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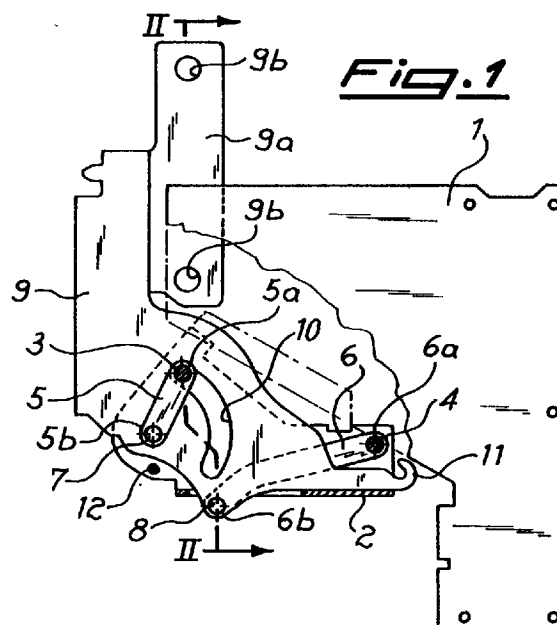
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(54) **Hinge with movable axis of rotation in particular for the panel-finished doors of built-in dish washing machines**

(57) Hinge with a movable axis of rotation, in particular for the panel-lined doors of built-in dish washing machines, comprising a fixed plate (1) attached to the dish washer and an arm (9) attached to the door thereof and rotating about a movable pin (7) attached to the free end (5b) of a first lever (5), the other end (5a) of which is hinged on a fixed pin (3) attached to the plate (1), there also being provided a second lever (6), the opposite ends of which are hinged, respectively, on a pin (8) attached to the arm (9) and on a fixed pin (4) attached to the plate (1), said combination being designed to make the pin (7) and hence the arm (9) carrying the dish-washer door follow a curved trajectory.



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Description

The present invention relates to a hinge with a movable axis of rotation, in particular for the panel-lined doors of built-in dish washing machines.

In the technological sector of electric household appliances it is known of the need to incorporate said appliances in the container-type furniture which furnishes a kitchen, in order to reduce the amount of space occupied and give the electric appliances themselves a particular aesthetic appearance.

More particularly it is also known how the doors of electric household appliances must be lined with a finishing panel which is the same as the panels forming the doors of the adjacent cabinets; the thickness of the said panel and the fact that it also extends beyond the bottom edge of the door of the electric appliance result in rotation of the door being substantially impeded since the bottom edge of the fitted panel, during rotation, strikes against the adjacent furniture or against the bottom trimming thereof.

It is also known of hinges in which rotation of the door occurs about a hinging axis which is able to perform a translatory movement during rotation so as to move the door away from the associated container during rotation and thus allow complete opening of the door itself.

The hinges of the known type, however, have complicated structures and dimensions such that they cannot be used in the specific sector of dish washing machines, which require particular and special arrangements of the constructional parts.

The technical problem which is posed, therefore, is that of providing a hinge for the doors of built-in dish washing machines, which is designed to allow total opening of the door even in the case where the latter is lined with an external finishing panel, thereby also ensuring that the bottom edge of the door always remains inside the body of the dish washer so that any dripping of residual water always occurs inside the machine itself.

Within the scope of this problem the need also arises to ensure that the last section of the closing path of the door is performed with a movement which keeps the edge of the door parallel to the closing edge of the machine compartment on the same level, so as to exert a uniform pressure on the front sealing gasket, attached to the said edge, so as to prevent greater wear in some zones compared to other zones with consequent leakage of water during washing.

These results are obtained by the present invention which provides a hinge with a movable axis of rotation, in particular for the panel-lined doors of built-in dish washing machines, comprising a fixed plate attached to the dish washer and an arm attached to the door thereof and rotating about a movable pin attached to the free end of a first lever, the other end of which is hinged on a fixed pin attached to the plate, there also being provided a second lever, the opposite ends of which are hinged,

respectively, on a pin attached to the arm and on a fixed pin attached to the plate, said combination being designed to make the pin and hence the arm (9) carrying the dish-washer door follow a curved trajectory.

Further details may be obtained from the following description, with reference to the accompanying drawings, in which:

Figure 1 shows a partially sectioned side view of the hinge according to the invention with the door in the closed position;

Figure 2 shows a schematic cross-sectional view of the hinge along the plane indicated by II-II in Figure 1;

Figure 3 shows a partially sectioned side view of the hinge according to the invention with the door in the semi-open position; and

Figure 4 shows a partially sectioned side view of the hinge according to the invention with the door in the totally open position.

As shown in Figures 1 and 2, the hinge according to the invention is composed of a plate 1 having a front shape substantially in the form of an "upturned L" on which an elongated seat 2 with a U-shaped cross-section is formed; two fixed pins 3 and 4 are attached to one arm 2a of said "U" and have respectively hinged on them the first ends 5a, 6a of two levers 5 and 6, the other ends 5b and 6b of which are respectively hinged on two additional pins 7 and 8 supported by a shaped arm 9, the upper part 9a of which has holes 9b for connection with the door of the dish washer.

Said shaped arm 9 has, internally, a curved recess 10 designed to allow rotation of the arm 9 itself about the fixed fulcrum 3.

The arm 9 has, moreover, a hook-shaped end extension 11 to which it is possible to fasten spring means, known per se and therefore not illustrated, which keep the door in equilibrium during the opening/closing rotational movement, thereby reducing the amount of force required by the user.

A pin 12 is moreover arranged transversely between the arms of the "U" in a predetermined position so as to cooperate with a seat 9c of the arm 9 and form an end-of-travel stop for the opening rotational movement of the arm 9 itself.

The hinge operates in the following manner:

During the opening phase (Figure 3), the arm 9 rotating about the pin 7 entrains in rotation with it also the lever 6 which, on account of its rigidity, rotating about its fixed fulcrum 4, obliges the arm 9 to move away outwards causing also outwards rotation of the lever 5 which, being pivotably mounted on the fixed pin 3, forces the pin 7 to follow a trajectory outwards and upwards, with consequent corresponding displacement of the arm 9 and the door (not shown) attached thereto.

Continuing the opening movement of the door, the lever 5 and the lever 6 reach the point where they are situated at the maximum distance from their fixed fulcrum; therefore, continuing the opening rotational movement of the arm 9, the lever 5 reverses the direction of rotation, returning downwards and allowing total opening of the arm 9 itself which, upon reaching the horizontal position, brings its seat 9c into abutment against the end-of-travel pin 12 and the hook-shaped extension 11 against a folded portion 11a of the plate 1 against which it stops; in this way the force required to support the door in the open position is distributed between the pin 12 and the folded portion 11a.

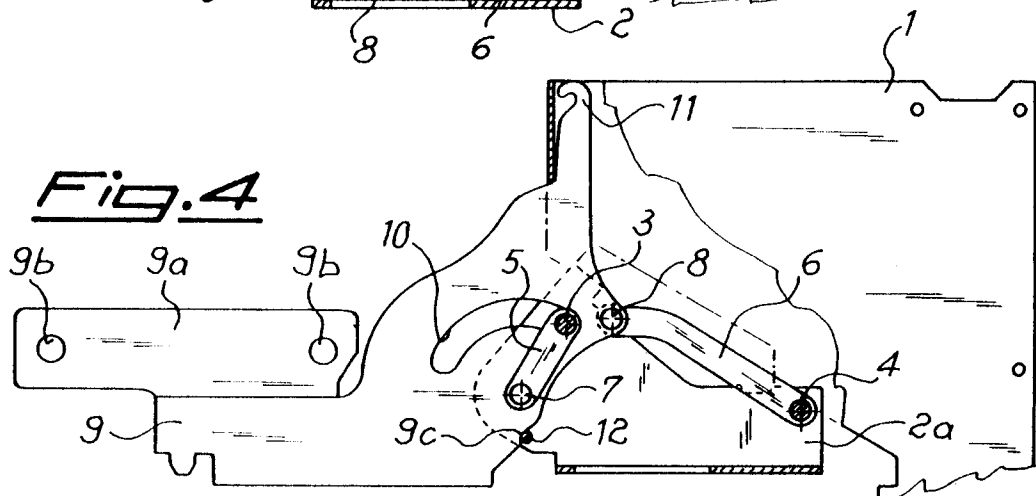
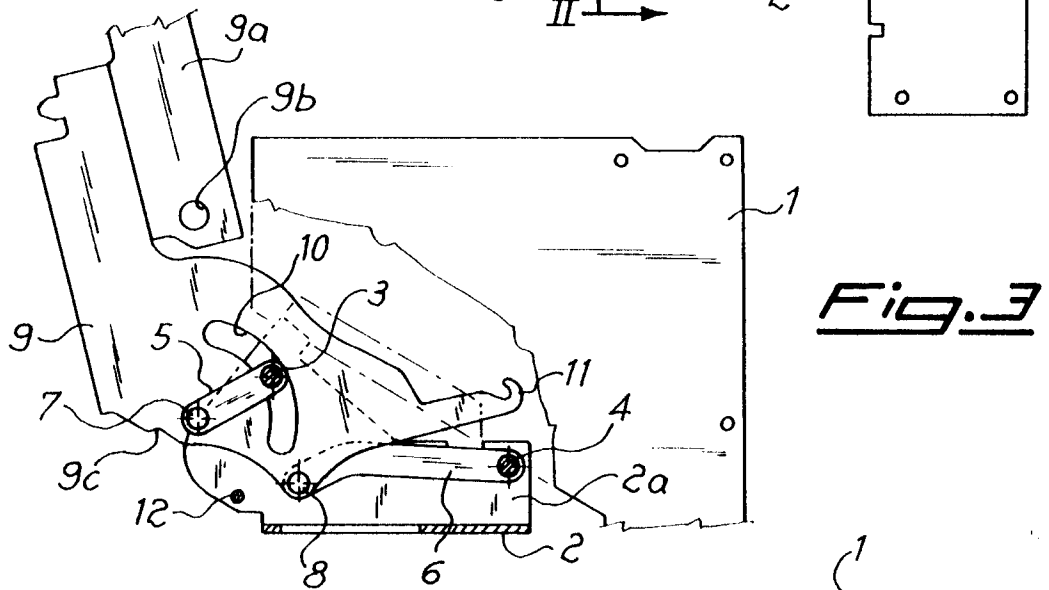
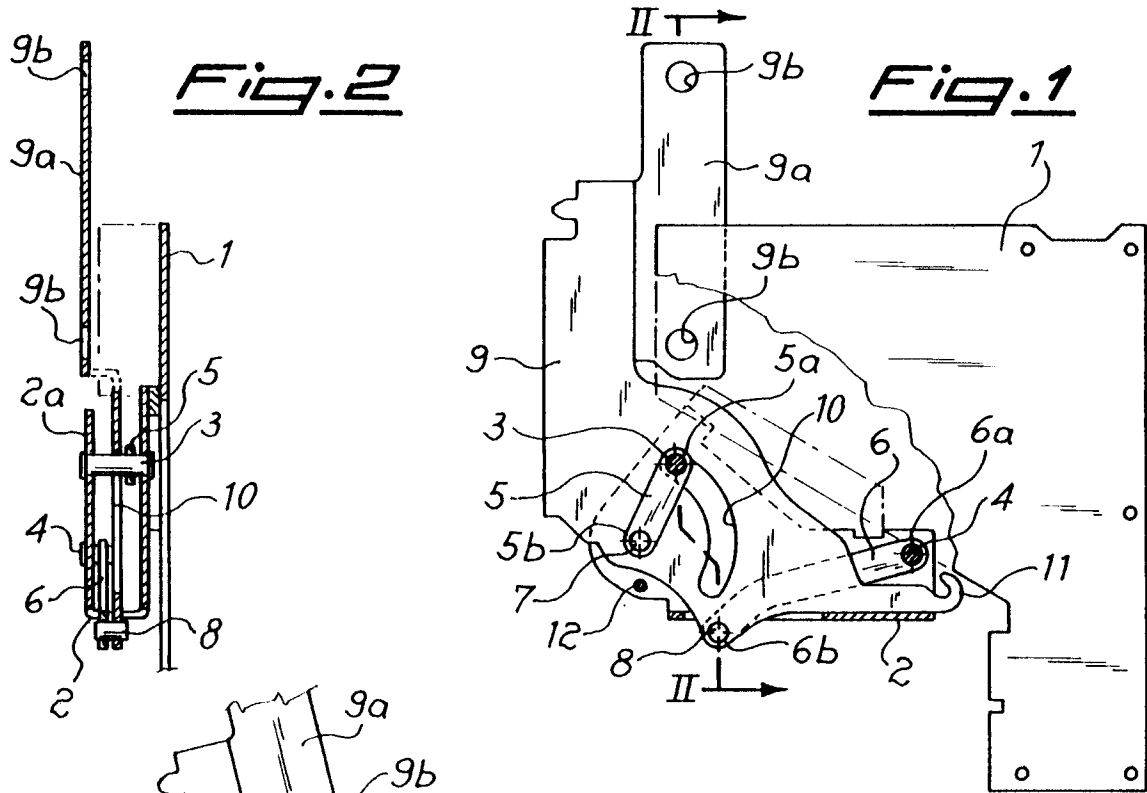
Many variants may be introduced as regards the realization of the parts which make up the invention, without thereby departing from the protective scope of the present invention as defined by the claims which follow.

Claims

1. Hinge with a movable axis of rotation, in particular for the panel-lined doors of built-in dish washing machines, characterized in that it comprises a fixed plate (1) attached to the dish washer and an arm (9) attached to the door thereof and rotating about a movable pin (7) attached to the free end (5b) of a first lever (5), the other end (5a) of which is hinged on a fixed pin (3) attached to the plate (1), there also being provided a second lever (6), the opposite ends of which are hinged, respectively, on a pin (8) attached to the arm (9) and on a fixed pin (4) attached to the plate (1), said combination being designed to make the pin (7) and hence the arm (9) carrying the dish-washer door follow a curved trajectory.
2. Hinge according to Claim 1, characterized in that said plate (1) has a front shape in the form of an "upturned L".
3. Hinge according to Claim 1, characterized in that said plate (1) has an elongated extension (2) substantially in the form of a "U".
4. Hinge according to Claim 1, characterized in that the arms (2a) of said U-shaped extension carry the fixed pins (3,4) of the hinge.
5. Hinge according to Claim 1, characterized in that the said arms (2a) of the U-shaped extension have transversely arranged between them a pin (12) designed to cooperate with a corresponding seat (9c) in the arm (9) so as to form an end-of-travel stop for the opening rotational movement of the arm (9).
6. Hinge according to Claim 1, characterized in that said arm (9) has internally a recess (10) designed

to allow rotation of the arm (9) itself relative to the pin (3).

7. Hinge according to Claim 1, characterized in that said arm (9) has a hook-shaped extension (11) forming the element for connection to the means balancing the door during the opening/closing rotational movement.
8. Hinge according to Claim 1, characterized in that said hook-shaped extension (11) is designed to cooperate with a corresponding folded portion (11a) of the plate (1) so as to form an end-of-travel stop for the opening rotational movement of the arm (9).





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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 1360

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 437 815 (V-ZUG AG)	1,3,4	E05D3/06 A47L15/42 F24C15/02
Y	* column 1, line 45 - column 3, line 55; figures *	7	
A	---	8	
Y	FR-A-2 556 580 (INDESIT)	7	
A	* page 3, line 7 - line 15; figures *	8	
X	EP-A-0 565 809 (NUOVA STAR S.R.L.) * column 3, line 24 - line 30 * * column 6, line 12 - line 16; figures 5-7 *	1,3,4	
X	FR-A-2 057 278 (MARTIN) * the whole document *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E05D A47L F24C
Place of search THE HAGUE		Date of completion of the search 19 August 1996	Examiner Van Kessel, J
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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