7) and is slidably engaged in first slots (12) of the base (5).

3. Household appliance according to claim 2, wherein the intermediate element (9) and the tie rod (7) are hinged to each other at said first pin (11).

4. Household appliance according to claim 1, wherein the surface (10) of the intermediate element (9) which cooperates with said first cam (13) comprises a first roller (10A).

5. Household appliance according to claim 1, wherein the point (A) of connection between the second end of the spring (8B) and the intermediate element (9), the surface (10) of the intermediate element (9) and said first pin (11) are in spaced positions and are arranged in side view at the vertices of a triangle where the segment connecting the surface (10) and point (A) forms the major base of the triangle.

6. Household appliance according to claim 1, wherein the tie rod (7) comprises a shock absorber (14), the shock absorber comprising a stem (14A) equipped with an end (14B) which cooperates with a shaped surface (6A) of the joint (6) to brake a closing and/or opening movement of the door (3), the shock absorber being fixed to the tie rod (7) preferably by means of at least two fixing pins (P) and/or through at least one window (7A) of the tie rod (7) in which it is engaged in undercut.

7. Household appliance according to the previous claim, wherein the end (14B) of the stem which cooperates with the shaped surface (6A) of the joint

comprises a second roller (15).

8. Household appliance according to the preceding claim, wherein the second roller (15) is associated with the stem (14A) by means of a fork element.

9. Household appliance according to claim 8, wherein a second pin (18) is the axis of the second roller (15) and protrudes from the tie rod (7), the second pin (18) being engaged in second slots (20) of the base (5) or cooperating with retainers (21) made on the base (5).

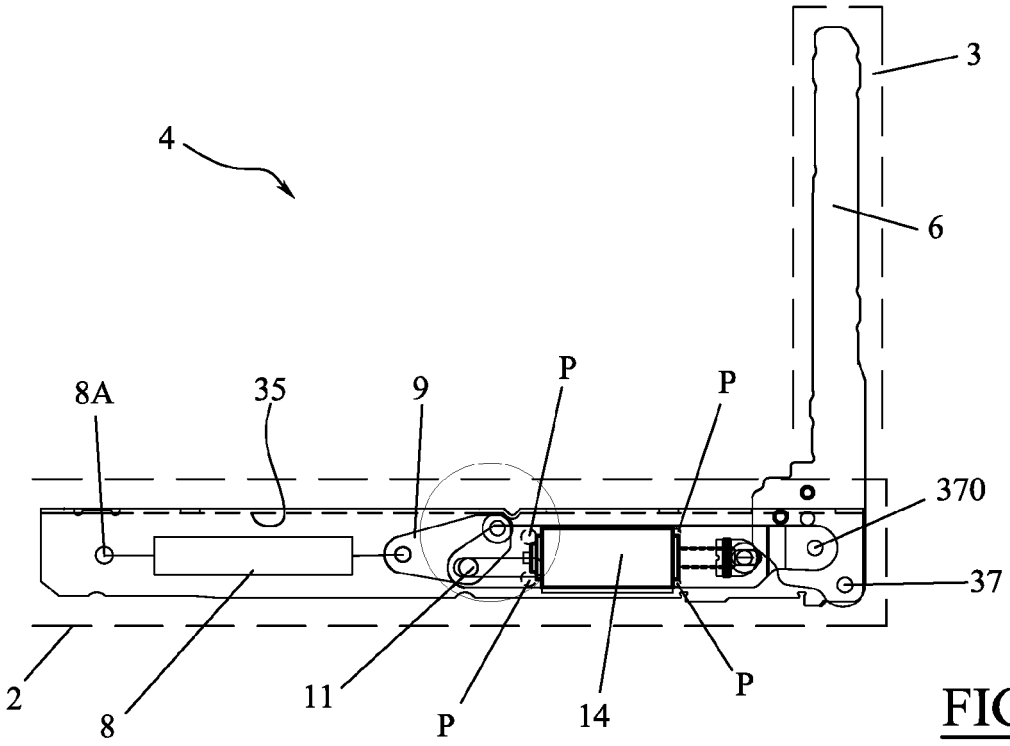
4
3
6
8A
35
9
P
P
370
37
2
8
11
P
14
P

FIG.1

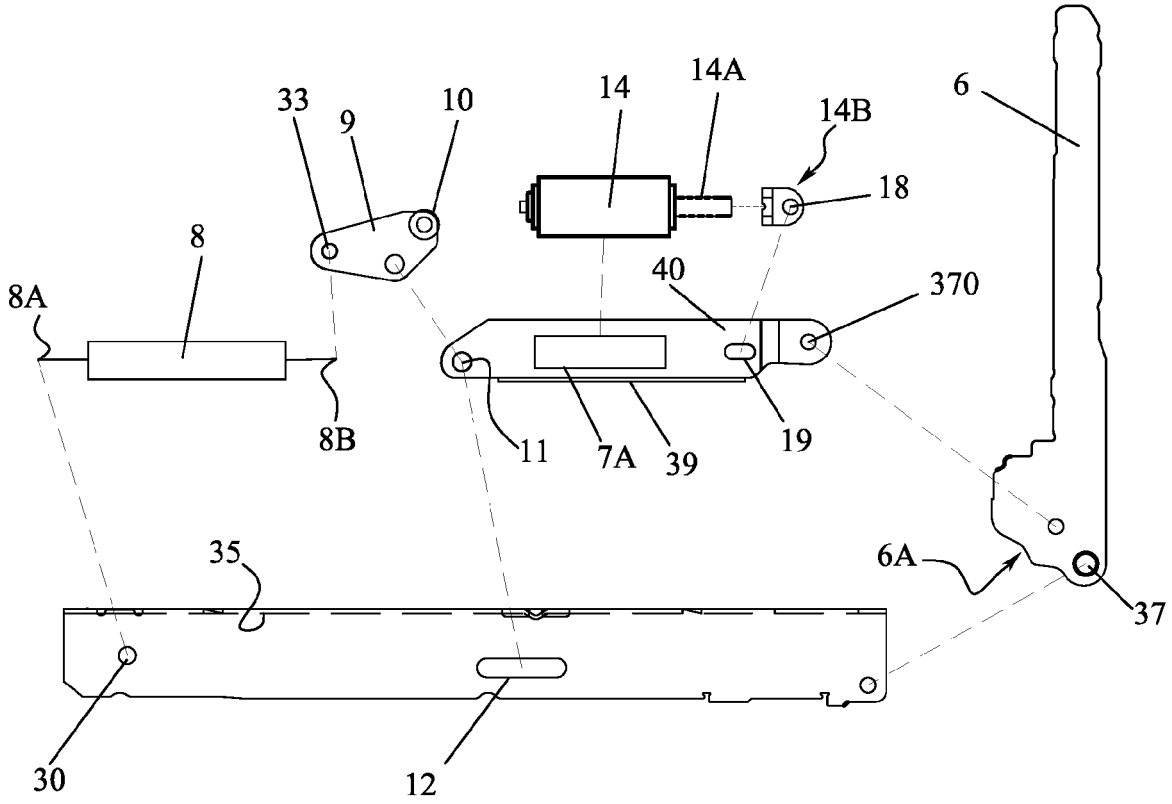
33
9
10
14
14A
14B
18
6
8
8A
40
370
8B
11
7A
39
19
35
6A
37
30
12

FIG.2

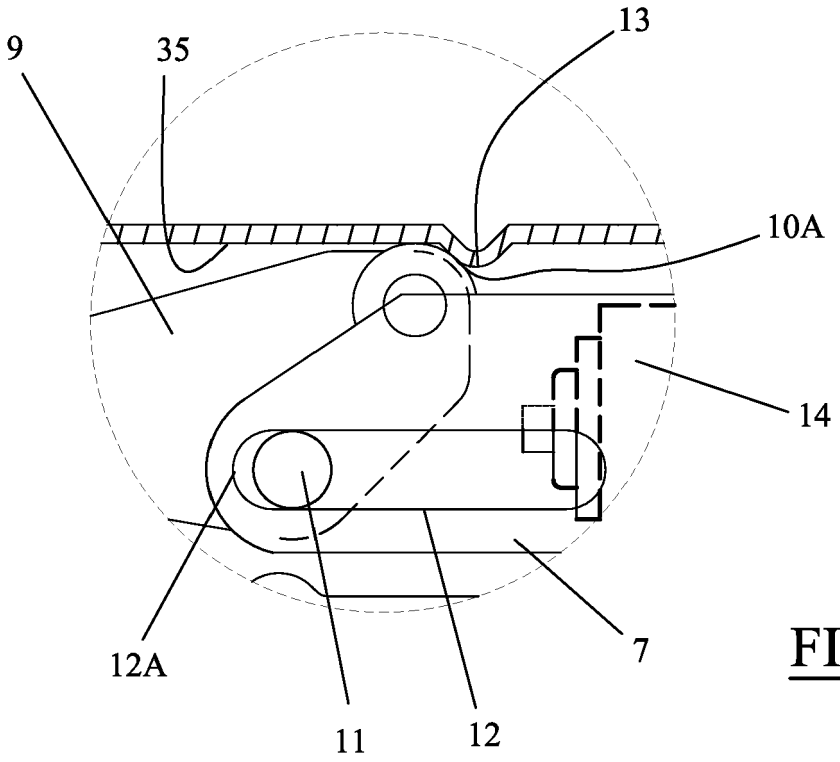

FIG.3

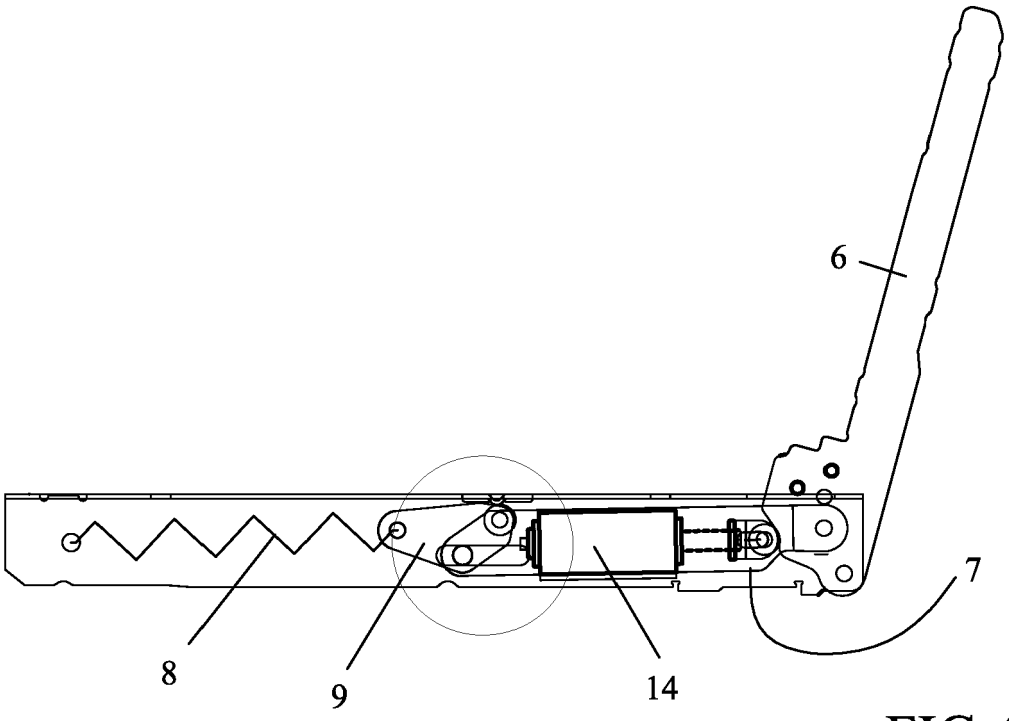

FIG.4

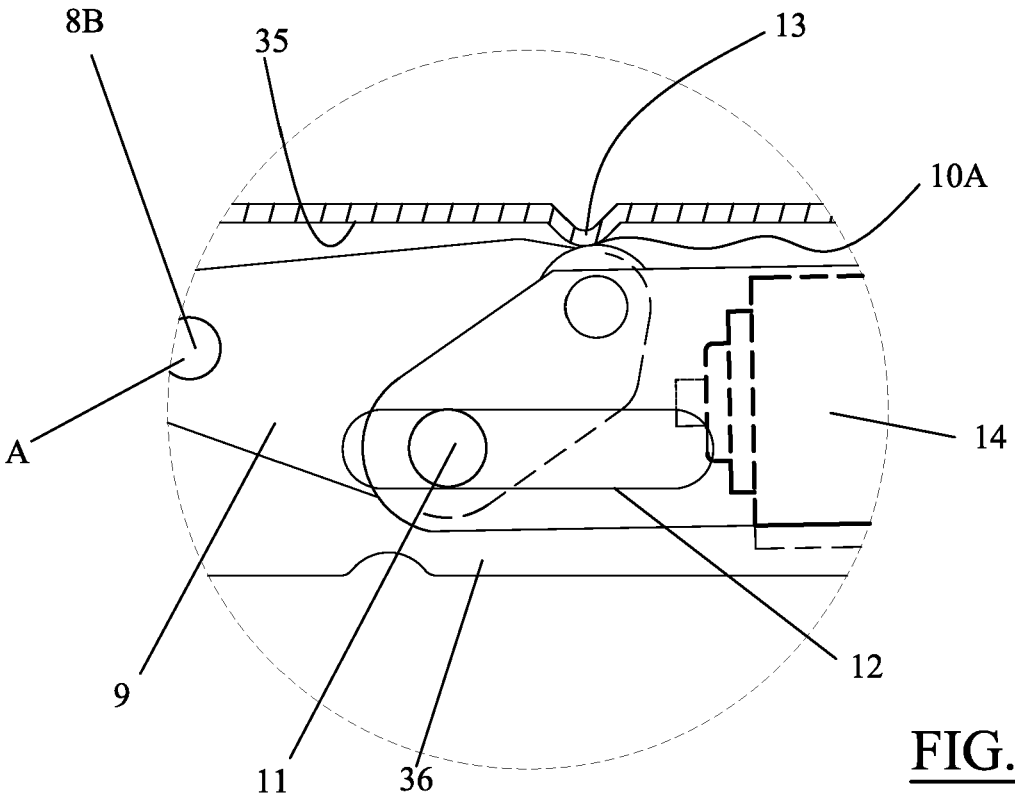

FIG.5

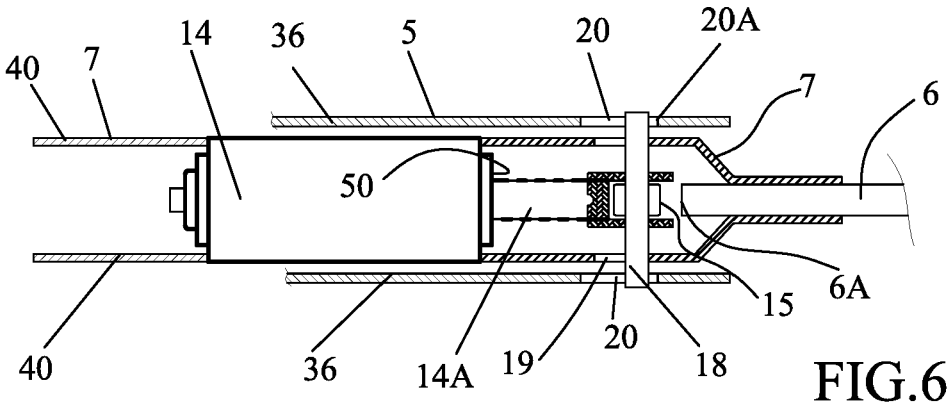

FIG.6

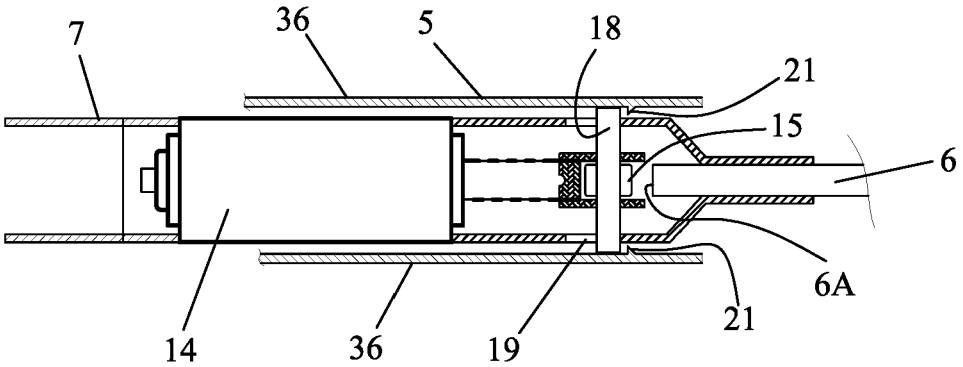

FIG.7

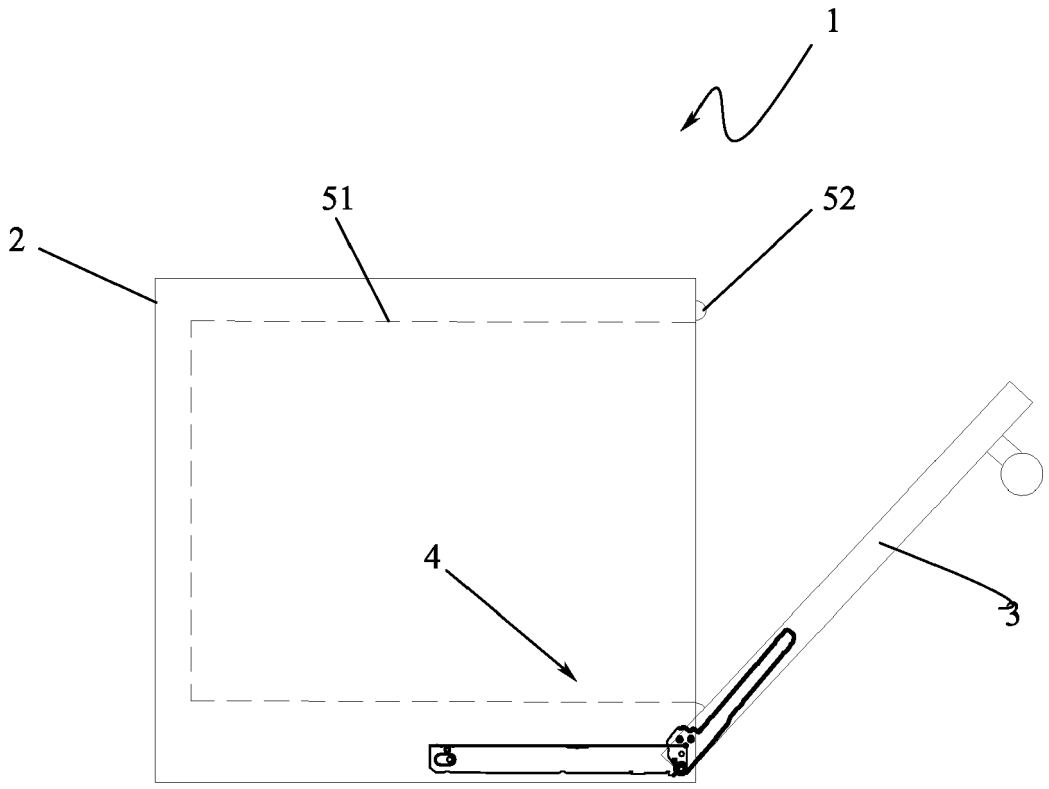

FIG.8

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 7345

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 302 150 A1 (CMI SRL [IT]) 16 April 2003 (2003-04-16) * paragraphs [0012] - [0029]; figures 1, 2 * -----	1-9	INV. E05F1/12
A	CN 108 360 937 A (JIANGSU XINGHUI PRECISION TECH CO LTD) 3 August 2018 (2018-08-03) * figures 1-10 * -----	1-9	
A	US 2015/152675 A1 (VANINI MARCO [IT]) 4 June 2015 (2015-06-04) * paragraphs [0020] - [0054]; figures 1-5 * -----	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 June 2021	Klemke, Beate

CATEGORY OF CITED DOCUMENTS

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09-06-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1302150 A1	16-04-2003	EP 1302150 A1	16-04-2003
		ES 2335973 T3	07-04-2010
		IT BO20010620 A1	10-04-2003
CN 108360937 A	03-08-2018	NONE	
US 2015152675 A1	04-06-2015	NONE	

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