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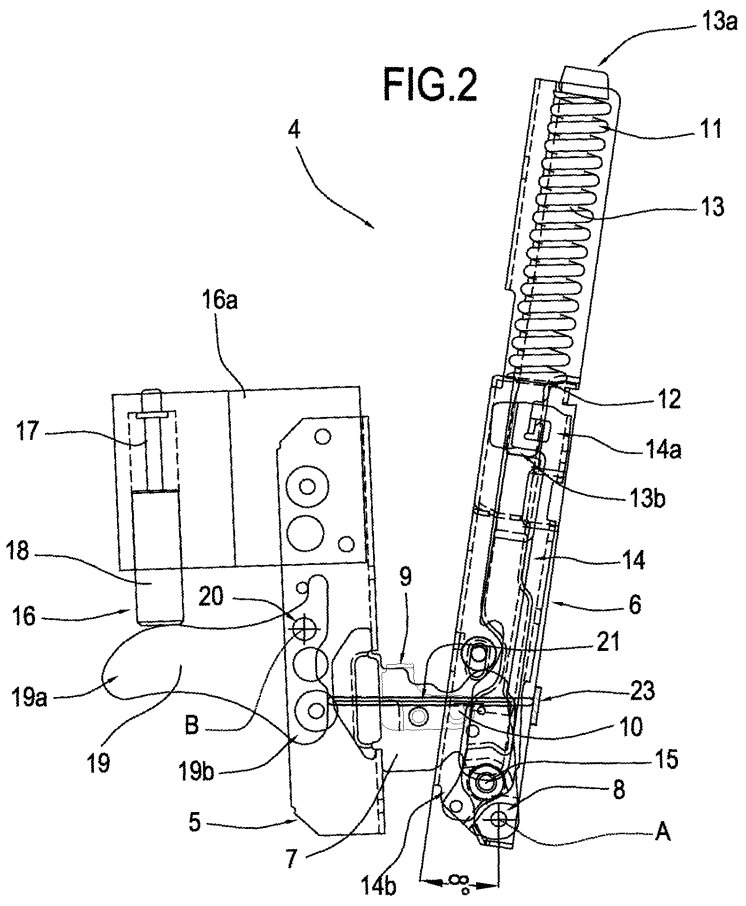
(54) **Improved hinge for wings or doors**

(57) The hinge for wings or doors, in particular for electrical household appliances, comprises a first box-shaped body (5), a second box-shaped body (6), a connecting element (7) between the box-shaped bodies (5, 6) and a damping cylinder (16) for applying a damping effect on the second box-shaped body (6) as the latter moves towards the first body (5).

FIG.2



EP 2 284 344 A2

Description

[0001] This invention relates to a hinge for wings or doors, and more specifically, a hinge used for connecting the doors of electrical household appliances, such as ovens, to the respective supporting frames.

[0002] This specification describes the present invention with reference to an oven purely by way of example and without limiting the scope of the inventive concept.

[0003] Hinges of this type normally consist of two separate parts kinematically linked to each other, either directly or through an interposed lever or the like.

[0004] In prior art ovens, the hinges usually comprise two separate elements which are kinematically linked to each other and both of which have a box-shaped structure. More specifically, one of the two box-shaped structures is fixed to the oven frame on one side of the oven access opening, while the other of the two box-shaped structures is fixed to one edge of the oven door in such a way that the door can be tilted relative to the frame.

[0005] Between the two box-shaped structures there is an operatively interposed connecting means, in the form of a lever element, which is pivoted to one of the two box-shaped structures, normally the one fixed stably to the door, and which has a first arm rigidly connected to the other of the two box-shaped structures. The second lever arm, which lies in the same plane as the first, is operated on by elastic elements which affect both the opening and closing movement of the door.

[0006] When the oven door is tilted away from the closed position, the elastic elements oppose, firstly, the movement which detaches the door from the oven mounting frame and, secondly, the subsequent rotational movement of the door and its consequent lowering to the position in which the access opening of the oven is fully open. During the second part of its opening movement, the door, under the combined action of its weight, which tends to pull it downwards, and of the elastic elements, which oppose this downward pulling action, is thus made to turn gradually.

[0007] When the oven door is tilted up from the fully open limit position, the action of the elastic elements is first balanced by the weight of the door, thus initially ensuring that it turns gradually towards the closed position. After that, however, if the user is not careful to slow the door down, the force of the elastic elements tends to push it forcefully towards the oven frame, causing it to slam shut, often rather suddenly and noisily.

[0008] To overcome this drawback, hinges with damping elements capable of at least partly slowing down the last part of the door's closing movement have been developed, also by the same applicant as this invention.

[0009] In prior art hinges of this type, the damping elements are driven by means that extend outside the hinge, forming protruding parts which, besides being decidedly unattractive and precisely because they protrude, constitute a potential danger to users of the appliance, be it an oven or other household appliance.

[0010] This invention has for an aim to provide a hinge for wings or doors which overcomes the above mentioned drawback and which is at once simple in structure and practical and effective in operation. The technical features of the invention according to the above mentioned aim may be easily inferred from the contents of the appended claims, especially claim 1, and preferably any of the claims that depend, either directly or indirectly, on claim 1.

[0011] 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 perspective view from above of an oven with a door connected to it by two hinges made in accordance with this invention;
- Figures 2 and 3 are side elevation views with some parts cut away for clarity and others transparent, illustrating a preferred embodiment of the hinge for wings or doors according to the invention in two different stages of operation;
- Figures 4 to 6 are perspective views showing details of the hinge illustrated in the drawings listed above.

[0012] 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 tilting fashion about a horizontal axis A. Figures 2 and 3 illustrate in detail a preferred embodiment of a hinge 4 made according to this invention.

[0013] Each of the two hinges 4 comprises a first box-shaped body 5 fixed to the frame 2 of the oven 1 on one side of the latter's access opening, and a second box-shaped body 6 fixed to one edge of the door 3, not illustrated in Figures 2 and 3.

[0014] The box-shaped bodies 5 and 6 are both elongate in shape and are kinematically linked to each other by a connecting element 7 also forming part of the hinge 4. The connecting element 7 is pivoted on the second box-shaped body 6 by means of a pin 8 and has a portion rigidly fastened to the first body 5 to make the door 3 movable in tilting fashion relative to the frame 2 between a closed limit position, illustrated in Figure 3, and an open limit position not illustrated in detail but schematically represented in Figure 1. The representation of the partly open positions of the door 3 and of the hinge 4, as for example in the configuration illustrated in Figure 2, is useful to the understanding of this invention.

[0015] A clevis 9 for fastening the connecting element 7 to the first box-shaped body 5 is pivoted on the element 7 by a respective pin 10.

[0016] The hinge 4 also comprises a helical spring 11 supported by the second box-shaped body 6, said spring 11 abutting with a lower end coil of it on a transversal wall 12 of the second body 6 itself. The spring 11 is held in abutment on the transversal wall 12 by the head 13a

of a rod 13 which is positioned coaxially inside the spring 11 and which forms a guide for the spring 11 itself. The rod 13 protrudes from the bottom of the spring 11 with one end of it 13b, which passes through an opening made in the transversal wall 12 to engage a first longitudinal end 14a of a tie rod 14, whose second longitudinal end 14b is hinged to the connecting element 7 by a pin 15 located near the above mentioned pin 8.

[0017] The relative position between the pin 8 and the pin 15, where the elastic reaction of the spring 11 is applied, and the pre-compression of the spring 11 itself provide an elastic action which tend to continuously push the door 3 towards, and keep it in, the closed position.

[0018] As illustrated in Figures 2 and 4, the hinge 4 comprises a gas- or fluid-driven damping cylinder 16 mounted on a respective mounting plate 16a fixed in cantilever fashion to the first box-shaped body 5.

[0019] In the specific non-limiting embodiment illustrated in Figures 2 to 4, the cylinder 16 comprises a fixed stem 17 integral with the plate 16a, and a body 18 which is movable relative to the stem 17. The damping cylinder 16, whether of the gas- or fluid-driven type, is designed to apply a damping effect on the second box-shaped body 6 as the latter moves towards the first box-shaped body 5 when the door 3 passes from the open position to the closed position.

[0020] The hinge 4 comprises a rocker lever 19 pivoted on the box-shaped body 5 by a respective pin 20 to rotate about a pivot axis B perpendicular to the plane of Figures 2 and 3.

[0021] In the hinge 4, when assembled, the rocker lever 19 is positioned in the immediate vicinity of the connecting element 7 between the box-shaped bodies 5, 6.

[0022] On opposite sides of the above mentioned pin 20, the lever 19 has a first and a second arm, labelled 19a and 19b, respectively.

[0023] The first arm 19a of the lever 19 is designed to engage the damping cylinder 16 to compress the movable body 18 against the piston stem 17.

[0024] The lever 19 constitutes for the hinge 4 a respective means for actuating the damping cylinder 16.

[0025] As illustrated in Figures 2 and 3, the hinge 4 comprises a control element 21 for controlling the rocker lever 19, said control element 21 being adapted to engage the lever 19 in such a way as to cause it to rotate about its pivot axis B.

[0026] As illustrated in detail in Figure 5, the control element 21 has the shape of a rod.

[0027] With reference in particular to Figures 4 and 5, the control element 21 is slidably inserted in a through hole 22 made in the connecting element 7. The hole 22 forms a cavity which constitutes means for guiding the movement of the control element 21 and integrated in the connecting element 7.

[0028] With reference to Figures 2 and 3, the hinge 4 also has a plate 23 which is integral with the second box-shaped body 6 and which may be either applied to or integrated in the wall of the second box-shaped body 6, the plate 23 constituting means for pushing the control element 21.

[0029] As illustrated in Figures 5 and 6, the rod-shaped control element 21 has a flattened portion 21a, delimited at its longitudinal ends by two protuberances 24. These two protuberances 24 are designed to abut a pin that goes into a respective hole F and through the body of the connecting element 7 and also intercepts the hole 22 made in the body itself to house the element 21. Advantageously, said pin coincides with the pin 10 on which is pivoted the clevis 9 which locks the connecting element 7 to the box-shaped body 5.

[0030] The two protuberances 24 thus constitute, for the control element 21, two stops that limit its sliding movement inside the through hole 22.

[0031] The pin 10 therefore constitutes an element which interferes with the protuberances 24 of the control element 21.

[0032] The interfering element and the protuberances 24 form, in their entirety, retaining means for holding the control element 21 inside the cavity formed by the hole 22 made in the connecting element 7.

[0033] The retaining means are designed to allow the control element 21 a limited movement, whose maximum extension is determined by the distance between the two protuberances 24.

[0034] In use, starting from the fully open position of the door 3, not illustrated in the accompanying drawings, rotation of the door and of the second box-shaped body 6 as one with it about the axis A towards the closed position is facilitated by the elastic action of the spring 11 and is initially hindered by the weight of the door 3 itself.

[0035] As the door 3 continues in its closing movement, the second box-shaped body 6 of the hinge 4 reaches the position illustrated in Figure 6, where the control element 21, pushed by the plate 23 as one with the second box-shaped body 6, comes into contact with the second arm 19b of the rocker lever 19.

[0036] As the door 3 passes between the still partly open position illustrated in Figure 2 and the closed position illustrated in Figure 3, the damping cylinder 16, is compressed and consequently applies a damping action opposing the closing action applied by the spring 11, thereby slowing the door 3 in its movement towards the fully closed position.

[0037] More in detail, still with reference to Figures 2 and 3, the plate 23 of the second box-shaped body 6 pushes the rod-shaped element 21 and hence the second arm 19b of the lever 19, thereby imparting to the lever 19 a clockwise rotational motion about its pivot axis B. Said rotation of the lever 19 in turn causes its first arm 19a to push the movable body 18 against the fixed stem 17, in such a way as to compress the damping cylinder 16.

[0038] Thus, even if the user does not apply any slowing action to it, the door 3, pushed by the spring 11 towards the oven 1 frame 2, reaches the latter smoothly and silently thanks to the decelerating action applied by the damping cylinder 16 at the end of the closing move-

ment.

[0039] The positioning of the control element 21 at least partially inside the body of the connecting element 7, that is to say, in a position not in view and protected from shocks and dirt, makes the hinge 4 according to the invention especially advantageous in terms of appearance, user safety and operating reliability.

[0040] It should further be stressed that the damping cylinder 16 is also supported by the first box-shaped body 5 and is recessed in the frame 2 of the electrical household appliance, in a position not in view and protected from shocks and dirt. Its positioning therefore also contributes to making the hinge 4 in its entirety particularly advantageous in terms of appearance and operating reliability.

Claims

1. A hinge for wings or doors, in particular for electrical household appliances, comprising:

   - a first box-shaped body (5) attachable to a frame (2),
   - a second box-shaped body (6) attachable to a door (3),
   - a connecting element (7) between the box-shaped bodies (5, 6) for making the door (3) movable in tilting fashion relative to the frame (2) between a closed position and at least one open position,
   - a gas- or fluid-driven damping cylinder (16) supported by the first box-shaped body (5) for applying a damping effect on the second box-shaped body (6) as the latter moves towards the first box-shaped body (5) upon approaching the closed position,
   - a rocker lever (19) pivoted on the box-shaped body (5) to actuate the damping cylinder (16),
   - an element (21) for controlling the rocker lever (19), said control element (21) being designed to engage the lever (19) in such a way as to cause it to rotate about its pivot axis (B), **characterized in that** it comprises means for guiding the movement of the control element (21), said guide means being integrated in the connecting element (7).

2. The hinge according to claim 1, where the control element has the shape of a rod, **characterized in that** the guide means comprise a rectilinear cavity (22) made in the connecting element (7).

3. The hinge according to claim 2, **characterized in that** the cavity (22) comprises a hole through the connecting element (7).

4. The hinge according to claim 2 or 3, **characterized in that** it comprises retaining means for holding the control element (21) inside the respective cavity (22), said means being designed to allow the control element (21) itself a certain limited movement.

5. The hinge according to claim 4, **characterized in that** the retaining means comprise an element which interferes with at least one portion (24) of the control element (21).

6. The hinge according to claim 5, **characterized in that** the interfering element is a pin (10) that goes through a respective hole (F) made in the connecting element (7).

7. The hinge according to any of the claims from 1 to 6, **characterised in that** it comprises means for pushing the lever (19) control element (21).

8. The hinge according to claim 7, **characterized in that** the pushing means comprise a plate (23) which is integral with the second box-shaped element (6).

9. The hinge according to claim 8, **characterized in that** the plate (23) is formed in a wall of the second box-shaped element (6).

10. An electrical household appliance comprising at least one hinge (4) according to any of the foregoing claims from 1 to 9.

FIG.1

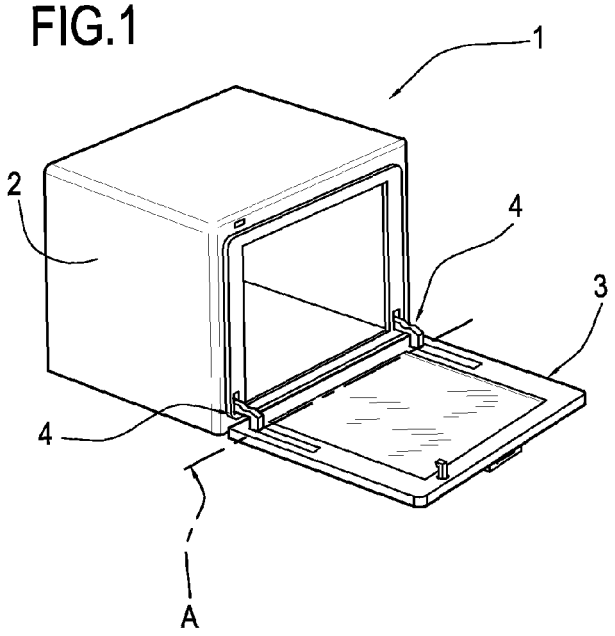


FIG.4

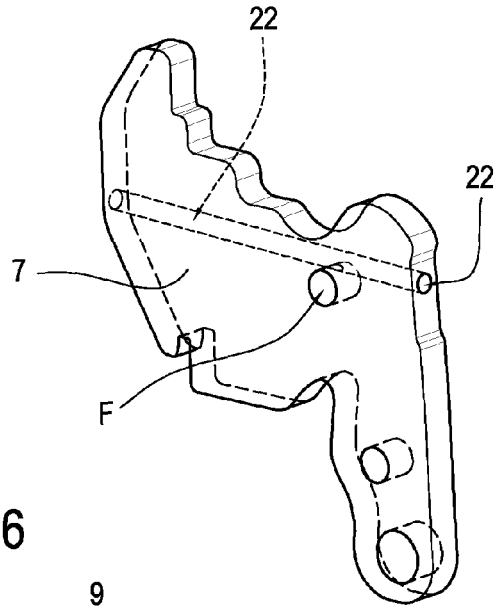


FIG.5

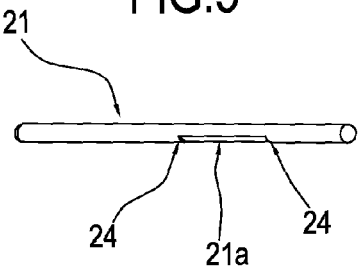


FIG.6

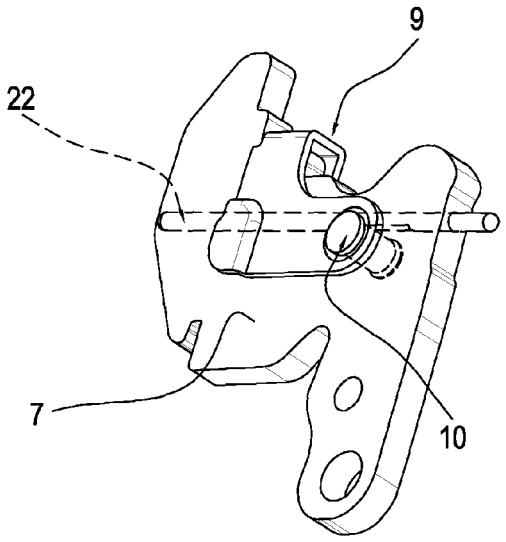


FIG.3

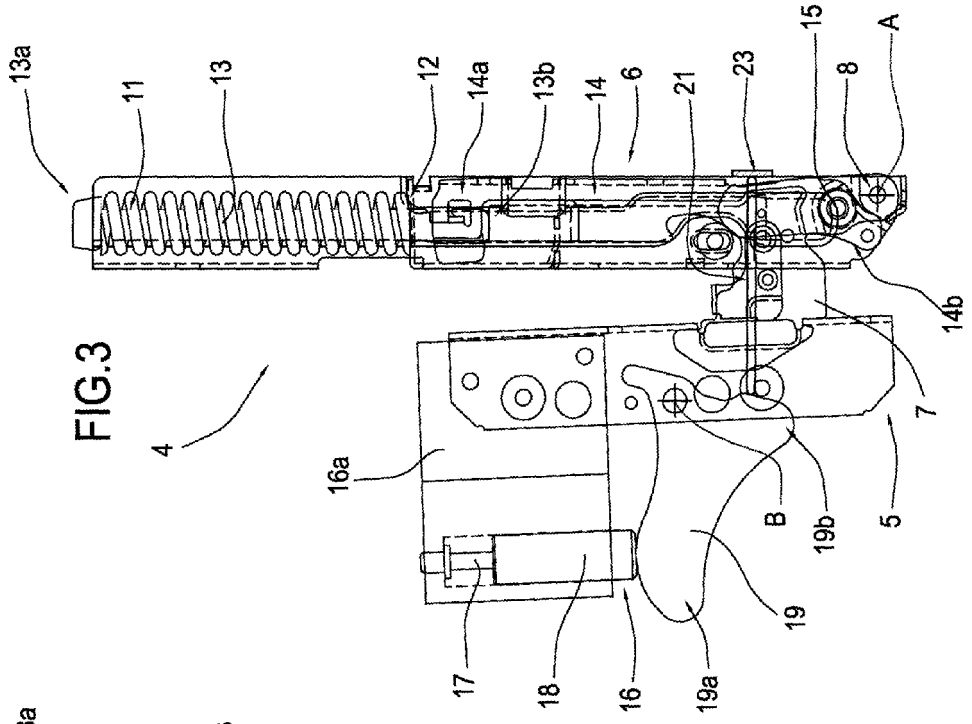

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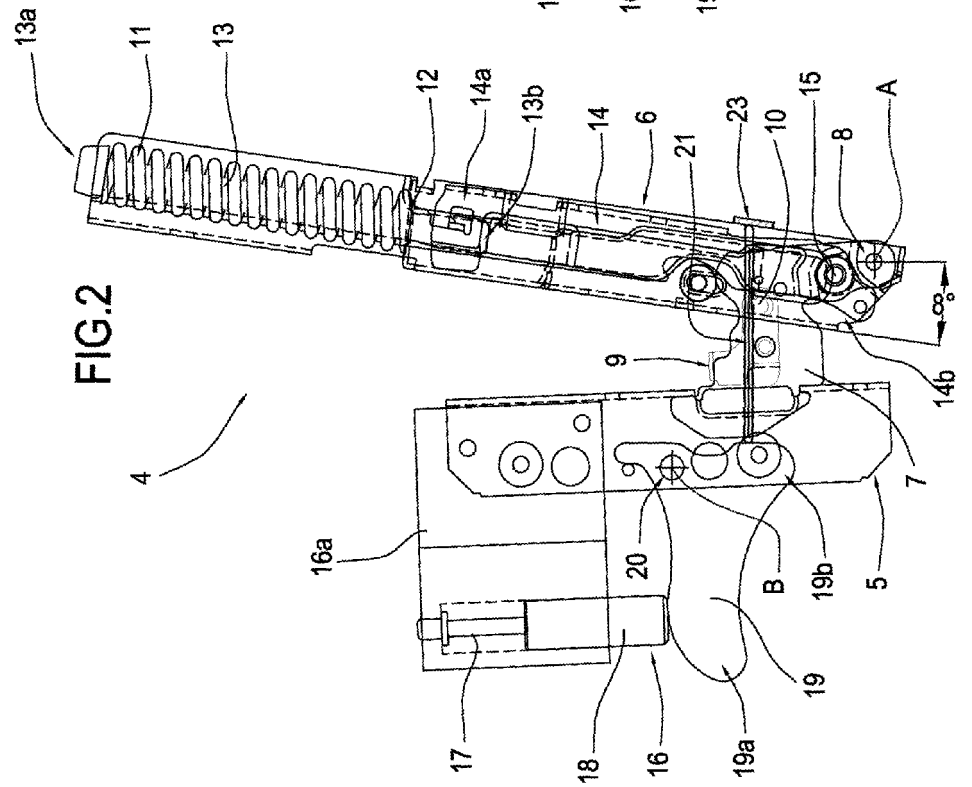
FIG.2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