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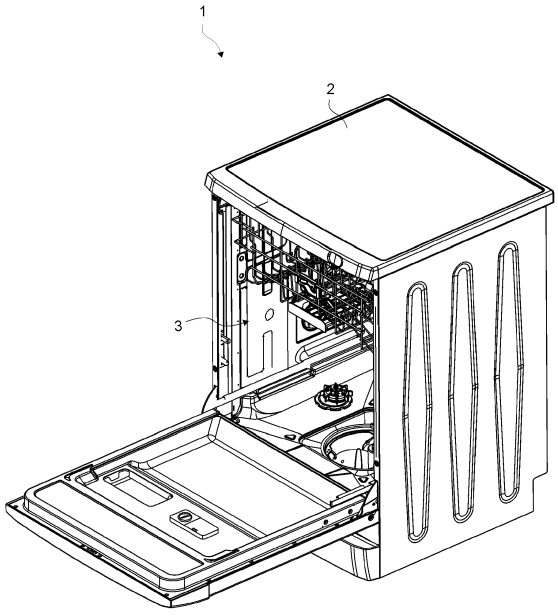
(54) **A DISHWASHER COMPRISING A LIQUID/GEL DOSING UNIT**

(57) The present invention relates to a dishwasher (1) comprising a body (2); a washing cabin (3) disposed on the body (2) and wherein the washing process is performed; a detergent dispenser (4) that is detachably mounted on the body (2) and wherein liquid/gel detergent can be filled; a detergent receptacle (5) that is disposed inside the detergent dispenser (4) and wherein detergent is filled; a scaling receptacle (6) that is disposed next to the detergent receptacle (5) and wherein the detergent to be used in the washing process is transferred from the detergent receptacle (5) and collected; at least one first opening (7) that is arranged between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) to the scaling receptacle (6); at least one second opening (8) that is arranged between the scaling receptacle (6) and the washing cabin (3) and that enables the detergent to be transferred from the scaling receptacle (6) to the washing cabin (3), and a dosing mechanism (9) that is disposed between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) towards the washing cabin (3) by controlling opening/closing of the first opening (7) and the second opening (8).

Figure 1



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Description

[0001] The present invention relates to a dishwasher comprising a liquid/gel dosing unit that can dose the required amount of detergent into the washing cabin.

[0002] In dishwashers, it is important that the use of detergent should be in the optimum level for cleaning the dishes due to both the life span of the dishes and also for our health and pollution of the environment because of the chemicals contained therein. At the start of each washing cycle, the detergent is filled into the detergent dispenser disposed on the machine by the user. In washings where intensively dirty dishes are washed, generally the use of greater amounts of detergent is preferred. Using the detergent in the right amount is among the factors that directly affect the washing performance. Therefore, lately the use of powder or gel/liquid detergents, the amount of which depends on user preference is becoming widespread. However, the amount of detergent being determined by the user cannot always provide the optimum washing performance. Nowadays, the dosing units that automatically determine the amount of detergent and transfer the same into the washing cabin are used for finding a solution to this problem. The user fills in the detergent into the dishwasher once by means of the dosing unit and the required detergent during washing is provided by the dosing unit. However, the use of liquid detergents having high viscosity in the dosing units cannot always provide the required amount of dose. The dosing unit cannot control the amount of transferred detergent from time to time since the viscosity is high. Therefore, a greater amount of detergent may be transferred to the washing cabin and detergent residues may remain on the washed dishes.

[0003] In the state of the art European Patent No. EP2073684, a household appliance is disclosed, that comprises a liquid detergent dosing unit.

[0004] The aim of the present invention is the realization of a dishwasher wherein the liquid/gel dosing operation can be performed automatically. 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 body, a washing cabin disposed on the body wherein the washing process is performed and a detergent dispenser that is detachably mounted on the body. The detergent dispenser comprises a detergent receptacle where the detergent is stored and a scaling receptacle whereto the detergent from the detergent receptacle is transferred to be delivered into the washing cabin. A first opening providing the transfer of the detergent is arranged between the detergent receptacle and the scaling receptacle, and a second opening between the scaling receptacle and the washing cabin. A dosing mechanism enables the detergent to first pass from the detergent receptacle into the scaling receptacle through the first opening and from there to reach the washing cabin by means of the second opening.

[0005] The dishwasher of the present invention comprises a first valve enabling the first opening to be closed and whereon the gasket is disposed, a second valve enabling the second opening to be closed and whereon the gasket is disposed, and the dosing mechanism. The first and the second valves move in the vertical direction. By means of the first valve and the second valve disposed on the dosing mechanism, at least one opening is enabled to be closed while detergent is transferred from the detergent receptacle towards the washing cabin. During operation of the dosing mechanism only the first opening or only the second opening is open. Thus, by preventing both of the openings being open at the same time, the detergent is prevented from being directly transferred accidentally from the detergent receptacle to the washing cabin.

[0006] In an embodiment of the present invention, the dosing mechanism comprises a crankshaft disposed on the detergent receptacle in the direction of the first opening and the second opening and a piston rod, one end of which is situated on the crankshaft and the other end extending towards the scaling receptacle. A first support member is connected to the end of the piston rod extending towards the scaling receptacle which moves together with the piston rod in the vertical direction. A second support member, with the second valve situated on its other end, is fastened on the first support member. The first valve is disposed on the second support member and under the first support member such that the second support member can move thereon. A first spring is disposed between the first support member and the second support member and a second spring is situated between the first valve and the second valve. By means of the springs controlling the movement is facilitated.

[0007] In an embodiment of the present invention, the dosing mechanism comprises a stopper disposed on the first support member. When the piston rod moves downwards, the stopper exerts pressure on the first valve. The second spring that is compressed under the first valve by the pressure enables the first valve to move in the downward direction. Thus, the first opening opens and enables flow of detergent from the detergent receptacle towards the scaling receptacle.

[0008] In an embodiment of the present invention, the dosing mechanism comprises a grasper disposed on the first support member. When the piston rod moves upwards, the grasper grasps the second support member and enables the same to move in the upwards direction. By means of the second spring being compressed between the first valve and the second valve, the second valve moves in the upwards direction and enables the second opening to be opened.

[0009] In an embodiment of the present invention, the dosing mechanism enables the first opening and the second opening to remain closed between the positions of the piston rod at the lowest and highest points. Thus, controlling the flow of the liquid detergent is facilitated.

[0010] In an embodiment of the present invention, the dosing mechanism comprises the first spring that ena-

bles the second opening to be closed by pushing the second valve downwards between the lowest and highest points of the piston rod.

[0011] In an embodiment of the present invention, the dosing mechanism comprises the second spring that enables the first opening to be closed by pushing the first valve upwards between the lowest and highest points of the piston rod.

[0012] In an embodiment of the present invention, the dishwasher comprises a motor that enables the crankshaft to be energized and move.

[0013] In an embodiment of the present invention, the dosing mechanism enables one dose of detergent to be delivered from the detergent receptacle to the washing cabin as the piston rod makes one whole rotation on the crankshaft.

[0014] The dishwasher realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of the dishwasher.
Figure 2 - is the perspective view of the detergent dispenser.
Figure 3 - is the perspective view of the dosing mechanism when piston rod is at the lowest point of the crankshaft.
Figure 4 - is the perspective view of the dosing mechanism when the piston rod is at the highest point of the crankshaft.
Figure 5 - is the perspective view of the dosing mechanism when the first opening and the second opening are closed at the same time.
Figure 6 - is the perspective view of the detergent dispenser and the motor.

[0015] The elements illustrated in the figures are numbered as follows:

1. Dishwasher
2. Body
3. Washing cabin
4. Detergent dispenser
5. Detergent receptacle
6. Scaling receptacle
7. First opening
8. Second opening
9. Dosing mechanism
10. Gasket
11. First valve
12. Second valve
13. Crankshaft
14. Piston rod
15. Fist support member
16. Second support member
17. First spring
18. Second spring
19. Stopper
20. Grasper
21. Motor

[0016] The dishwasher (1) comprises a body (2); a washing cabin (3) disposed on the body (2) and wherein the washing process is performed; a detergent dispenser (4) that is detachably mounted on the body (2) and wherein liquid/gel detergent can be filled; a detergent receptacle (5) that is disposed inside the detergent dispenser (4) and wherein detergent is filled; a scaling receptacle (6) that is disposed next to the detergent receptacle (5) and wherein the detergent to be used in the washing process is transferred from the detergent receptacle (5) and collected; at least one first opening (7) that is arranged between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) to the scaling receptacle (6); at least one second opening (8) that is arranged between the scaling receptacle (6) and the washing cabin (3) and that enables the detergent to be transferred from the scaling receptacle (6) to the washing cabin (3); at least one gasket (10) that is seated on the openings (7, 8) and that provides leak proofing, and a dosing mechanism (9) that is disposed between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) towards the washing cabin (3) by controlling opening/closing of the first opening (7) and the second opening (8). The detergent filled by the user and stored in the detergent receptacle (5) is transferred by the dosing mechanism (9) during the washing process from the detergent receptacle (5) towards the washing cabin (3). The amount of detergent required for the washing program is delivered to the scaling receptacle (6) by passing through the first opening (7). The detergent transferred to the scaling receptacle (6) is delivered to the washing cabin (3) by passing through the second opening (8).

[0017] The dishwasher (1) furthermore comprises a first valve (11) having a gasket (10) thereon for closing the first opening (7), a second valve (12) having a gasket (10) for closing the second opening (8), and the dosing mechanism (9) that enables at least one opening (7, 8) to be almost entirely closed during transfer of detergent from the detergent receptacle (5) to the washing cabin (3). As the first opening (7) is closed by the first valve (11), the detergent flow from the detergent receptacle (5) towards the scaling receptacle (6) is cut off. As the second opening (8) is closed by the second valve (12), the detergent flow from the scaling receptacle (6) towards the washing cabin (3) is cut off. When the first opening (7) is closed, the second opening (8) is opened and when the second opening (8) is closed, the first opening (7) is opened. Thus, a cycle is completed. As the piston rod (14) completes one full rotation on the crankshaft (13), the first opening (7) and the second opening (8) are enabled to be closed at the same time between the lowest and highest points. Accordingly, the openings (7, 8) are enabled to be controlled more easily and during the trans-

fer of the liquid detergents with high viscosity the amount of detergent is enabled to be controlled. During one full cycle of the dosing mechanism (9), each of the first opening (7) and the second opening (8) is opened and closed only once by itself. During the cycle, the two openings (7, 8) are closed twice at the same time.

[0018] In an embodiment of the present invention, the dishwasher (1) comprises a crankshaft (13) disposed on the detergent receptacle (5) in the direction of the first opening (7) and the second opening (8); a piston rod (14), one end of which is fastened to the crankshaft (13) and the other end extending towards the scaling receptacle (6); a first support member (15), one end of which is fastened to the piston rod (14) moving in the vertical direction; a second support member (16) that is connected to the first support member (15), that has the second valve (12) thereon and that moves together with the first support member (15) in the vertical direction; the first valve (11) mounted to the second support member (16) so as to move on the second support member (16); a first spring (17) disposed between the first support member (15) and the second support member (16), and a second spring (18) disposed between the first valve (11) and the second valve (12). The piston rod (14) moves in the vertical direction as the crankshaft (13) rotates. As the piston rod (14) moves downwards, the first support member (15), one end of which is connected to the piston rod (14), also moves downwards. Thus, the first valve (11) moving in the vertical direction on the second support member (16) enables the first opening (7) to be opened by moving downward and detergent to be transferred from the detergent receptacle (5) towards the scaling receptacle (6). By means of the piston rod (14) moving upwards, the second support member (16) is pulled upwards and enables the second openings (8) to be opened. By means of the first spring (17) and the second spring (18), movement of the valves (11, 12) is facilitated.

[0019] In an embodiment of the present invention, the dosing mechanism (9) comprises a stopper (19) that is disposed on the first support member (15), that exerts pressure on the first valve (11) when the piston rod (14) moves downwards and that enables the first valve (11) to compress the second spring (18) and the first opening (7) to be opened. When the piston rod (14) moves downwards, the first support member (15) is pushed downwards by the piston rod (14). The stopper (19) situated on the first support member (15) contacts the first valve (11) and pushes the first valve (11) downwards. The first valve (11) that can move in the vertical direction moves downwards by sliding on the second support member (16). Thus, the first opening (7) is enabled to be opened.

[0020] In an embodiment of the present invention, the dosing mechanism (9) comprises a grasper (20) that is disposed on the first support member (15), that grasps the second support member (16) when the piston rod (14) moves upwards and enables the same to move in the upward direction and that enables the second spring (18) to be compressed between the first valve (11) and the second valve (12). When the piston rod (14) moves upwards, the first support member (15) is pulled upwards by the piston rod (14). By means of the first support member (15) moving upwards, the second spring (18) is opened and pushes the first valve (11) upwards. Thus, the first opening (7) is enabled to be closed. After the first opening (7) is closed, the grasper (20) located on first support member (15) grasps the second support member (16) and enables the same to move upwards. Thus, the second valve (12), situated on the second support member (16) that moves upwards, enables the second opening (8) to be opened by moving upwards.

[0021] In an embodiment of the present invention, the dosing mechanism (9) enables the first opening (7) and the second opening (8) to be closed at the same time as the piston rod (14) moves on the crankshaft (13) between the lowest and highest points. When the piston rod (14) is at the lowest point on the crankshaft (13), the first valve (11) is pulled downwards and the first opening (7) is open. When the piston rod (14) starts to move towards the highest point on the crankshaft (13), the first support member (15) enables the first opening (7) to be closed by moving in the upward direction. However, the second opening (8) is not opened before the piston rod (14) comes to the lowest point on the crankshaft (13). Thus, the first opening (7) and the second opening (8) are enabled to be closed at the same time when the piston rod (14) is at the 90° and 270° positions on the crankshaft (13). Thus, the use of liquid detergents having high viscosity values during the cycle is facilitated.

[0022] In an embodiment of the present invention, the dishwasher (1) comprises the first spring (17) that pushes the second valve (12) downwards while the piston rod (14) moves on the crankshaft (13) between the lowest and highest points. When the piston rod (14) is between the lowest and highest points on the crankshaft (13), the second valve (12) is pushed downwards by the first spring (17). Thus, the second valve (12) closes the second opening (8) and the second opening (8) is enabled to remain closed until the piston rod (14) comes to the highest point on the crankshaft (13).

[0023] In an embodiment of the present invention, the dishwasher (1) comprises the second spring (18) that pushes the first valve (11) upwards while the piston rod (14) moves on the crankshaft (13) between the lowest and highest points. When the piston rod (14) is between the lowest and highest points on the crankshaft (13), the first valve (11) is pushed upwards by the second spring (18). Thus, the first valve (11) closes the first opening (7) and the first opening (7) is enabled to remain closed until the piston rod (14) comes to the lowest point on the crankshaft (13).

[0024] In an embodiment of the present invention, the dishwasher (1) comprises a motor (21) that enables the crankshaft (13) to move. The crankshaft (13) rotates by being energized by the motor (21).

[0025] In an embodiment of the present invention, the dosing mechanism (9) enables one dose of detergent to

be delivered to the washing cabin (3) as the piston rod (14) completes one full rotation on the crankshaft (13). In intensive washing programs, the dosing mechanism (9) performs more than one cycle and delivers several doses of detergent to the washing cabin (3).

[0026] By means of the present invention, high viscosity liquid detergent is enabled to be delivered to the washing cabin (3) by means of a dosing mechanism (9). The user fills in detergent into the dosing mechanism (9) and during washing, the detergent requirement is maintained by the dosing mechanism (9). Meanwhile, liquid detergents having high viscosity are enabled to be dosed controllably.

Claims

1. A dishwasher (1) comprising a body (2); a washing cabin (3) disposed on the body (2) and wherein the washing process is performed; a detergent dispenser (4) that is detachably mounted on the body (2) and wherein liquid/gel detergent can be filled; a detergent receptacle (5) that is disposed inside the detergent dispenser (4) and wherein detergent is filled; a scaling receptacle (6) that is disposed next to the detergent receptacle (5) and wherein the detergent to be used in the washing process is transferred from the detergent receptacle (5) and collected; at least one first opening (7) that is arranged between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) to the scaling receptacle (6); at least one second opening (8) that is arranged between the scaling receptacle (6) and the washing cabin (3) and that enables the detergent to be transferred from the scaling receptacle (6) to the washing cabin (3); at least one gasket (10) that is seated on each opening (7, 8) and that provides leak proofing, and a dosing mechanism (9) that is disposed between the detergent receptacle (5) and the scaling receptacle (6) and that enables the detergent to be transferred from the detergent receptacle (5) towards the washing cabin (3) by controlling opening/closing of the first opening (7) and the second opening (8), **characterized by** a first valve (11) having a gasket (10) thereon for closing the first opening (7), a second valve (12) having a gasket (10) for closing the second opening (8), and the dosing mechanism (9) that enables at least one opening (7, 8) to be almost entirely closed during transfer of detergent from the detergent receptacle (5) to the washing cabin (3).

2. A dishwasher (1) as in claim 1, **characterized by**

   - a crankshaft (13) disposed on the detergent receptacle (5), in the direction of the first opening (7) and the second opening (8),
   - a piston rod (14), one end of which is fastened to the crankshaft (13), the other end extending towards the scaling receptacle (6),
   - a first support member (15), one end of which is fastened to the piston rod (14), moving in the vertical direction,
   - a second support member (16) that is connected to the first support member (15), that has the second valve (12) thereon and that moves together with the first support member (15) in the vertical direction,
   - the first valve (11) mounted to the second support member (16) so as to move on the second support member (16), and
   - a first spring (17) disposed between the first support member (15) and the second support member (16) and a second spring (18) disposed between the first valve (11) and the second valve (12).

3. A dishwasher (1) as in Claim 1 or Claim 2, **characterized by** the dosing mechanism (9) comprising a stopper (19) that is disposed on the first support member (15), that exerts pressure on the first valve (11) when the piston rod (14) moves downwards and that enables the first valve (11) to compress the second spring (18) and the first opening (7) to be opened.

4. A dishwasher (1) as in any one of the above claims, **characterized by** the dosing mechanism (9) comprising a grasper (20) that is disposed on the first support member (15), that grasps the second support member (16) when the piston rod (14) moves upwards and enables the same to move in the upward direction and that enables the second spring (18) to be compressed between the first valve (11) and the second valve (12).

5. A dishwasher (1) as in any one of the above claims, **characterized by** the dosing mechanism (9) that enables the first opening (7) and the second opening (8) to be closed at the same time as the piston rod (14) moves on the crankshaft (13) between the lowest and highest points.

6. A dishwasher (1) as in any one of the above claims, **characterized by** the first spring (17) that pushes the second valve (12) downwards while the piston rod (14) moves on the crankshaft (13) between the lowest and highest points.

7. A dishwasher (1) as in any one of the above claims, **characterized by** the second spring (18) that pushes the first valve (11) upwards while the piston rod (14) moves on the crankshaft (13) between the lowest and highest points.

8. A dishwasher (1) as in any one of the above claims, **characterized by** a motor (21) that enables the crankshaft (13) to move.

9. A dishwasher (1) as in any one of the above claims, **characterized by** the dosing mechanism (9) that enables one dose of detergent to reach the washing cabin (3) as the piston rod (14) completes one full rotation on the crankshaft (13).

Figure 1

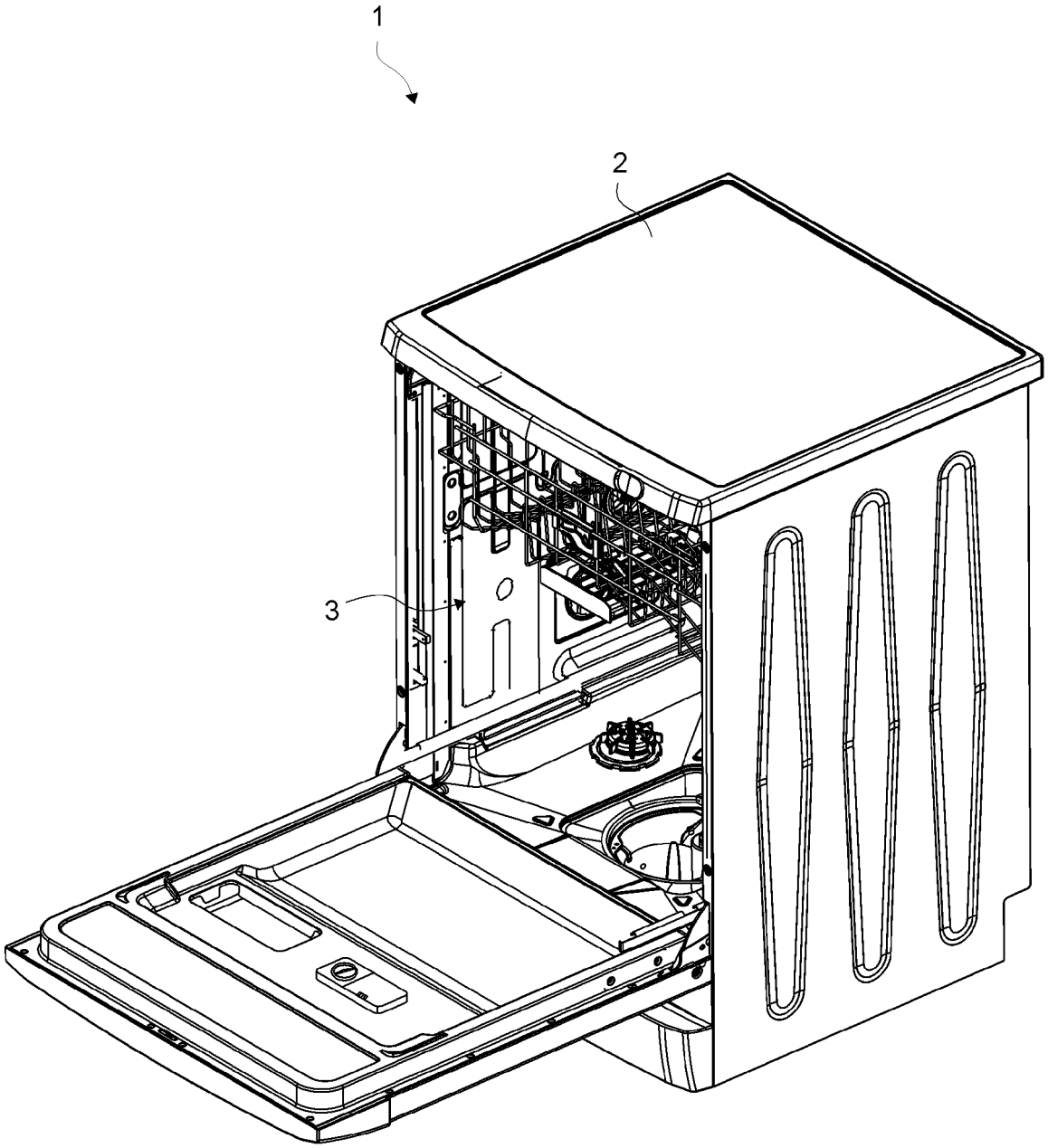


Figure 2

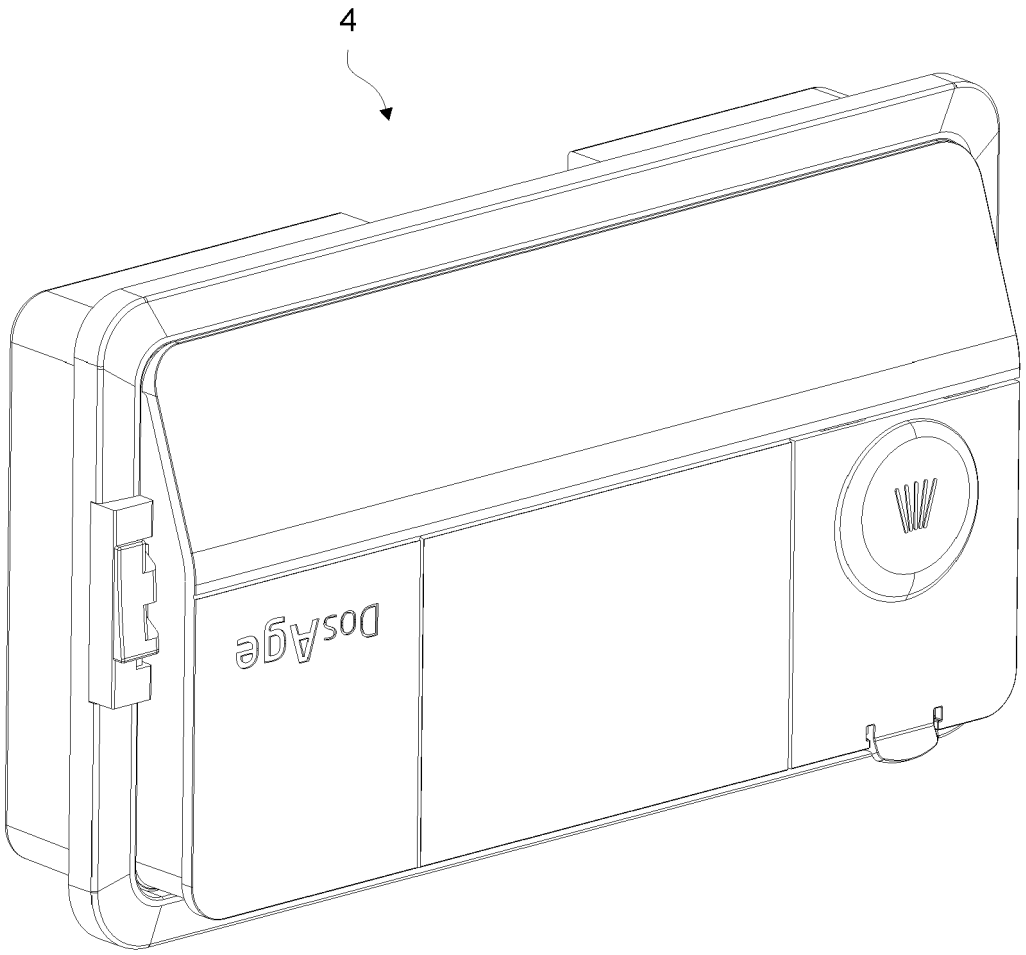


Figure 3

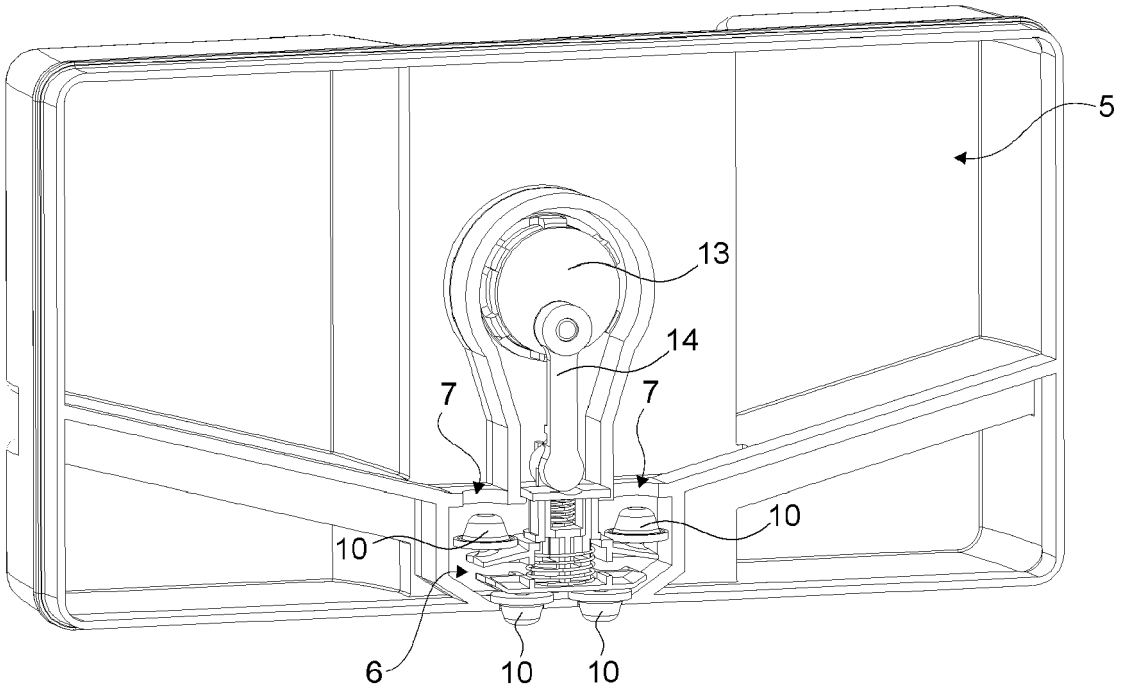


Figure 4

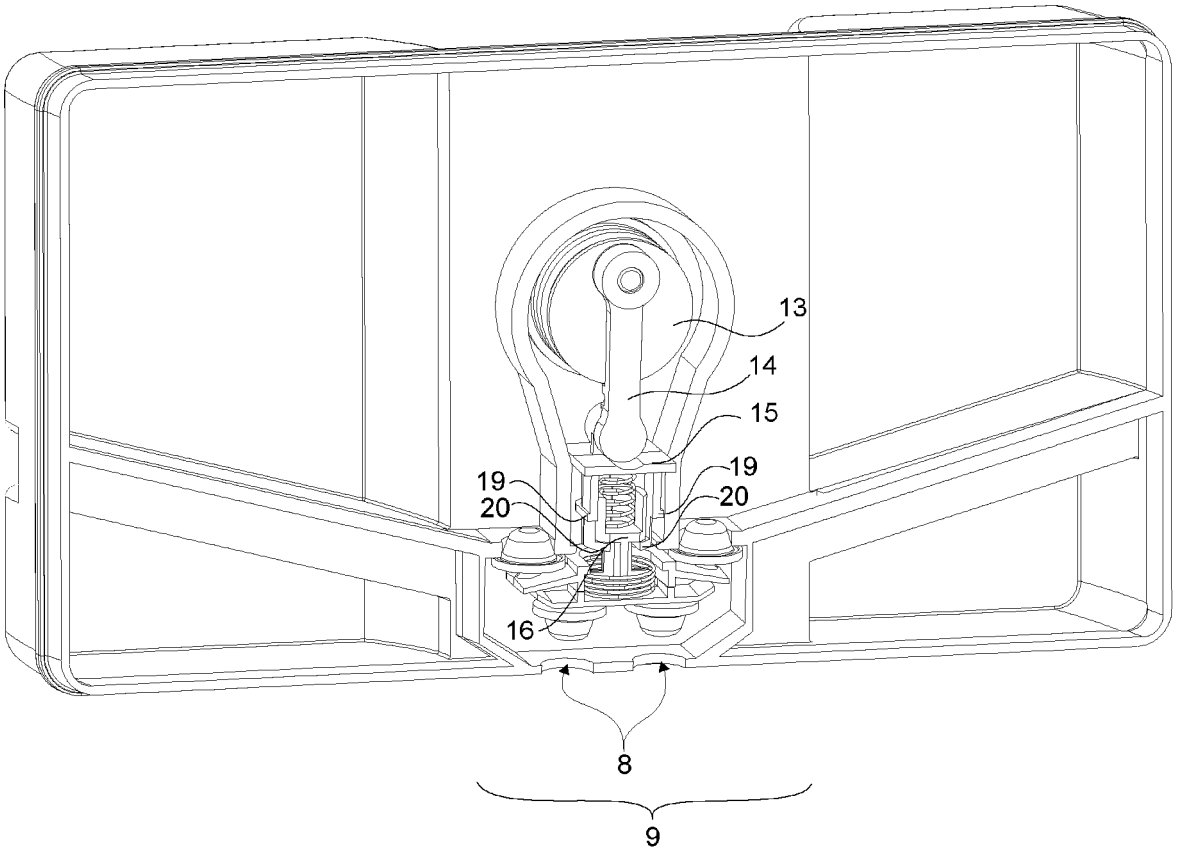


Figure 5

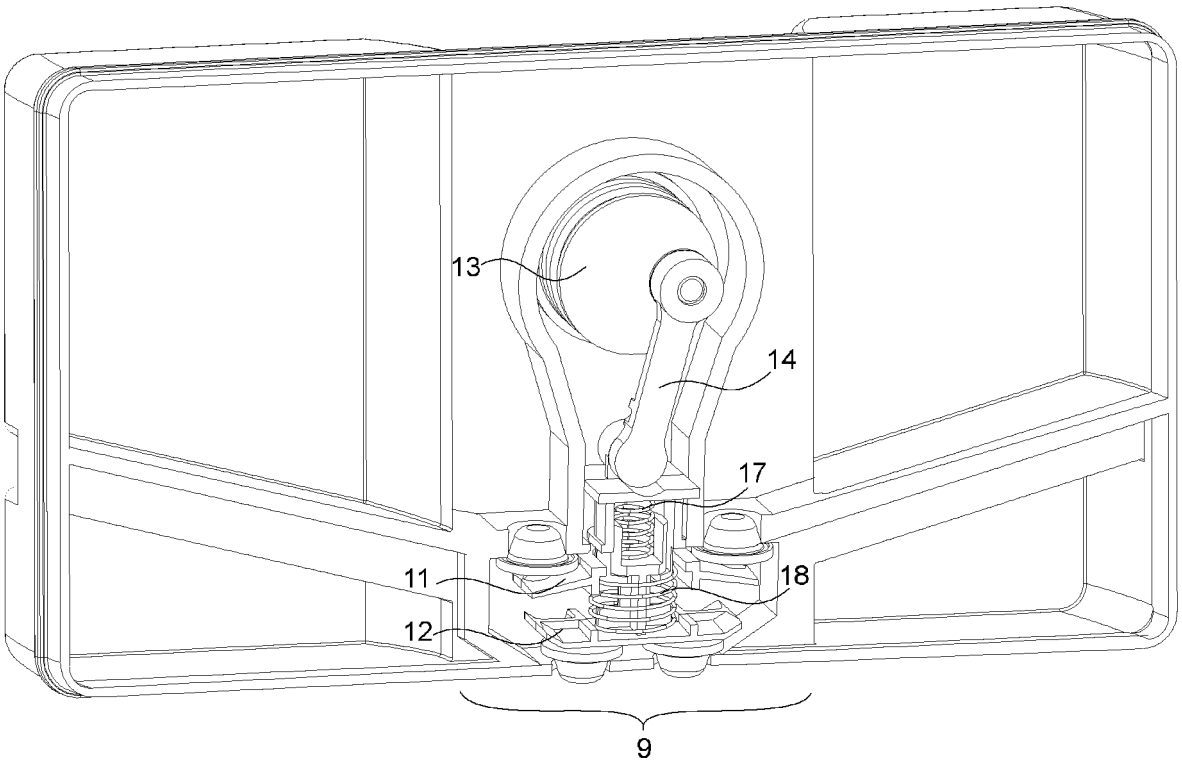
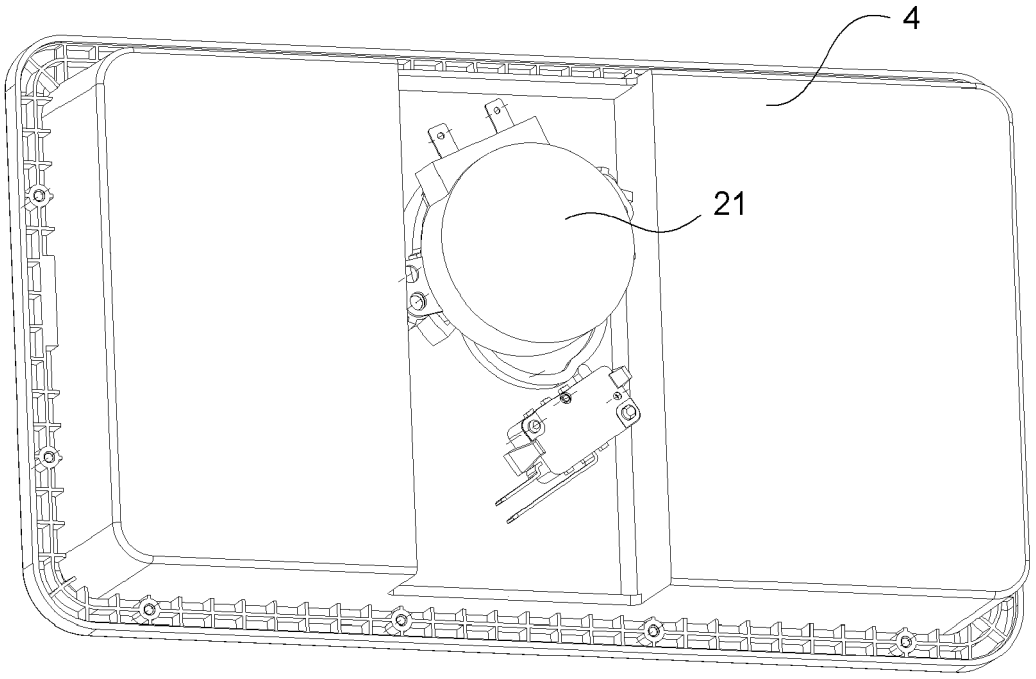


Figure 6



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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 3365

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2010 003771 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 13 October 2011 (2011-10-13)	1	INV. A47L15/44
A	* page 4, paragraph 31 - page 10, paragraph 66; figures 1-5 *	2-9	
X	EP 1 943 937 A1 (ELECTROLUX HOME PROD CORP [BE]) 16 July 2008 (2008-07-16)	1	
A	* column 4, paragraph 24 - column 6, paragraph 37; figures 1,3,4,6,7 *	2-9	
X	DE 10 2007 017098 A1 (HENKEL AG & CO KGAA [DE]) 16 October 2008 (2008-10-16)	1	
A	* figures 4-6 *	2-9	
X	ES 2 533 246 A1 (INNOVACIO I RECERCA IND I SOSTENIBLE S L [ES]) 8 April 2015 (2015-04-08)	1	
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TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 January 2017	Lodato, Alessandra

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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