



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.09.2009 Bulletin 2009/39

(51) Int Cl.:
A47L 15/50 (2006.01)

(21) Application number: **08153112.1**

(22) Date of filing: **20.03.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

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(54) **Dish-rack for a dishwasher, and dishwasher featuring such a rack**

(57) A dish-rack (1) for a dishwasher, having a box-like basket (5); and a cup-tray (6) fixed, inside the basket (5), to one (5a) of the lateral walls of the basket (5) by an oscillating-arm connecting member (7) having at least one bottom oscillating arm (8) and at least one top oscillating arm (9), which are hinged to the lateral wall (5a), one above the other, to rotate freely about two axes of

rotation (A, C) parallel to and spaced apart from each other and coplanar with the lateral wall (5a) of the basket, so that the cup-tray (6) is movable selectively into a lowered position, in which the cup-tray (6) is substantially horizontal and at a predetermined height from the bottom of the basket (5), or a raised position, in which the cup-tray (6) is substantially parallel to, faces, and rests against the lateral wall (5a).

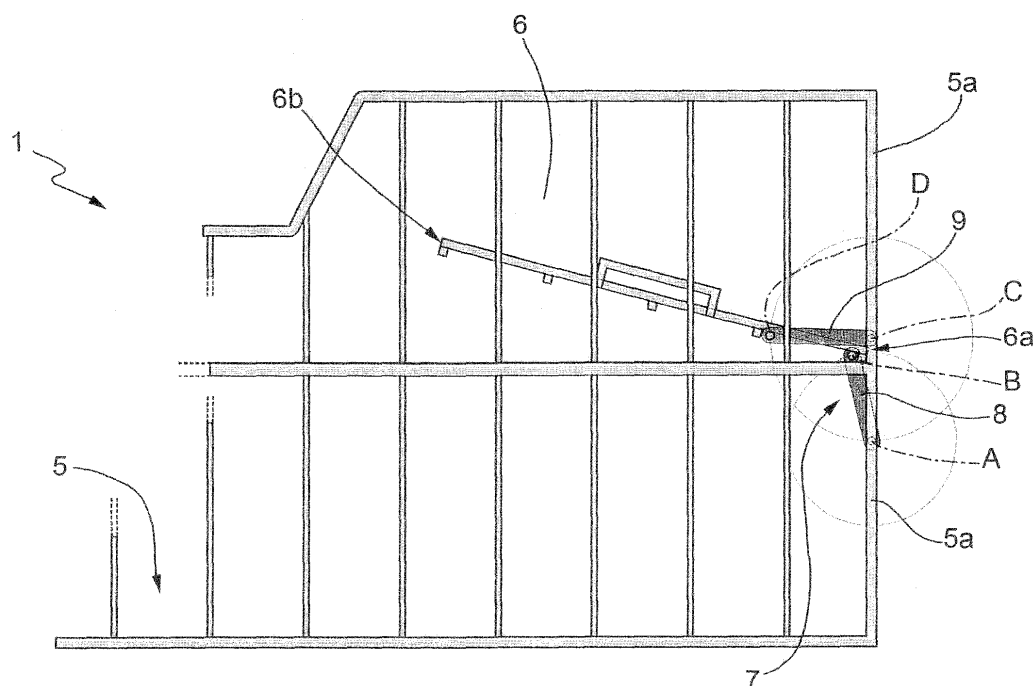


FIG.2

Description

[0001] The present invention relates to a dish-rack for a dishwasher, and to a dishwasher featuring such a rack.

[0002] More specifically, the present invention relates to a pull-out dish-rack occupying the top part of the wash chamber of a front-loading dishwasher, to which the following description refers purely by way of example.

[0003] As is known, currently marketed front-loading dishwashers comprise a substantially parallelepiped-shaped outer casing housing a wash chamber which communicates with the outside through an opening formed in one of the vertical lateral walls of the casing; a door hinged to the casing, just below the access opening to the wash chamber, to rotate about a horizontal axis of rotation to and from a substantially vertical closed position, resting against the lateral wall of the casing, to seal the access opening to the wash chamber; and two dish-racks positioned one over the other inside the wash chamber, and resting on supporting rails along which the racks are pulled out.

[0004] Dishwashers of the above type also comprise two rotary spray washing members, each of which is mounted for rotation inside the wash chamber, just below a respective dish-rack, and has a number of nozzles for directing pressurized-water jets onto the dishes inside the rack above it.

[0005] Known dish-racks are defined by a rigid, box-like, substantially parallelepiped-shaped basket or container, which is pushed inside the wash chamber along two longitudinal rails fitted to the lateral walls of the casing, inside the wash chamber, and has a bottom wall and four lateral walls made of a number of criss-cross bars forming a grille body that supports the dishes while at the same time allowing the water jets through.

[0006] In addition, the dish-rack occupying the top part of the wash chamber also comprises a substantially rectangular cup-tray hinged, inside the basket, to one of the four vertical lateral walls of the basket to rotate, about a horizontal axis of rotation, between a lowered position - in which the cup-tray is substantially horizontal and at a predetermined height from the bottom of the basket, so as to act as an additional shelf for small glasses and coffee-cups - and a raised position - in which the cup-tray is substantially vertical and rests against the vertical wall of the basket to which it is hinged, to make room for loading large dishes on the bottom of the basket.

[0007] Unfortunately, to hold a sufficient number of small glasses and/or coffee-cups, the overall width of the cup-tray must be more or less equal to the height of the lateral wall of the basket, with the result that, in the raised position, the cup-tray projects beyond the top edge of the lateral wall of the basket by an amount approximately equal to the distance between the axis of rotation of the tray and the bottom of the basket.

[0008] When the cup-tray is in the raised position, the part of the tray projecting from the top of the basket obviously limits how close the top dish-rack can be posi-

tioned to the ceiling of the wash chamber, so front-loading dishwashers are fitted by the makers with supporting rails that allow the user to manually adjust the height of the top dish-rack according to the position of the cup-tray.

[0009] Adjustable supporting rails, however, are more expensive than conventional types, with all the drawbacks this entails.

[0010] At present, in fact, adjustable supporting rails are limited to top-of-the-range dishwashers.

[0011] It is an object of the present invention to provide a dish-rack with a fold-up cup-tray, designed to eliminate the aforementioned drawbacks.

[0012] According to the present invention, there is provided a dish-rack for a dishwasher, as claimed in Claim 1 and preferably, though not necessarily, in any one of the dependent Claims.

[0013] According to the present invention, there is also provided a dishwasher, as claimed in Claim 8.

[0014] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows, schematically, a front-loading dishwasher featuring a dish-rack in accordance with the teachings of the present invention;

Figure 2 shows a side view, with parts removed for clarity, of part of the Figure 1 dish-rack;

Figures 3 to 8 show, schematically, the movement of the cup-tray with which the Figure 2 dish-rack is equipped.

[0015] Number 1 in Figure 1 indicates as a whole a dish-rack, particularly suitable for removable insertion inside the wash chamber of a home dishwasher 2.

[0016] In the example shown, dishwasher 2 is a front-loading dishwasher comprising a substantially parallelepiped-shaped outer casing 3, in which is formed a wash chamber 3a for housing two dish-racks, preferably, though not necessarily, of different heights and aligned one over the other.

[0017] More specifically, wash chamber 3a communicates with the outside through an opening formed in one of the vertical lateral walls of casing 3, and dishwasher 2 comprises a door 4 hinged to casing 3, just below the access opening to wash chamber 3a, to rotate, about a substantially horizontal axis of rotation, to and from a closed position, in which door 4 is substantially vertical and rests against the lateral wall of casing 3 to seal the access opening to wash chamber 3a.

[0018] Inside wash chamber 3a, dishwasher 2 comprises a number of longitudinal supporting rails (not shown) fitted to the inner lateral walls of casing 3 to permit insertion and removal of both the top and bottom dish-rack of dishwasher 2 through the access opening to wash chamber 3a; and two rotary spray washing members (not shown), each of which is mounted for rotation inside wash chamber 3a, just below a respective dish-rack, and has a number of nozzles for directing pressurized-water jets

onto the dishes in the dish-rack above it.

[0019] Casing 3, door 4, the longitudinal supporting rails, and the rotary spray washing members are all commonly known parts in the industry and therefore not described in detail.

[0020] With reference to Figures 1 and 2, dish-rack 1 preferably, though not necessarily, occupies the top part of wash chamber 3a, thus constituting the top dish-rack of dishwasher 2, and comprises a rigid, box-like, substantially parallelepiped-shaped container or basket 5 designed to slide into wash chamber 3a along the longitudinal supporting rails fitted to the inner lateral walls of casing 3 defining wash chamber 3a; and a substantially rectangular cup-tray 6, which, inside basket 5, is fixed movably to and projects from one of the four vertical lateral walls - hereinafter indicated 5a - of the basket, so that its two long lateral edges 6a and 6b are locally parallel at all times to lateral wall 5a and to the bottom wall of basket 5.

[0021] More specifically, cup-tray 6 is fixed movably to and projects from lateral wall 5a of the basket so it can be set selectively by the user to a lowered position - in which cup-tray 6 is substantially horizontal and at a predetermined height from the bottom of basket 5, so as to act as an additional shelf for small glasses and coffee-cups - or a raised position - in which cup-tray 6 is substantially parallel to, facing, and resting on lateral wall 5a (i.e. in a substantially vertical position), to make room for loading large dishes on the bottom of basket 5.

[0022] In the example shown, the bottom wall and four lateral walls of rigid, box-like, substantially parallelepiped-shaped container or basket 5 are made of a number of criss-cross bars forming a grille body that supports the dishes while at the same time allowing the water jets through; and cup-tray 6 is defined by a flat, substantially rectangular grille, the length w of the long lateral edges 6a and 6b of which is approximately equal to, but no greater than, the length of lateral wall 5a of the basket measured parallel to the edge between lateral wall 5a and the bottom wall of the basket.

[0023] Unlike known dish-racks, cup-tray 6 of dish-rack 1 is connected to lateral wall 5a of basket 5 by an oscillating-arm connecting member 7 comprising at least one bottom oscillating arm 8 and at least one top oscillating arm 9, which are hinged, one above the other, to lateral wall 5a of basket 5 to rotate freely about two axes of rotation parallel to and spaced apart from each other, and each of which is substantially coplanar with lateral wall 5a and locally parallel to the edge of basket 5 between the bottom wall and lateral wall 5a of the basket.

[0024] More specifically, with reference to Figures 2 to 8, bottom oscillating arm 8 lies in a plane locally perpendicularly to lateral wall 5a, and has a first end hinged to lateral wall 5a to rotate freely, with respect to lateral wall 5a, about a first axis of rotation A locally coplanar with lateral wall 5a and locally parallel to the edge of basket 5 between the bottom wall and lateral wall 5a of the basket; and a second end hinged to the body of cup-tray 6

- roughly along the long lateral edge 6a positioned adjacent to lateral wall 5a when cup-tray 6 is in the lowered position - so as to rotate freely, with respect to cup-tray 6, about a second axis of rotation B locally parallel to axis of rotation A.

[0025] Top oscillating arm 9 also lies in a plane locally perpendicular to lateral wall 5a, but on the opposite side of bottom oscillating arm 8 to the bottom of basket 5, and has a first end hinged to lateral wall 5a to rotate freely, with respect to lateral wall 5a, about a third axis of rotation C locally parallel to and spaced apart from axis of rotation A; and a second end hinged to the body of cup-tray 6, in the space between the two long lateral edges 6a and 6b of the cup-tray, to rotate freely, with respect to cup-tray 6, about a fourth axis of rotation D locally parallel to axis of rotation C.

[0026] In addition, bottom oscillating arm 8 and top oscillating arm 9 are designed so that the distance between axes of rotation C and D is greater than that between axes of rotation A and B; and top oscillating arm 9 is hinged to lateral wall 5a, above bottom oscillating arm 8, so that the distance between axes of rotation A and C substantially equals the distance between axes of rotation C and D.

[0027] In the example shown, oscillating-arm connecting member 7 of dish-rack 1 comprises two bottom oscillating arms 8 and two top oscillating arms 9, in both cases parallel to and facing each other.

[0028] Top oscillating arms 9 move in the space between the short lateral edges of cup-tray 6 and the two lateral walls of the basket adjacent to lateral wall 5a, i.e. move in two planes (parallel to the Figure 2 plane) locally perpendicular to lateral wall 5a and to the bottom of basket 5, and locally substantially tangent to the two lateral walls of the basket adjacent to lateral wall 5a; while the two bottom oscillating arms 8 move, parallel to and facing each other, in another two planes inside the space bounded by the planes of the two top oscillating arms 9.

[0029] Operation of dish-rack 1 and dishwasher 2 will be clear from the above description, with no further explanation required.

[0030] As regards cup-tray 6, on the other hand, the design of oscillating-arm connecting member 7 enables the user to selectively rotate cup-tray 6 simultaneously about axes of rotation A and C into a lowered position (Figure 2), in which cup-tray 6 is substantially horizontal, at a predetermined height from the bottom of basket 5, with long lateral edge 6a substantially resting against lateral wall 5a of the basket, between axes of rotation A and C; and into a raised or fold-up position (Figure 3), in which cup-tray 6 is parallel to and facing lateral wall 5a, with both long lateral edges 6a and 6b resting against lateral wall 5a, and with long lateral edge 6a at a minimum distance from the bottom of basket 5.

[0031] In other words, in the raised or fold-up position (Figure 3), axis of rotation D is at a minimum distance from axis of rotation A, and axis of rotation B at a maximum distance from axis of rotation C; and, in the lowered

position (Figure 2), axis of rotation B is at a minimum distance from axis of rotation C.

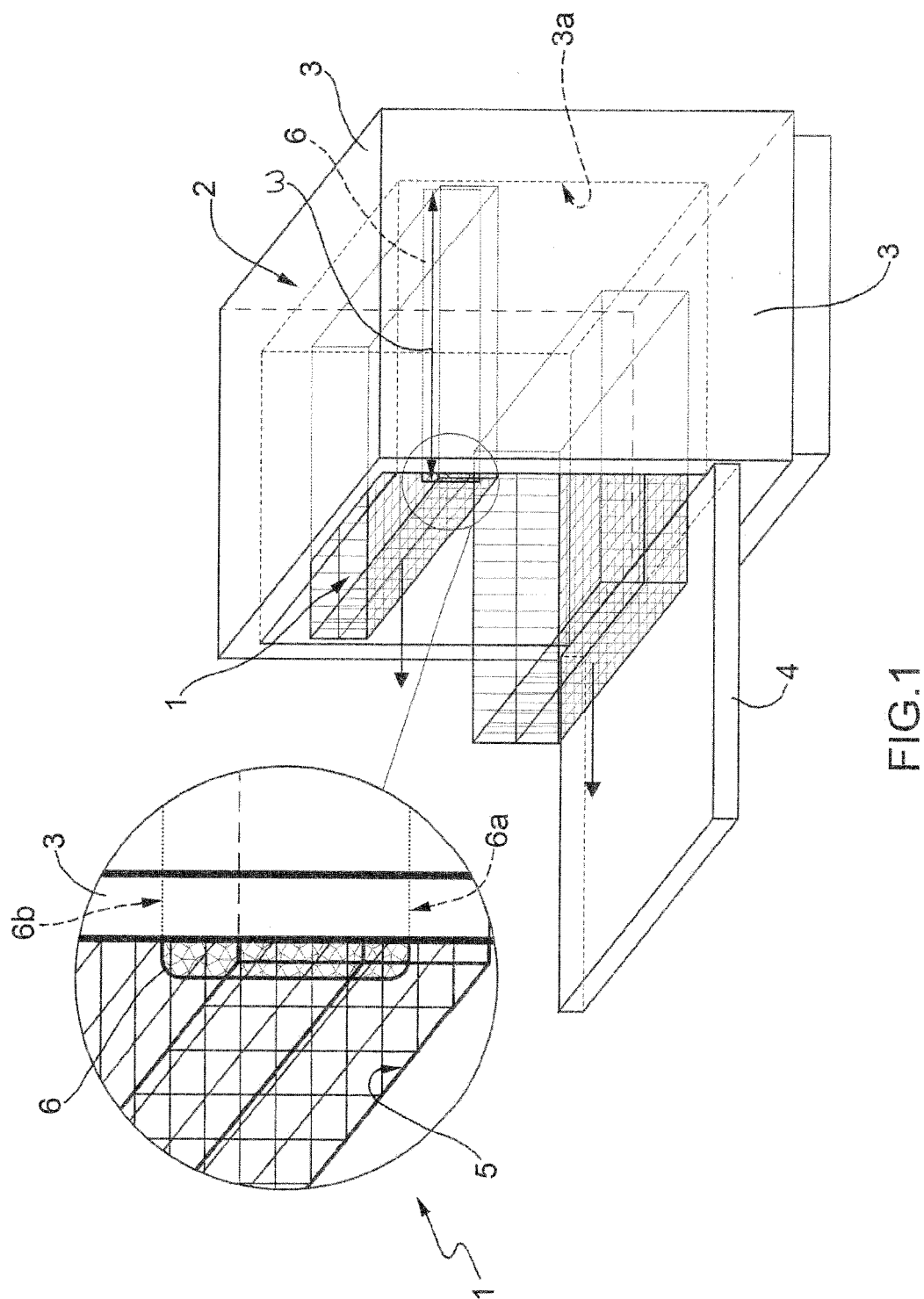
[0032] The advantages of oscillating-arm connecting member 7 are obvious : in the raised or fold-up position, the cup-tray no longer projects from the perimeter of the basket, so the top dish-rack of the dishwasher need no longer be lowered when the cup-tray is in the raised or fold-up position.

[0033] Clearly, changes may be made to dish-rack 1 and dishwasher 2 as described herein without, however, departing from the scope of the present invention.

[0034] For example, dishwasher 2 may be a chest type, as described in U.S. Patent US-7152612.

Claims

1. A dish-rack (1) for a dishwasher, comprising a rigid box-like basket (5) having at least one lateral wall (5a), and a cup-tray (6) fixed movably to and projecting from said lateral wall (5a), inside the basket (5), so as to move selectively into a lowered position in which said cup-tray (6) is substantially horizontal and at a predetermined height from the bottom of the basket (5), or a raised position in which said cup-tray (6) is substantially parallel to, faces, and rests against the lateral wall (5a) to make room for loading large dishes on the bottom of the basket (5) underneath; said dish-rack (1) being **characterized in that** the cup-tray (6) is connected to said lateral wall (5a) by an oscillating-arm connecting member (7) comprising at least one bottom oscillating arm (8) and at least one top oscillating arm (9), which are hinged to the lateral wall (5a), one above the other, to rotate freely about two axes of rotation (A, C) parallel to and spaced apart from each other, and each of which is substantially coplanar with said lateral wall (5a).
2. A dish-rack as claimed in Claim 1, **characterized in that** said at least one bottom oscillating arm (8) has a first end hinged to the lateral wall (5a) to rotate freely about a first axis of rotation (A) locally coplanar with said lateral wall (5a), and a second end hinged to the body of the cup-tray (6) to rotate freely about a second axis of rotation (B) locally parallel to said first axis of rotation (A); and said at least one top oscillating arm (9) has a first end hinged to said lateral wall (5a) to rotate freely about a third axis of rotation (C) locally parallel to and spaced apart from said first axis of rotation (A), and a second end hinged to the body of the cup-tray (6) to rotate freely about a fourth axis of rotation (D) locally parallel to said third axis of rotation (C); the bottom oscillating arm (8) and the top oscillating arm (9) being designed so that the distance between the third (C) and fourth (D) axis of rotation is greater than the distance between the first (A) and second (B) axis of rotation.
3. A dish-rack as claimed in Claim 2, **characterized in that** the top oscillating arm (9) is hinged to said lateral wall (5a), above the bottom oscillating arm (8), so that the distance between the first (A) and third (C) axis of rotation substantially equals the distance between the third (C) and fourth (D) axis of rotation.
4. A dish-rack as claimed in any one of the foregoing Claims, **characterized in that** said cup-tray (6) is substantially rectangular, and is movable inside the basket (5) so that the two long lateral edges (6a, 6b) of the cup-tray are locally parallel at all times to said lateral wall (5a); the second end of the bottom oscillating arm (8) being hinged to the body of said cup-tray (6) roughly along the long lateral edge (6a) positioned adjacent to the lateral wall (5a) when the cup-tray (6) is in the lowered position; and the second end of the top oscillating arm (9) being hinged to the body of said cup-tray (6) between said two long lateral edges (6a, 6b).
5. A dish-rack as claimed in any one of the foregoing Claims, **characterized in that** said basket (5) is substantially parallelepiped-shaped, and is sized for insertion inside the wash chamber (3a) of the dishwasher (2).
6. A dish-rack as claimed in Claim 5, **characterized in that** the bottom wall and the four lateral walls of said basket (5) are made of a number of criss-cross bars forming a grille body that supports the dishes while at the same time allowing water jets through; and **in that** said cup-tray (6) is defined by a flat, substantially rectangular grille, the length (w) of the long lateral edges (6a, 6b) of which is roughly equal to, but no greater than, the length of the lateral wall (5a) to which said cup-tray (6) is fixed.
7. A dish-rack as claimed in any one of the foregoing Claims, **characterized in that** said oscillating-arm member (7) comprises two bottom oscillating arms (8) parallel to and facing each other; and two top oscillating arms (9) parallel to and facing each other.
8. A dishwasher (2) comprising an outer casing (3), in which a wash chamber (3a) is formed; and at least one dish-rack (1) housed in said wash chamber (3a); the dishwasher (2) being **characterized in that** said dish-rack (1) is as claimed in any one of the foregoing Claims.



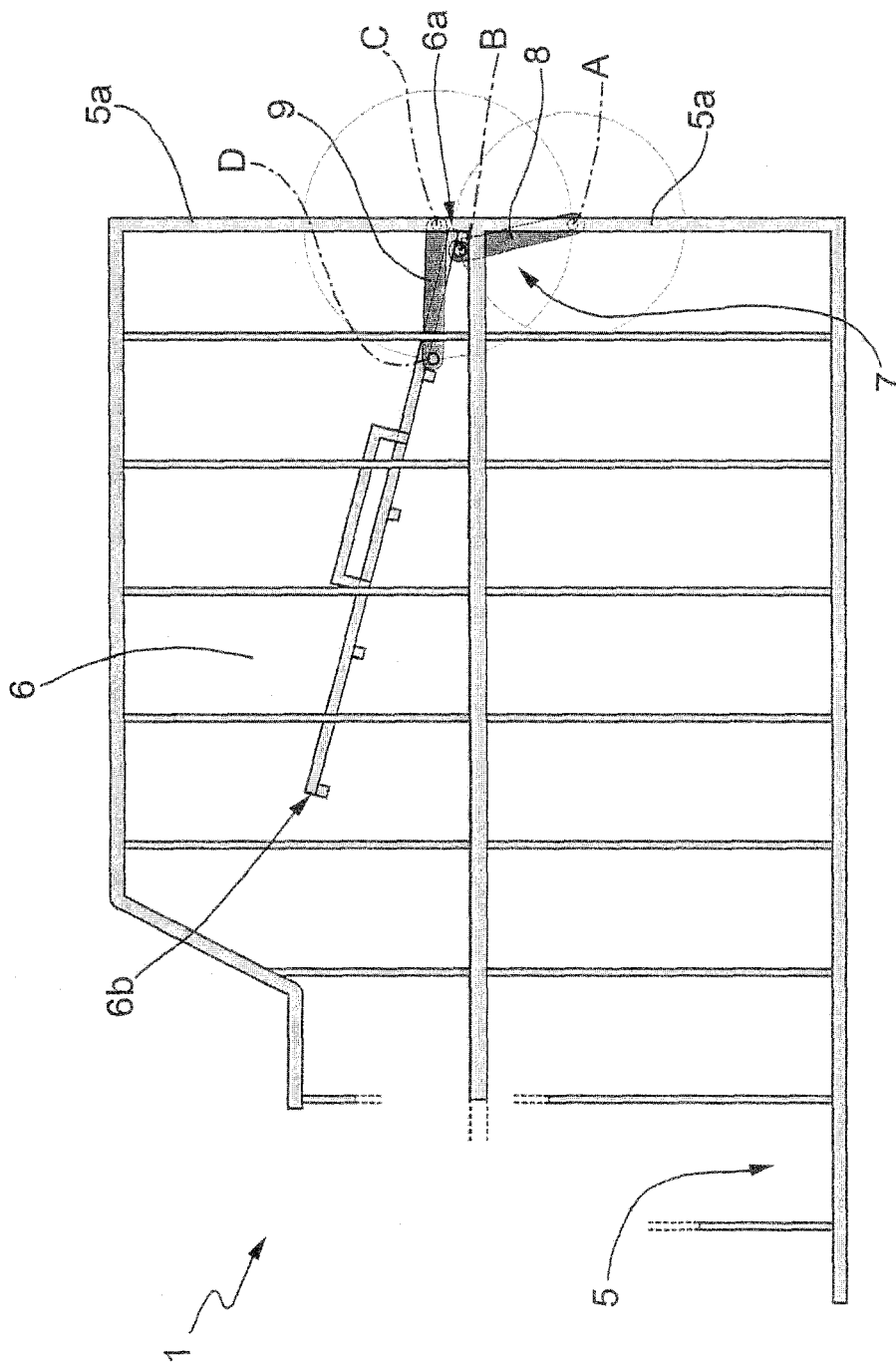


FIG. 2

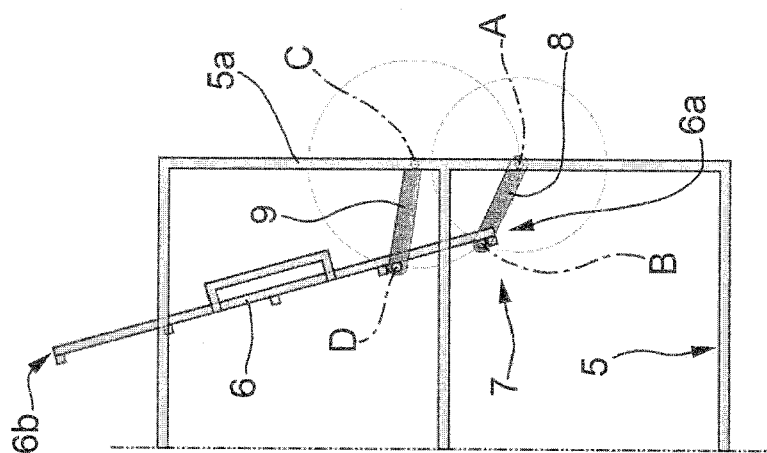


FIG.5

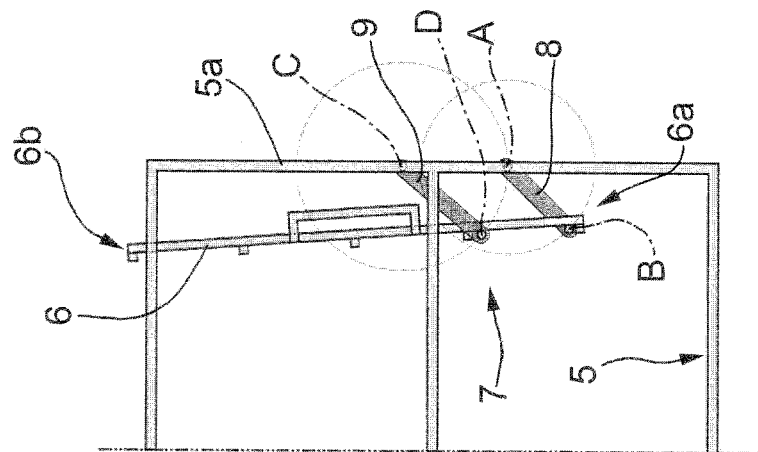


FIG.4

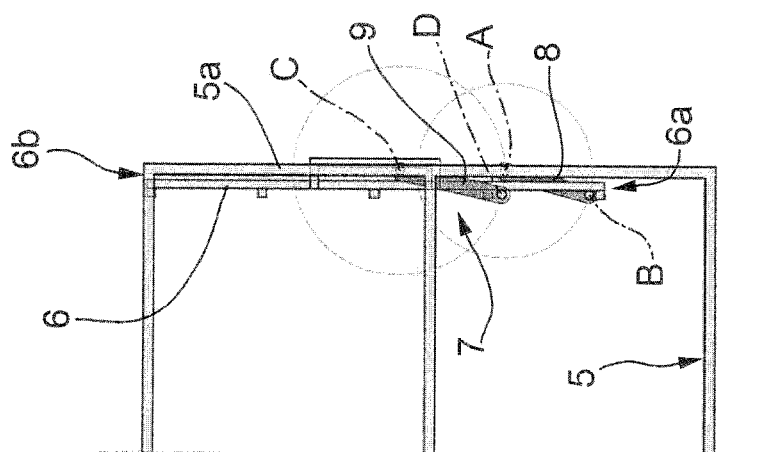


FIG.3

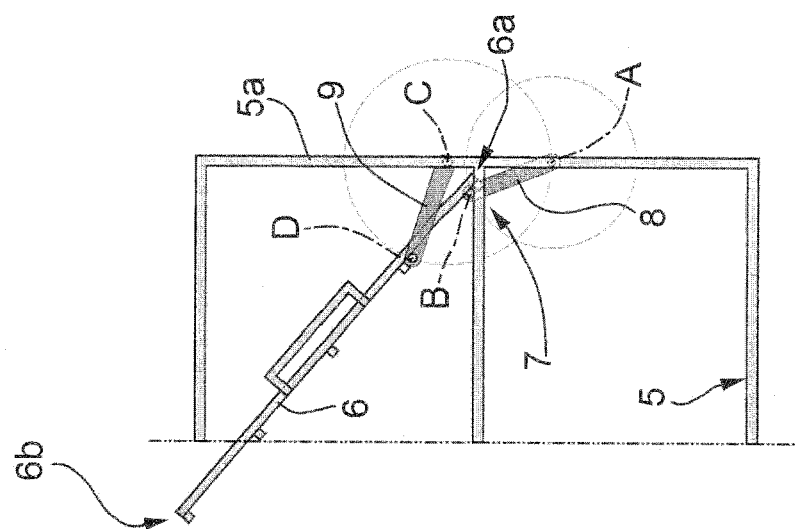


FIG. 6

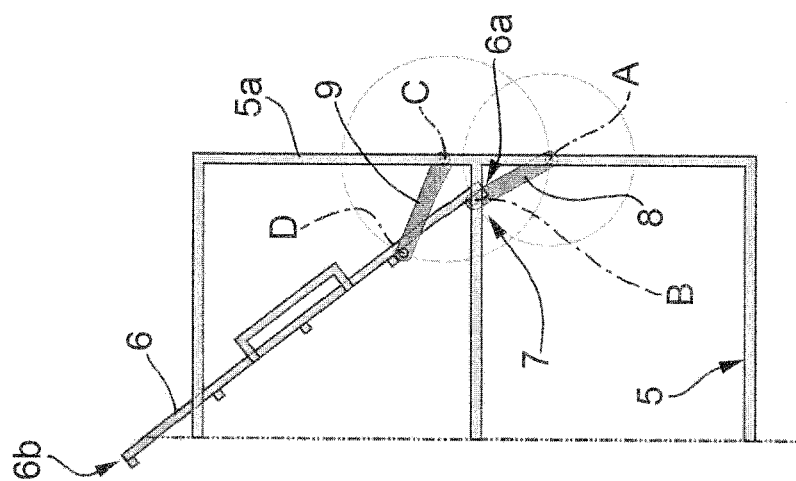


FIG. 7

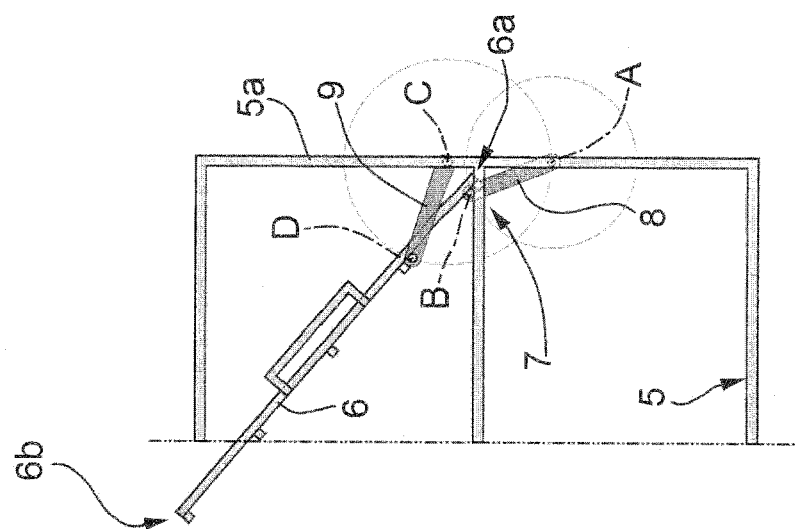


FIG. 8



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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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 August 2008	Examiner Hannam, Martin
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ON EUROPEAN PATENT APPLICATION NO.**

EP 08 15 3112

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19-08-2008

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