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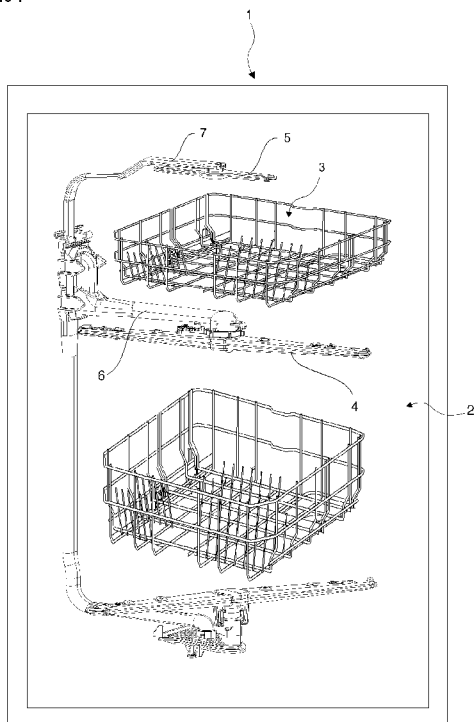
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(54) **Title:** A DISHWASHER WITH IMPROVED WASHING EFFECTIVENESS

Figure 1



(57) **Abstract:** The present invention relates to a dishwasher (1) comprising a washing chamber (2), an upper rack (3) through which the items to be washed are loaded into and unloaded from the washing chamber (2), an upper spray arm (4) that is disposed under the upper rack (3) and that sprays water into the washing chamber (2) by rotating around itself, a top spray arm (5) that is disposed above the upper rack (3) and that sprays water into the washing chamber (2) by rotating around itself, an upper supply line (6) that transmits the water received from the main supply line to the upper spray arm (4) and a top supply line (7) that transmits the water received from the main supply line to the top spray arm (5).

Description**A DISHWASHER WITH IMPROVED WASHING EFFECTIVENESS**

- [0001] The present invention relates to a dishwasher, the washing effectiveness of which is improved.
- [0002] Dishwashers comprise upper and lower racks which are placed in the washing chamber and wherein kitchenware items such as pots and plates can be placed. A spray arm, connected to the water line, is disposed under each rack which sprays water onto the objects placed in the rack. In some dishwashers, a top spray arm is used above the upper rack in addition to the present lower spray arms and the upper spray arms. The top spray arm both enables the cutlery placed in the top cutlery basket to be washed and supports the cleaning of the kitchenware items placed in the upper and lower racks. While the lower spray arm generally operates alone, the upper spray arm and the top spray arm operate together in washing steps. If the flow rate of the water delivered to the top spray arm and the upper spray arm that are fed from the same supply line is not sufficient, the washing performance of the dishwasher is adversely affected.
- [0003] In the state of the art European Patent Application No. EP1549196, a dishwasher is disclosed, having a nozzle that extends from the side of the spray arm and that sprays water to a region of the rack situated thereabove.
- [0004] The aim of the present invention is the realization of a dishwasher, the washing effectiveness of which is improved.
- [0005] The dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a washing chamber wherein kitchenware items to be washed are loaded and unloaded, an upper rack disposed at the upper side of the washing chamber, an upper spray arm that is disposed under the upper rack and that sprays water into the washing chamber by rotating around itself, a top spray arm that is positioned inside the washing chamber such that the upper rack remains between the upper spray arm and the top spray arm, and an upper supply line and a top supply line connected to the same supply line, opening to the upper spray arm and the top spray arm

respectively. In certain washing steps, the upper spray arm and the top spray arm are operated simultaneously. In the said washing steps, wash water is allocated to the top spray arm and the upper spray arm.

[0006]

[0007] The dishwasher of the present invention comprises a valve that is mounted on the upper supply line and that changes the flow rate of the water delivered to the upper spray arm by rotating. By means of the valve, the flow rate of the water flowing to the upper spray arm and the top spray arm can be adjusted.

[0008] In an embodiment of the present invention, the valve is rotated by the movement of the upper spray arm and thus changes the flow rate of the water in the upper supply line. The valve increases or decreases the flow rate of the water in the upper supply line with respect to the rotation direction of the upper spray arm. The valve increases the pressure of the water flowing to the top supply line by reducing the flow rate of the water in the upper supply line and increases the flow rate of the water flowing to the upper spray arm when the upper spray arm changes its rotation direction.

[0009] In an embodiment of the present invention, the valve changes the flow rate of the water delivered to the upper spray arm by moving with the flow of the water in the upper supply line. The movement of the water is transmitted to the valve and thus the valve is enabled to rotate.

[0010] In an embodiment of the present invention, the valve comprises a disc connected to the upper supply line, a ramp that forms a bulge on the surface of the disc so as to remain between the upper supply line and the disc, and a flow reduction pin that rises and descends gradually by changing place on the surface of the disc with the rotation of the disc. By means of the upper spray arm contacting the disc at each full rotation, the disc rotates a certain tour around its axis depending on the radius thereof. The level where the flow reduction pin contacts the disc changes gradually during the movement of the disc due to the ramp. Thus, the flow rate of the water received into the upper spray arm and the top spray arm that are fed from the same supply line is increased and decreased alternately.

- [0011] In a derivative of this embodiment, the space occupied by the ramp on the disc is predetermined by the producer and thus the time of the reduction of the flow rate of the upper spray arm can be adjusted.
- [0012] In an embodiment of the present invention, the dishwasher comprises a drive pin that is disposed on the surface of the upper spray arm facing the upper supply line, that moves together with the upper spray arm and that moves the disc by contacting the disc in each rotation tour after which it returns to the position it starts its movement. The rotation movement of the upper spray arm is transmitted to the disc by means of the drive pin. Thus, the rotation of the disc is facilitated.
- [0013] In an embodiment of the present invention, the valve comprises an impeller that is disposed inside the upper supply line, that is grouped with the disc so as to transmit the rotation movement to the disc and the movement of which is actuated by the flow of the water inside the upper supply line. In this embodiment, the disc rotates with the flow of the water independently from the rotation movement of the upper spray arm. By means of the rotation of the disc, the valve adjusts the flow rate of the upper spray arm.
- [0014] A dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0015] Figure 1 – is the schematic view of a dishwasher.
- [0016] Figure 2 – is the perspective view of the upper supply line and the upper spray arm related to an embodiment of the present invention.
- [0017] Figure 3 – is the view of detail A in Figure 2.
- [0018] Figure 4 – is the perspective view of the valve in an embodiment of the present invention.
- [0019] Figure 5 – is the sideways perspective view of the valve in an embodiment of the present invention.
- [0020] Figure 6 – is the perspective view of the upper supply line and the upper spray arm related to another embodiment of the present invention.
- [0021] Figure 7 – is the view of detail B in Figure 6.
- [0022] The elements illustrated in the figures are numbered as follows:
1. Dishwasher

2. Washing chamber
3. Upper rack
4. Upper spray arm
5. Top spray arm
6. Upper supply line
7. Top supply line
8. Valve
9. Ramp
10. Drive pin
11. Flow reduction pin
12. Recess
13. Shaft
14. Impeller
15. Disc

[0023] The dishwasher (1) comprises a washing chamber (2), an upper rack (3) by means of which the items to be washed are loaded into and unloaded from the washing chamber (2), an upper spray arm (4) that is disposed under the upper rack (3) and that sprays water into the washing chamber (2) by rotating around itself, a top spray arm (5) that is positioned above the upper rack (3), an upper supply line (6) that transmits the water received from the main supply line to the upper spray arm (4) and a top supply line (7) that transmits the water received from the main supply line to the top spray arm (5). In certain steps of the washing process, the upper spray arm (4) and the top spray arm (5) operate simultaneously.

[0024] The dishwasher (1) of the present invention comprises a valve (8) that is disposed on the upper supply line (6) so as to remain between the upper spray arm (4) and the upper supply line (6) and that changes the flow rate of the water delivered to the upper spray arm (4) by changing position. By means of the valve (8), the flow rate of the water delivered to the upper spray arm (4) and the top spray arm (5) is adjusted and washing effectiveness of the dishwasher (1) is increased.

[0025] In an embodiment of the present invention, the valve (8) is actuated by the upper spray arm (4) contacting the surface of the valve (8) during its

rotation and changes the flow rate of the water delivered to the upper spray arm (4).

[0026] In an embodiment of the present invention, the valve (8) changes the flow rate of the water delivered to the upper spray arm (4) by moving with the flow of the water in the upper supply line (6).

[0027] In an embodiment of the present invention, the valve (8) comprises a disc (15) disposed on the upper supply line (6), a ramp (9) that extends on the circular surface of the disc (15) in the axial direction, and a flow reduction pin (11) that is mounted on the upper supply line (6) so that one end contacts the disc (15) and the other end extends into the upper supply line (6) and the space occupied by which in the upper supply line (6) changes with the rotation of the disc (15). The flow reduction pin (11) contacting the ramp (9) during the rotation of the disc (15) decreases the flow rate of the water flowing to the upper spray arm (4) by rising inside the upper supply line (6) and thus the water is enabled to be sprayed from the top spray arm (5) in a pressurized manner.

[0028] In an embodiment of the present invention, the valve (8) comprises a drive pin (10) that is disposed on the upper spray arm (4), that moves together with the rotating upper spray arm (4) and that enables the disc (15) to gradually rotate around its axis by contacting the disc (15) after each tour of the upper spray arm (4). In this embodiment, the drive pin (10) facilitates the transmission of movement from the upper spray arm (4) to the disc (15).

[0029] In a derivative of this embodiment, the valve (8) comprises more than one recess (12) that is arranged consecutively on the disc (15) and that has a geometry that allows the drive pin (10) to go thereinto and exit therefrom. Thus, the drive pin (10) is prevented from getting stuck inside the recess (12) and limiting the rotation movement of the upper spray arm (4).

[0030] In an embodiment of the present invention, the valve (8) comprises an impeller (14) that is disposed inside the upper supply line (6), that is connected to the disc (15) and that rotates the disc (15) by moving with the flow of the water inside the upper supply line (6). While moving, the impeller (14) rotates also the disc (15) to which it is connected on the

same vertical axis. Thus, the impeller (14) starts the movement of the disc (15) by rotating when the flow of water starts inside the upper spray arm (4) without requiring a sensor. Thus, the valve (8) continuously reduces and increases the flow rate of the water delivered to the upper spray arm (4).

- [0031] In an embodiment of the present invention, the valve (8) comprises a shaft (13) that is disposed between the disc (15) and the upper supply line (6) and that enables the disc (15) to rotate around its axis.
- [0032] In an embodiment of the present invention, the cross-sectional area of the flow reduction pin (11) narrows towards the end thereof where the flow reduction pin (11) contacts the disc (15). Thus, friction-based movement transmission losses between the disc (15) and the flow reduction pin (11) are decreased.
- [0033] By means of the present invention, when the flow rate of the water flowing to the upper supply line (6) is gradually decreased, the flow rate of the water in the top supply line (7) that receives water from the same supply line gradually increases. By means of alternately increasing the flow rate of the water flowing in the top supply line (7) and the upper supply line (6) respectively feeding the top spray arm (5) and the upper spray arm (4), the top spray arm (5) and the upper spray arm (4) are enabled to perform the washing process more effectively.

Claims

1. A dishwasher (1) **comprising** a washing chamber (2), an upper rack (3) by means of which the items to be washed are loaded into and unloaded from the washing chamber (2), an upper spray arm (4) that is disposed under the upper rack (3) and that sprays water into the washing chamber (2) by rotating around itself, a top spray arm (5) that is disposed above the upper rack (3) and that sprays water into the washing chamber (2) by rotating around itself, an upper supply line (6) that transmits the water received from the main supply line to the upper spray arm (4) and a top supply line (7) that transmits the water received from the main supply line to the top spray arm (5), **characterized by** a valve (8) that is disposed on the upper supply line (6) so as to remain between the upper spray arm (4) and the upper supply line (6) and that changes the flow rate of the water delivered to the upper spray arm (4) by changing position.
2. A dishwasher (1) as in Claim 1, **characterized by** the valve (8) that is contacted and thus actuated by the upper spray arm (4) during its rotation and that changes the flow rate of the water delivered to the upper spray arm (4).
3. A dishwasher (1) as in Claim 1, **characterized by** the valve (8) that changes the flow rate of the water delivered to the upper spray arm (4) by moving with the flow of the water in the upper supply line (6).
4. A dishwasher (1) as in any one of the above claims, **characterized by** the valve (8) comprising a disc (15) disposed on the upper supply line (6), a ramp (9) that extends on the circular surface of the disc (15) in the axial direction and a flow reduction pin (11) that is mounted on the upper supply line (6) such that one end contacts the disc (15) and the other end extends into the upper supply line (6) and the space occupied by which in the upper supply line (6) changes with the rotation of the disc (15).
5. A dishwasher (1) as in Claim 4, **characterized by** a drive pin (10) that is disposed on the upper spray arm (4), that moves together with the rotating upper spray arm (4) and that enables the disc (15) to gradually rotate around its axis by contacting the disc (15) after each tour of the upper spray arm (4).
6. A dishwasher (1) as in Claim 5, **characterized by** the valve (8) comprising more than one recess (12) that is arranged consecutively on the disc (15) and that

has a geometry that allows the drive pin (10) to go thereinto and exit therefrom.

7. A dishwasher (1) as in any one of the Claims 4 to 6, **characterized by** the valve (8) comprising an impeller (14) that is disposed inside the upper supply line (6), that is connected to the disc (15) and that rotates the disc (15) by moving with the flow of the water inside the upper supply line (6).
8. A dishwasher (1) as in any one of the Claims 4 to 7, **characterized by** the valve (8) comprising a shaft (13) that is disposed between the disc (15) and the upper supply line (6) and that enables the disc (15) to rotate around its axis.
9. A dishwasher (1) as in any one of the Claims 4 to 8, **characterized by** the valve (8) comprising the flow reduction pin (11) the cross-sectional area of which narrows towards the end thereof where the flow reduction pin (11) contacts the disc (15).

Figure 1

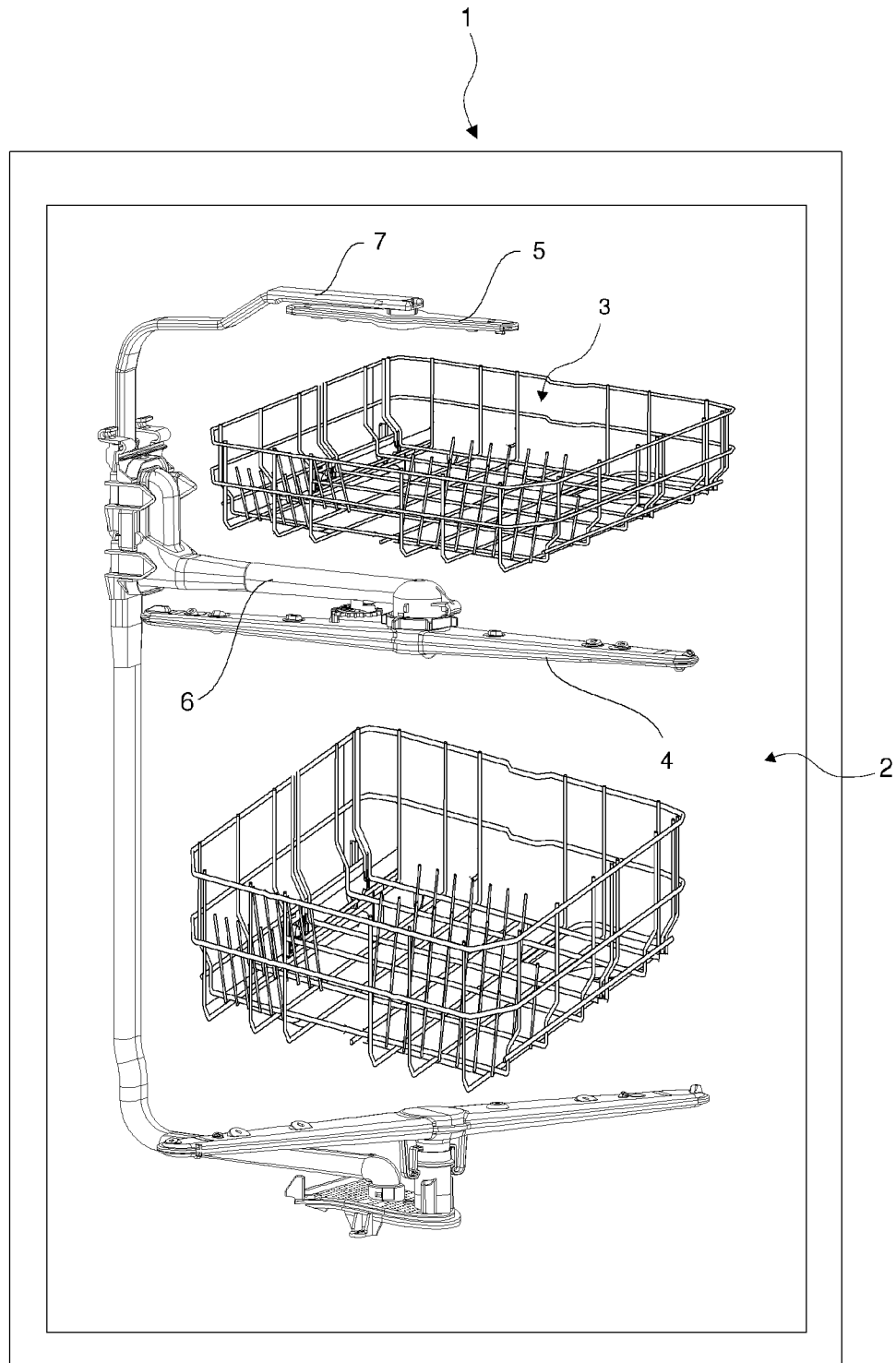


Figure 2

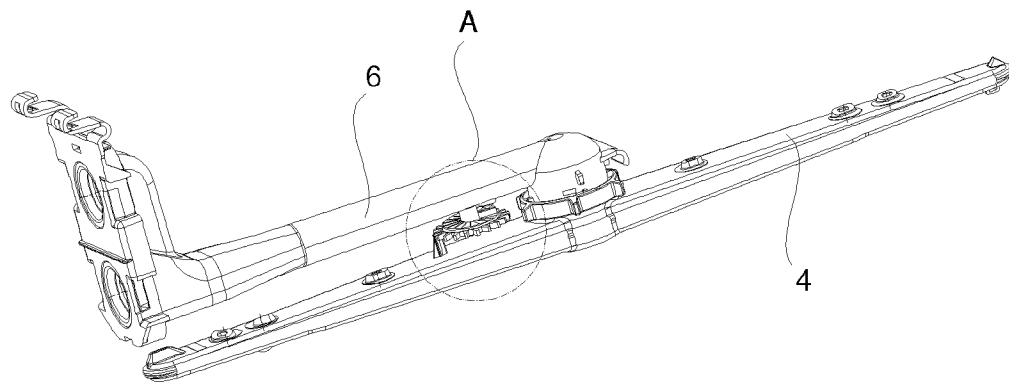


Figure 3

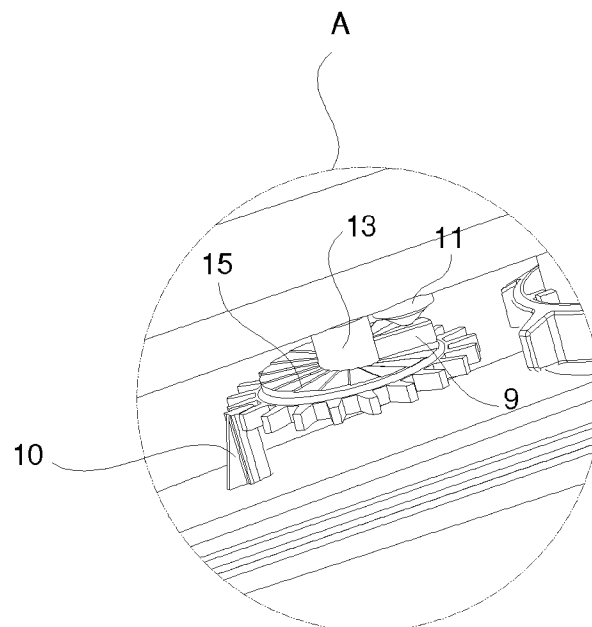


Figure 4

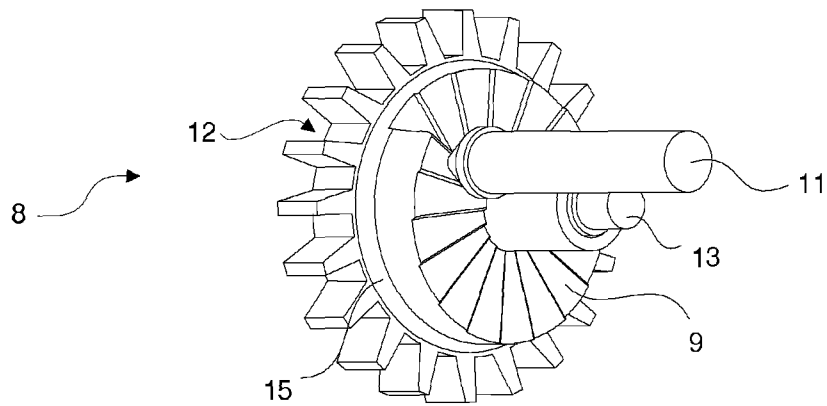


Figure 5

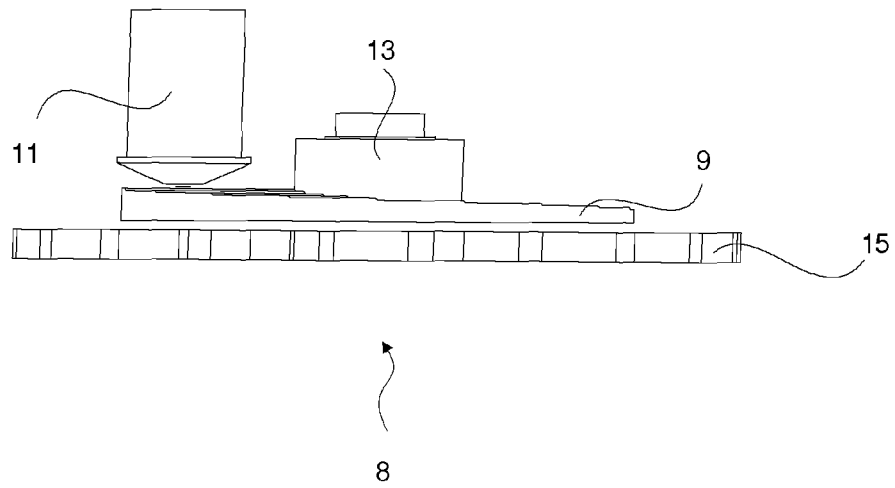


Figure 6

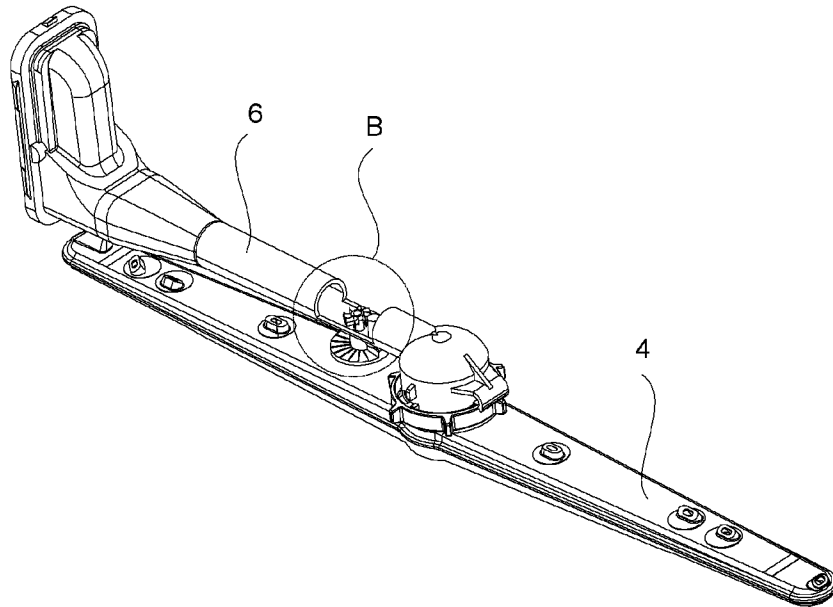
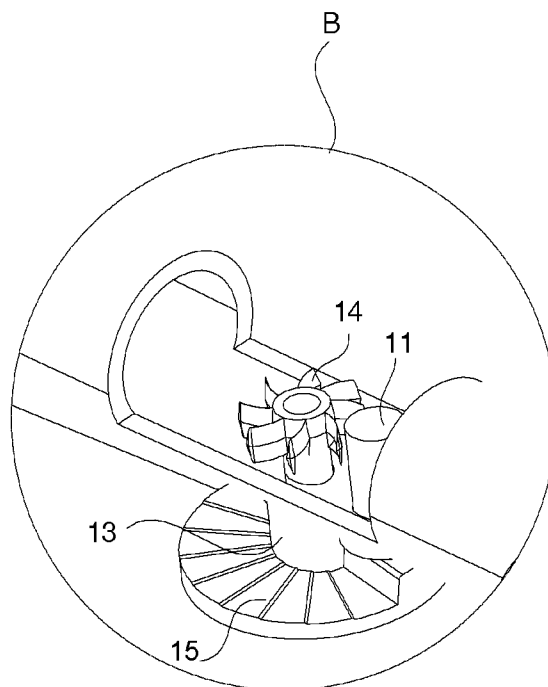


Figure 7



INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV. A47L15/23 A47L15/42
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 930 044 A1 (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 21 July 1999 (1999-07-21) the whole document	1,3
A	----- the whole document	2,4-9
A	EP 0 943 282 A2 (AEG HAUSGERAETE GMBH [DE]) 22 September 1999 (1999-09-22) paragraph [0018] - paragraph [0020] -----	1-9
A	DE 18 50 130 U (NEFF ALFRED DR [DE]) 19 April 1962 (1962-04-19) the whole document -----	1-9



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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0930044	A1	21-07-1999	DE 69811845 D1 10-04-2003
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