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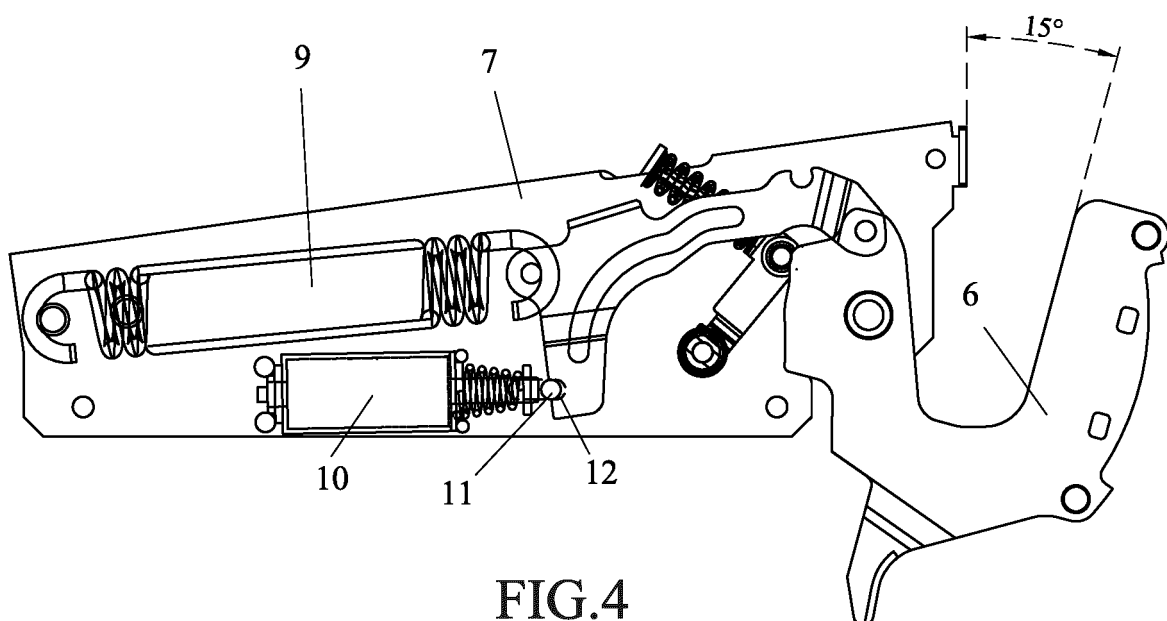
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20145 Milano (IT)(54) **HOUSEHOLD APPLIANCE**

(57) A household appliance (1) having at least one door (3) which comprises a guide element (30) sliding within a first guide (31) constrained to a structure (3A) of the household appliance (1), the door comprising a second guide (32) inside which a joint (6) of a first hinge (5) is slidingly engaged, the first hinge (5) comprising a frame (7) fixed to the structure (3A) of the household appliance,

the joint (6) and the frame (7) being reciprocally hinged at a first point (A), the joint (6) being also hinged at a second point (B) - other than the first point (A) - to a tie rod (8) to which a load is applied by an elastic element (9) constrained to the frame (7), the hinge (5) comprising a damper (10) configured to brake the door motion of the door when the door (3) is nearing the closed position.

**FIG. 4****EP 3 722 675 A1**

Description

FIELD OF THE INVENTION

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

[0002] In particular, it refers to an oven which features a door which, when open, is partly hidden within a housing located in the lower part of the oven.

BACKGROUND ART

[0003] The doors of traditional household appliances open by rotating around a hinging axis which may be either horizontal or vertical.

[0004] In the open position, therefore, the said doors extend outwards from the front of the appliance and require the user to reach forwards in order to, for example, access the heating compartment of an oven or a compartment of another appliance, thereby limiting accessibility thereto.

[0005] EP2574712A1 discloses a hinge according to the prior art.

SUMMARY OF THE INVENTION

[0006] The object of the present invention is to provide a household device which is improved compared with the known art.

[0007] This and other objects are achieved by means of a household appliance produced according to the technical teachings of the claims appended hereto.

BRIEF DESCRIPTION OF THE FIGURES

[0008] Further characteristics and advantages of the invention 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 an exploded side view of a hinge which is applicable to a household appliance according to the present invention;

Figure 1A is a simplified bottom-up view of the hinge in Figure 1 when assembled;

Figure 2 shows - laterally, schematically, and with some parts removed for simplicity - the hinge in Figure 1 when supporting a door (not shown) in the closed position;

Figure 3 shows - laterally, schematically, and with some parts removed for simplicity - the hinge in Figure 1 when supporting a door (not shown) in a nearly closed position, i.e. when the door is open by approximately 7°;

Figure 4 shows - laterally, schematically, and with some parts removed for simplicity - the hinge in Figure 1 when supporting a door (not shown) which is open by approximately 13°;

Figure 5 shows - laterally, schematically, and with some parts removed for simplicity - the hinge in Figure 1 when supporting a door (not shown) in the fully open position;

Figure 6 is a simplified side view of a household appliance, in particular of an oven, with the door closed;

Figure 7 shows the household appliance in Figure 6 with the door almost fully open;

Figure 8 shows the household appliance in figure 6, when the door is fully open and slid inside the structure of the household appliance, so as to be almost entirely concealed.

DETAILED DESCRIPTION OF THE INVENTION

[0009] With reference to the figures stated, reference number 1 is used to denote, as a whole, a household appliance.

[0010] The household appliance is only shown schematically in Figure 6, but essentially the said appliance includes a structure 3A that supports all the parts of the said appliance which are useful for the operation thereof.

[0011] More specifically, the appliance in Figure 6 may be an oven equipped with a concealed hatch or door.

[0012] The door 3 comprises a guide element 30, which may be a pin, for example, or a pin onto which a rotating roller is mounted, which slides within a first guide 31 connected to the structure 3A of the household appliance 1.

[0013] The door 3A also includes a second guide 32 inside which a joint 6 of a first hinge 5 is slidingly engaged.

[0014] For example, the joint 6 is engaged in the second guide 32 by means of at least one, but preferably two, wheels 33 which are rotatably constrained to the said joint 6.

[0015] In Figures 6 to 8, the household appliance is shown (schematically only) from a side view, therefore only one side of the door is visible. However, the other side of the door may feature similar structures to those described above and an additional hinge 5 which is either identical or very similar to the hinge which will be described in detail here.

[0016] The first hinge 5 comprises a frame 7 fixed to the structure 3A of the household appliance in a conventional manner.

[0017] The frame may be made from a single piece of shaped U-folded sheet metal. The mutually facing portions of the frame (shoulders) may be kept at a safe distance from the rivets 90.

[0018] Reinforcement bends 80 may be made in the

frame to suitably strengthen the structure.

[0019] The pins P1, P4, P5 - for linking the various parts of the hinge that will be described shortly - may also perform the double function of linking the various parts of the hinge and, at the same time, acting as spacers. These pins may be riveted or secured in another way.

[0020] The joint 6 and the frame 7, for example, are mutually hinged at a first point A, by a pin P1.

[0021] The joint 6 is also hinged by a pin P2 in a second point B which may be distant from the first point A, to a tie rod 8 to which a load is applied by an elastic element 9 secured to the frame 7.

[0022] In the example, the elastic element 9 is a tension spring. The hinging point D between the tie rod 8 and the spring is simply a pin P3 of the tie rod, to which one hook of the spring is fitted.

[0023] Advantageously, the tie rod 8 is made by U-folding metal sheet, which can also provide reinforcement folds 90. The pins P2 and P3 can also act as spacers to maintain the shape of the tie rod.

[0024] The U-folded configuration of the tie-rod also enables easy hinging at the joint 6 by means of the pin P2. Indeed, the shoulders of the tie rod are fitted onto the joint and the pin P2 is beaten into the holes of the tie rod so that the latter goes through the hole in the joint 6 at which the hinging B occurs.

[0025] The U-folded shape of the tie rod 8 also defines a compartment which houses at least some parts of the joint 6 when the said joint is in predetermined angular positions (see, for example, Figure 5) and advantageously houses the arm 16 which supports the roller 14 (which will be described later).

[0026] The spring 9 may be hooked onto a third point C of the frame, for example formed of a pin P4. Also in this case, a spring hook is simply fastened onto the pin P4.

[0027] As can be seen in Figure 1, the hinge 5 also includes a damper 10 configured so as to brake the door at least when the said door 3 is nearing the closed position.

[0028] The damper is, for example, of the hydraulic type, with a reset spring.

[0029] The damper 10 may be fastened onto the frame 7 and may cooperate with the tie rod 8 so as to brake the door 3, when nearing the closed position.

[0030] For example a body 10B of the damper 10 may be permanently fixed to the frame by means of rivets 90.

[0031] In this configuration, the damper 10 has a movable stem 10A which may cooperate with a movable pin 11, which is slidably engaged within a first slot 12 in the frame 7.

[0032] The first slot 12 may have a longitudinal axis L which is parallel or overlaying (or coincident, at least from a side view) with the axis of the movable stem 10A.

[0033] The tie rod 8 comprises a cradle portion 8A configured to partially engage (and house) the movable pin 11, when the door is in the braking stage.

[0034] The cradle portion 8A may have a semi-circular

configuration.

[0035] The cradle portion 8A may be positioned on the tie rod 8 in a position which is offset from the axis, which connects the said second point B and the said third point C.

[0036] Advantageously, the tie-rod therefore features an L-shape (from a side view).

[0037] To maintain a firm closed position (it is often useful for the door to be 'forced' into the closed position, for example to compress any seals), the joint 6 may feature a cam surface 6A to which a roller 14 applies a load by means of an additional spring 15.

[0038] Therefore, the cam 6A and the roller 14 cooperate to apply a load to the door 3 when the latter is in the closed position.

[0039] The additional spring 15 extends between the frame 7 (or suitably folded a part thereof) and the roller 14.

[0040] For example, the roller 14 may be positioned on an arm 16 hinged to the frame 7 at a fourth point 19. In this case, the arm, the roller, and the spring form a complex called the 'pendulum'.

[0041] The additional spring therefore applies a load to the arm and consequently the roller, pushing the latter against the cam of the joint.

[0042] It must be said that the roller may be in contact with the cam only at certain hinge positions, namely those which are near the position in which the hatch or door 3 is closed.

[0043] The operation of the invention is apparent from the description above and is essentially as follows.

[0044] Preliminarily it should be noted that in Figure 1, dashed lines are used to show how the hinge is assembled.

[0045] Furthermore, all the figures from 2 to 5 are extremely simplified and show the hinge with a part (a shoulder) of the frame 7 removed so as to show the reciprocal positions of the various parts of the hinge when the joint assumes different angles.

[0046] Figure 5 shows the hinge 5 in the fully open position, i.e. with the joint at a 90° angle (door open in Figure 8). It should be noted that the tie rod cradle 8A is far away from the first pin 11, which is slidably housed in the slot 12. In this configuration, the pin 11 may be free to slide in the slot and not pressed by the damper rod.

[0047] A rotation of the joint 6 in a closing direction brings the hinge (and therefore the door 3) into the condition shown in Figure 4. This is the configuration immediately prior to the intervention of the damper, during the closing motion of the said door 3.

[0048] Indeed, it can be seen that the cradle 8A is resting on the pin 11 and begins to push the latter towards the stem 10A of the damper, which however is not yet in contact with the first pin 11.

[0049] A further joint 6 closing movement, brought about by the spring 9 applying load to the tie rod 8, pushes the pin 11 into contact with the damper, which then starts intervening to brake the closing motion of the door.

[0050] Figure 3 shows the damper 10 in approximately

mid-stroke. In this configuration, the braking imposed on the joint 6 (and therefore on the door 3) is very intense.

[0051] The closing motion continues until the position in Figure 2 is reached. In these conditions the pin 11 is at the stroke limit inside the slot 12.

[0052] It should be noted that, in the passage from Figure 4 to Figure 3 and subsequently to Figure 2 (therefore during the closing motion), the roller 14 runs over a ridge on the cam 6A and thus pushes the joint - and therefore the door 3 - into the closed position.

[0053] This is, for example, to compress any seals which may be present in the household appliance (think for example of those of the door of an oven, or of a dishwasher).

[0054] It should be noted that, when the door 3 is in the opening stage, the joint moves away from the first pin 11, and the damper 10 can rearm itself.

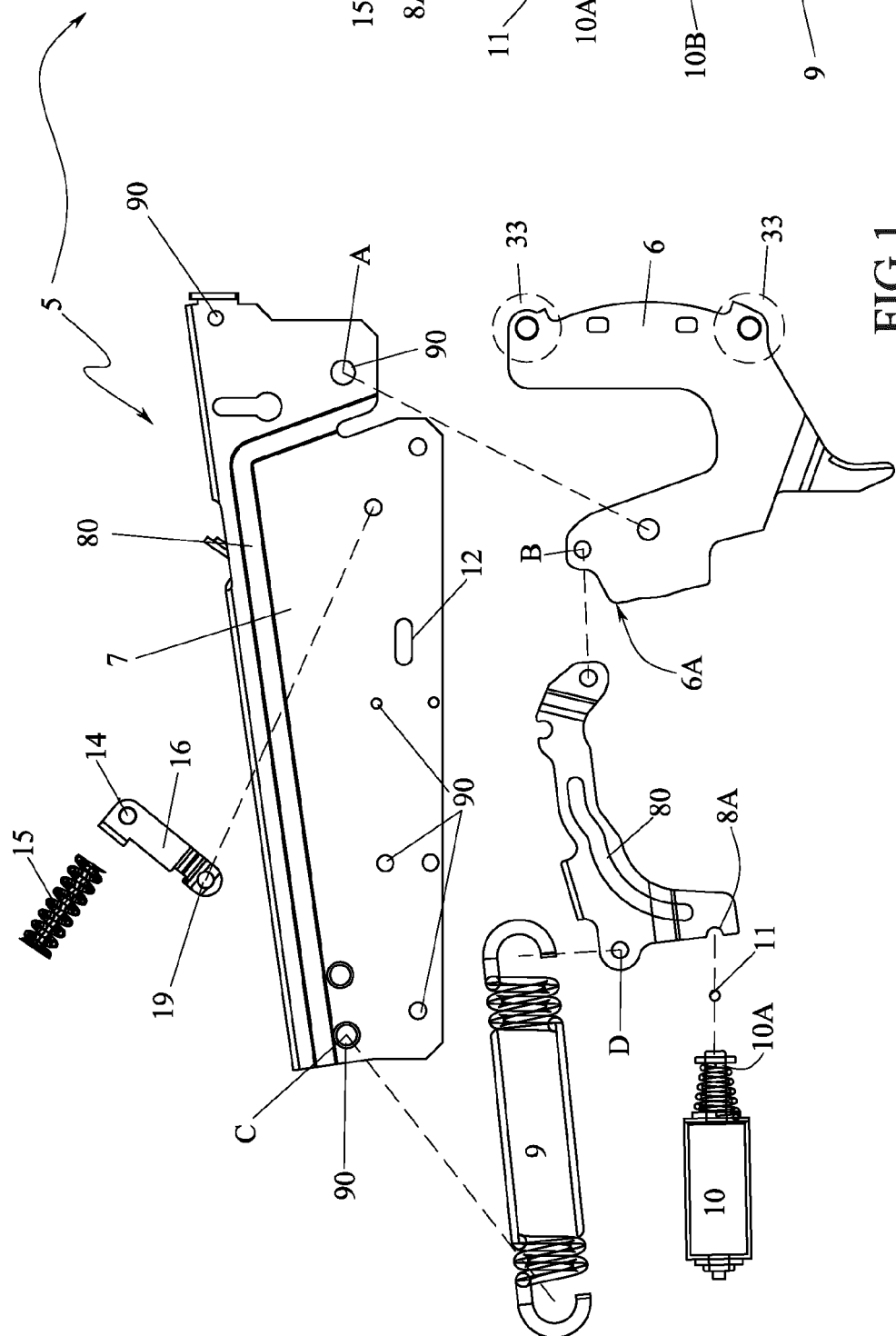
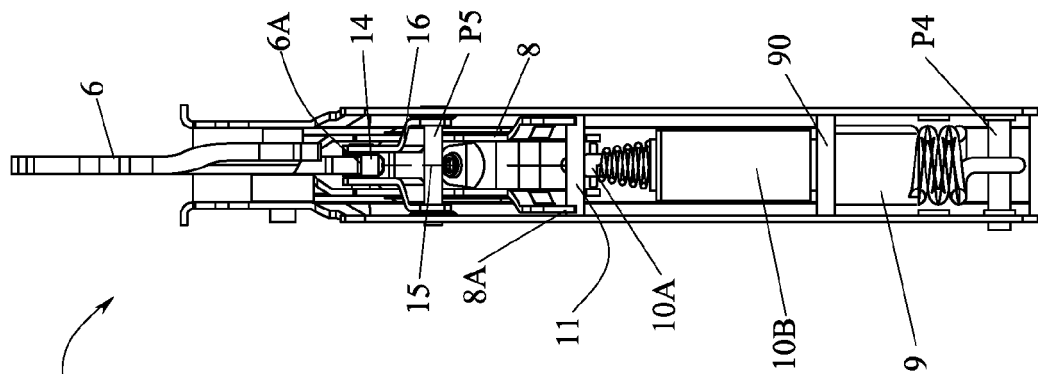
[0055] Various embodiments of the innovation have been disclosed herein, but further embodiments may also be conceived using the same innovative concept.

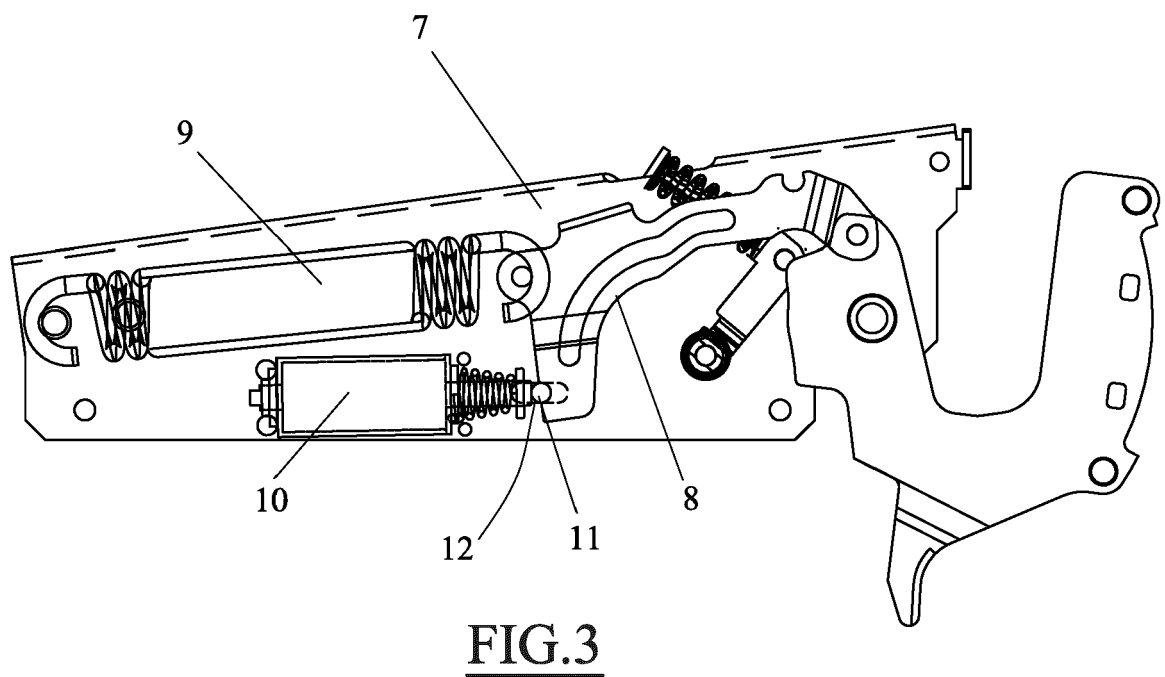
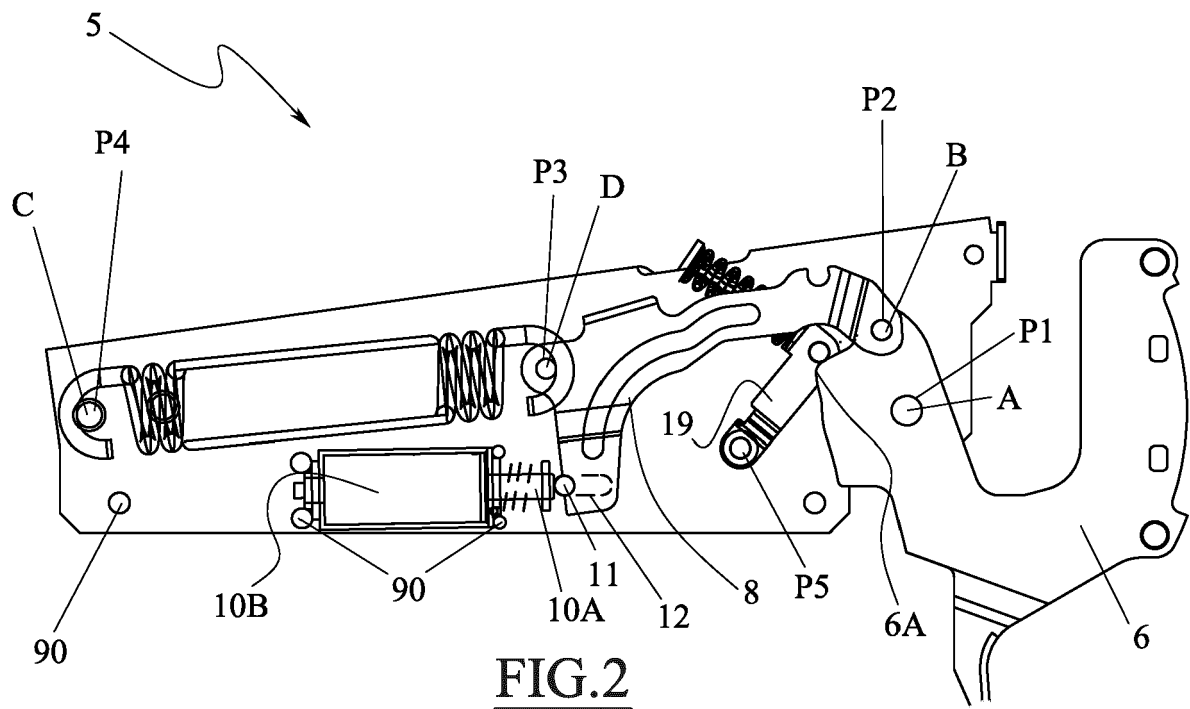
Claims

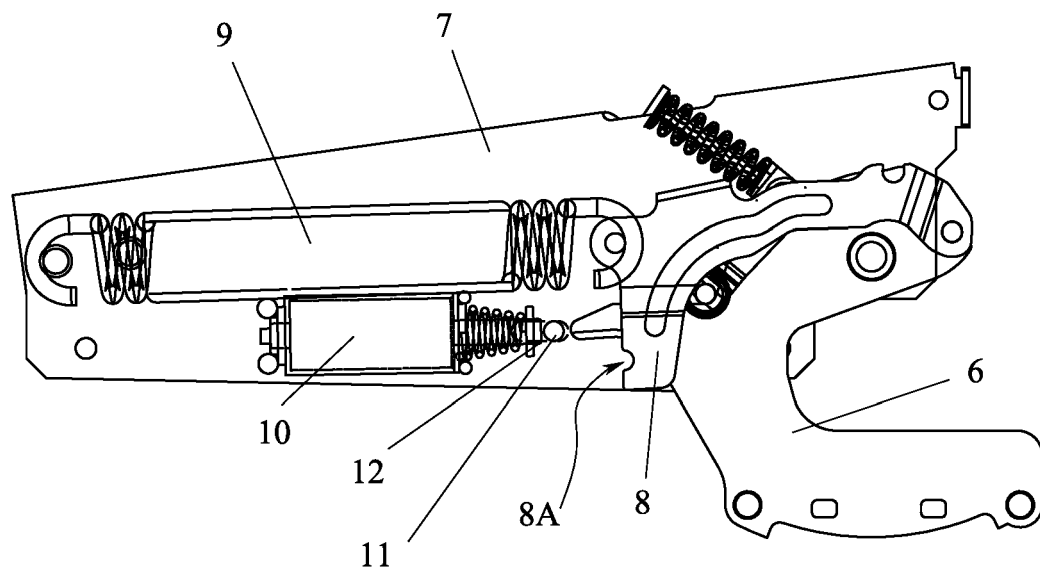
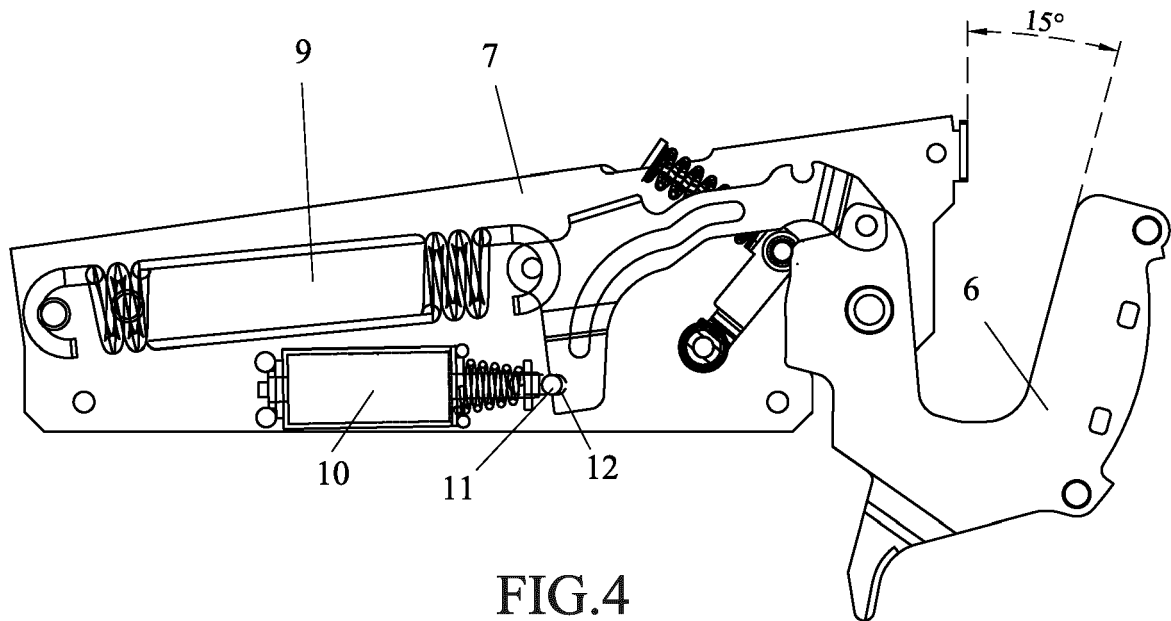
1. Household appliance (1) having at least one door (3) which comprises a guide element (30) sliding in a first guide (31) constrained to a structure (3A) of the household appliance (1), the door comprising a second guide (32) inside which a joint (6) of a first hinge (5) is slidably engaged, the first hinge (5) comprising a frame (7) fixed to the structure (3A) of the household appliance, the joint (6) and the frame (7) being reciprocally hinged at a first point (A), the joint (6) being also hinged at a second point (B) different from the first point (A) to a tie rod (8) loaded by an elastic element (9) constrained to the frame (7), the hinge (5) comprising a damper (10) configured to brake the door at least near a closed position of the door (3) itself, **characterized in that** the damper (10) is fixed to the frame (7) and cooperates with the tie rod (8) to brake the door (3), the damper (10) having a movable stem (10A) which cooperates with a first pin (11) slidably engaged in a first slot (12) of the frame (7).
2. Household appliance according to claim 1, wherein said first slot (12) is provided with a longitudinal axis (L) parallel or coincident to the axis of the movable stem (10A).
3. Household appliance according to claim 1, wherein the joint (6) is engaged in the second guide (32) by means of at least one, preferably two, wheels (33) rotatably connected to the joint (6).
4. Household appliance according to claim 1, wherein the elastic element is a spring (9), preferably a traction spring, hooked to a third point (C) of the frame,

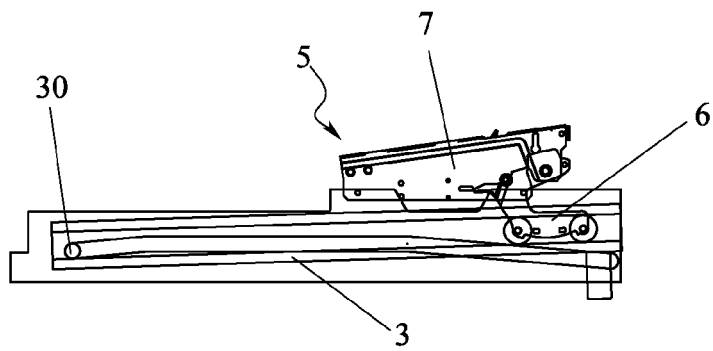
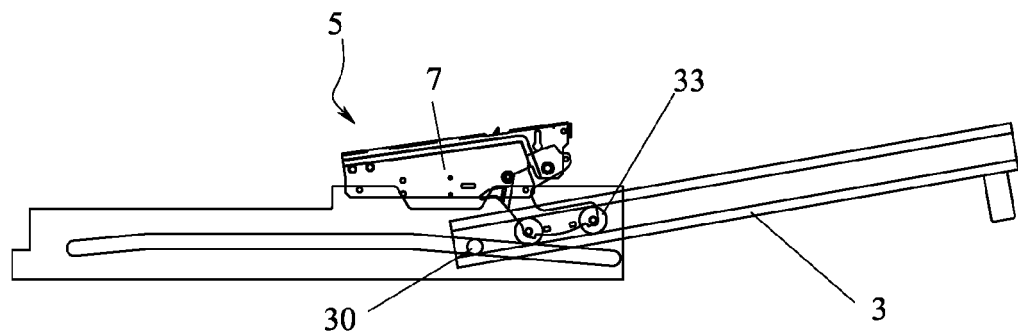
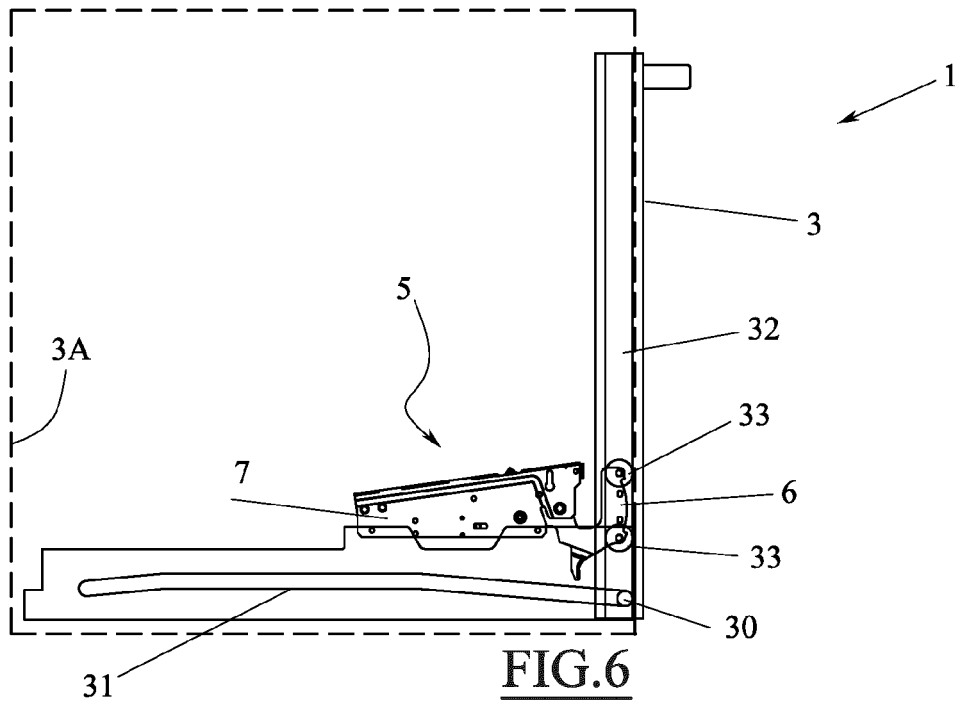
the spring and the tie rod being mutually constrained in a fourth point (D).

5. Household appliance according to claim 1, wherein the tie rod (8) comprises a cradle portion (8A) configured to engage and partially accommodate the first pin (11), when the door is in the braking phase.
6. Household appliance according to claim 5, wherein the cradle (8A) is provided on the tie rod in a position that is offset with respect to the axis that joins the second point (B) and the said third point (C).
7. Household appliance according to claim 1, wherein the joint (6) has a cam surface (6A) on which slides a roller (14) loaded by a further spring (15), the cam (6A) and the roller (14) cooperating to load the door (3) in the closed position.
8. Household appliance according to the preceding claim, wherein the roller is positioned on an arm (16) hinged in a fourth point (19) to the frame (7).
9. Household appliance according to one or more of the preceding claims, wherein the tie rod (8) is folded in a U-shape so as to form a space which allows to house at least a part of the joint (6) when it is in predetermined angular positions, and optionally so as to house the arm (16).











EUROPEAN SEARCH REPORT

Application Number
EP 20 16 8893

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Place of search The Hague		Date of completion of the search 28 August 2020	Examiner Jalal, Rashwan
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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