(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 391 800 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.10.2018 Bulletin 2018/43

(51) Int Cl.:
A47L 15/44 *(2006.01)*

(21) Application number: **18168227.9**

(22) Date of filing: **19.04.2018**

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

(30) Priority: **21.04.2017 IT 201700044151**

(71) Applicant: **Candy S.p.A.**
20900 Monza, Monza e Brianza (IT)

(72) Inventor: **FUMAGALLI, Aldo**
20900 Monza, MONZA E BRIANZA (IT)

(74) Representative: **Leihkauf, Steffen Falk**
Jacobacci & Partners S.p.A.
Via Senato, 8
20121 Milano (IT)

(54) **DISHWASHER WITH DETERGENT DISPENSER**

(57) A dishwasher (1) comprises a washing container (2), a spraying device (5, 6, 7) for spraying a washing liquid in the washing container (2), a detergent container (14) having a dispensing opening (17) for dispensing the detergent (16) into the washing container (2), and a shutter (18) for opening and closing the dispensing opening (17), wherein the detergent container (14) is adapted to accommodate a total volume of detergent (16) sufficient for a plurality of wash cycles and the dishwasher (1) further comprises a dosing device (19) in communication with the dispensing opening (17) and which can be activated by means of the dispensing actuator (20) for dosing and dispensing, during a single wash cycle, a partial volume of detergent provided for said single wash cycle.

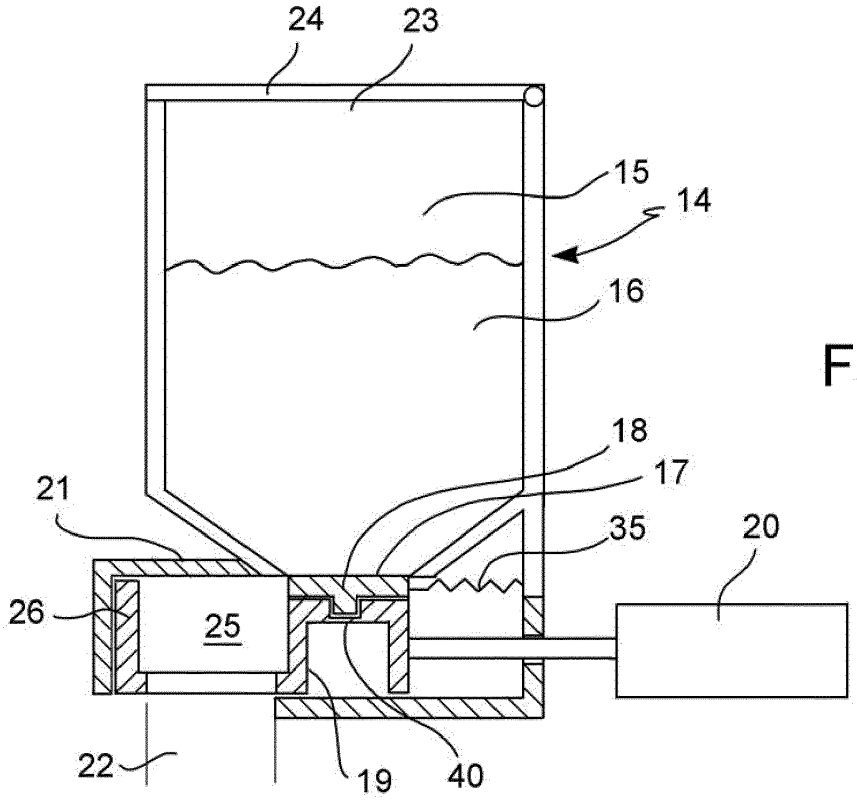

FIG. 2

EP 3 391 800 A1

Description

[0001] The present invention relates to a dishwasher of the type comprising a washing container for accommodating the dishes to be washed, a spraying device for spraying a washing liquid onto the dishes arranged in the washing container, and a detergent container for dispensing detergent during the wash cycle of the dishes.

[0002] Dishwashers are known with a detergent container, formed in the door of the dishwasher, which can be opened and closed by a cover. Before every use of the dishwasher, the user loads a dose of detergent into the detergent container (the volume of which is dimensioned to contain only one dose of detergent) and manually closes the cover, which remains closed by virtue of a snap-lock system. After switching on the dishwasher and closing the door, a wash cycle starts during which an actuator disengages the restraining system of the cover. In this manner, the entire content of the detergent container is poured into the washing container, in which it mixes with the water which is recirculated and sprayed onto the dishes.

[0003] With the dishwashers of the prior art, the user must load the detergent before each wash cycle and manual dosing a very small amount of powder or liquid, as precisely as possible, which activity is perceived as intrinsically annoying and sometimes difficult, in particular for elderly people. Furthermore, the fact that the dishwasher detergent must be stored out of the reach of children, and therefore is often placed in very high cabinets, which can be reached only by climbing onto a chair or onto a ladder, must also be taken into account.

[0004] It is thus the object of the invention to facilitate the loading and dosing of detergent in dishwashers.

[0005] These and other objects are achieved by means of a dishwasher according to claim **1.** Some advantageous embodiments are the object of the dependent claims.

[0006] According to an aspect of the invention, a dishwasher comprises:

- a washing container for accommodating dishes to be washed,
- a spraying device for spraying a washing liquid onto the dishes in the washing container,
- a detergent container forming an inner space for containing a detergent, a dispensing opening for dispensing the detergent from the inner space towards the washing container, and a shutter member for opening and closing the dispensing opening,
- an electronic control device which controls the activation of the spraying device and of a dispensing actuator acting on the shutter member,

wherein:

- the inner space of the detergent container is adapted to accommodate a total volume of detergent sufficient for a plurality of wash cycles,
- the dishwasher further comprises a dosing device in communication with the dispensing opening and which can be activated by means of the dispensing actuator for dosing and dispensing, during a single wash cycle, a partial volume of detergent provided for said single wash cycle.

[0007] By virtue of the sizing of the detergent container and of the dosing device and in that the dispensing actuator also actuates the dosing device, the detergent container can be filled less frequently, e.g. once a week or a month, with a large amount of detergent, without the user being burdened by the need to accurately dose at all, and the dishwasher can be used for a given period of time and for a given number of washes without needing to refill or dose the detergent.

[0008] Furthermore, by virtue of the dosing device actuated automatically during the wash cycle, the user only needs to load the detergent, but no longer dose it for the single wash cycle.

[0009] In order to better understand the invention and appreciate its advantages, some non-limiting embodiments will be described below by way of example with reference to the figures, in which:

- figure 1 is a diagrammatic front view of a dishwasher according to an embodiment of the invention;
- figure 2 is a diagrammatic section view of a detergent container and of a dosing device of the dishwasher according to an embodiment, in a first configuration of use (dispensing opening closed and dosing compartment empty);
- figure 3 shows the detergent container and the dosing device in figure 2 in a second configuration of use (dispensing opening open and dosing compartment filled);
- figure 4 shows the detergent container and the dosing device in figure 2 in a third configuration of use (dispensing opening closed again and dosing compartment still filled but in dosed detergent dispensing step);
- figures 5 and 6 are two section views of a detergent container for the dishwasher according to an embodiment;
- figure 7 is a diagrammatic side view of a dishwasher according to a further embodiment of the invention;
- figure 8 is a front view of a rinse-aid and detergent dispensing assembly of the dishwasher according to an embodiment;
- figure 9 diagrammatically shows part of a hydraulic circuit of the dishwasher according to an embodiment;
- figure 10 is a partial section view of the detergent container and of the dosing device of the dishwasher according to a further embodiment.

[0010] With reference to the figures, a dishwasher 1 comprises a washing container 2 adapted to accommodate dishes 3 to be washed and which can be closed by a door 4.

[0011] At least one spraying device is positioned inside the dishwasher 1, e.g. a spraying arm 5 rotatably mounted in the washing container 2 and forming a plurality of spraying nozzles 6 for spraying a washing liquid onto the dishes 3 accommodated in the washing container 2. A pump 7 is hydraulically connected, e.g. by means of a delivery pipe 8, to the spraying arm 5 for feeding the washing liquid to the spraying nozzles 6.

[0012] The dishwasher 1 also comprises a heating device 9, adapted to heat the washing liquid, e.g. an electric resistor arranged in a collection tank 10 of the washing liquid. The collection tank 10, preferably formed in a lower zone of the washing container 2 or under the washing container 2, is connected to the pump 7 to allow the drawing of the either cold or heated washing liquid needed for washing the dishes 3. The collection tank 10 and/or the pump 7 are further connected to an inlet valve 11 for loading network water, and to a discharge duct 12 for discharging the washing liquid. The inlet valve 11 is placed in a supply conduit 36 which can be connected to the water network and which forms an air break 37 to prevent drawing back of liquid into the water network and passes through a water softener device 38 (decalcifier) before opening into the washing container, in particular into the collection tank 10.

[0013] Dishwasher 1 further comprises a detergent container 14 forming an inner space 15 for containing a detergent 16 (powder or liquid), a dispensing opening 17 for dispensing detergent 16 from the inner space 15 towards the washing container 2, and a shutter member 18 for opening and closing the dispensing opening 17.

[0014] A control device, e.g. an electronic control board 13, is configured to allow the selection of a dish treatment program from a plurality of treatments programs, and controls the actuation of the pump 7, of the heating device 9, of the inlet valve 11 and of a dispensing actuator 20 acting on the shutter member 18.

[0015] According to an aspect of the invention, the inner space 15 of the detergent container 14 is sized to accommodate a total volume of detergent sufficient for a plurality of wash cycles, and the dishwasher 1 further comprises a dosing device 19 in communication with the dispensing opening 17 and which can be activated by means of the dispensing actuator 20 for dosing and dispensing, during a single wash cycle, a partial volume of detergent 16 for said single wash cycle.

[0016] By virtue of the sizing of the detergent container 14 and of the dosing device 19 and to the fact that the dispensing actuator 20 also actuates the dosing device 19, it is possible to:

- fill the detergent container less frequently, e.g. once a week or once a month,
- fill the detergent container with a large amount of detergent without the user being burdened with accurate dosing at all, and
- use the dishwasher 1 for a period of time and a number of washes without needing to refill or dose the detergent every time.

[0017] Furthermore, by virtue of the fact that the dosing device 19 is actuated automatically during the wash cycle, the user only needs to load the detergent, but no longer dose it for the single wash cycle.

[0018] According to an embodiment, the detergent container 14 can be either extracted or removed from the dishwasher 1 to facilitate its filling. Advantageously, the dishwasher 1 forms a coupling seat 21 for a removable mechanical connection, e.g. snap-locking or bayonet, of the detergent container 14 and for a connection of the dispensing opening 17 into communication with a dispensing conduit 22 communicating with the inside of the washing container 2.

[0019] The coupling seat 21 may be formed in a side wall 23 of the washing container 2, e.g. in the inner surface of the door 4 (**figure 7**).

[0020] According to an embodiment, the detergent container 14 forms a loading opening 23 (in addition to the dispensing opening 17) for pouring detergent 16 into the inner space 15 of the detergent container 14.

[0021] The loading opening 23 is preferably larger than the dispensing opening 17 to facilitate and speed up the filling of the detergent container 14 and to facilitate an airtight seal of the smaller dispensing opening 17 by means of the shutter member 18.

[0022] The loading opening 23 can be opened and closed by a cover 24 (possibly provided with a seal) which can be directly and permanently connected (e.g. hinged or inserted in the form of a gate valve) to the detergent container 14 (so that it cannot be lost but can easily be washable and repairable). Alternatively, the cover 24 may be provided as fully detachable component and therefore more easily replaceable.

[0023] According to an embodiment, the cover 24 may be formed or connected to the coupling housing 21 so as to close the loading opening 23 when the detergent container 14 is coupled to the coupling seat 21 so as to free the loading opening 23 when the detergent container 14 is detached from the coupling housing 21. This reduces the number of components and the number of operations required for loading the detergent.

[0024] In an embodiment (**figure 2**), with the detergent container 14 in position of use, the dispensing opening 17 is formed on a lower side of the detergent container 14, so as to facilitate the dispensing of the detergent 16 by virtue of the force of gravity. The loading opening 23 may be formed on an upper side of the detergent container 14, opposite to the dispensing opening 17, to facilitate the connection and the movement of the loading cover 24 and of the shutter member 18 without mutual encroachments.

[0025] According to a further embodiment, the dis-

pensing opening 17 may be formed in the loading cover 24 with the advantage of being able to make the base body of the detergent container 14 with a single opening.

[0026] According to an embodiment (**figures 2**, **3, 4**) the shutter member 18 may comprise:

- a translatable shutter, e.g. gate valve or a piston, or
- a rotating shutter, e.g. a ball, a cylinder, a plate, or
- an elastically deformable shutter, e.g. a membrane.

[0027] The shutter member 18 can be coupled to the dispensing opening 17 and can be displaced with respect to the dispensing opening by means of the flow actuator 20 to allow and prevent the release of detergent 16 from the dispensing opening 17 in controlled manner.

[0028] The shutter member 18 may be permanently and elastically urged into a closed position (e.g. by means of a spring 35, **figure 5**) to ensure the airtight seal of the dispensing opening 17 when the detergent container 14 is detached from the dishwasher and/or when the dispensing actuator 20 is deactivated.

[0029] Alternatively, the shutter member 18 may be shaped and displacable so as to always block the passage of detergent when the shutter member 18 stops immobile in any one position, and so as to allow the passage of detergent or even convey the detergent, when the shutter member 18 is moved with respect to the dispensing opening 17.

[0030] Examples of this latter embodiment are ball or piston or box shutters having one or more cavities adapted to receive a limited quantity of detergent when they are facing and communicating with the dispensing opening 17 and to release this limited amount of detergent when they are displaced out of communication with the dispensing opening 17.

[0031] According to an embodiment, the dosing device 19 delimits a dosing space 25 which is much smaller than the inner space of the detergent container 14, and which can be switched (displaced or connected) by means of the dispensing actuator 20:

- into communication with the dispensing opening 17 to fill with a dosed quantity of detergent 16 and
- successively, into communication with a dispensing conduit 22 and/or with the feeding conduit 36 of the network water, or directly with the inside of the washing container 2 to release the dosed quantity of detergent 16 into the washing container 2.

[0032] According to an embodiment, the dosing space 25 may be formed in a dosing container 26 which is either distinct or separate from the shutter 20 and possibly installed permanently in the dishwasher 1. This makes it possible to make the dosing container 25 independently from the detergent container 14 and to couple it easily and permanently with the dispensing actuator 20 (without needing to make a detachable coupling) in addition to not exposing the dosage compartment 26 to handling and to the consequent risk of displacement or damage, by the user.

[0033] According to an alternative embodiment, the dosing space 25 may be formed directly in the shutter member 18, thus reducing the number of individual components to be made and to move, at the cost of greater complexity of the shape of the shutter member 18.

[0034] According to an embodiment, the dosing space 25 can be switched (displaced or connected) by means of the dispensing actuator 20 into communication with the water feed conduit 36 or with the pump 7 to completely empty the dosed detergent 16, to wash the dosing space 25 and to achieve an intense mixing of the detergent 16 with the washing liquid (**figure 9**).

[0035] According to an embodiment, the volume of the dosing space 25 may be adjustable to adapt the dosed amount of detergent 16 to the wash cycle conditions, to the user's preferences or to the type of detergent used.

[0036] According to an embodiment (**figure 10**), the volume of the dosing space 25 can be adjusted by either displacing or deforming at least one wall 27 delimiting the dosing space 25, e.g. by means of the same dispensing actuator 20.

[0037] Either additionally or alternatively, the partial volume of detergent 16 for the single wash cycle is adjustable, preferably in automatic manner, e.g. by adjusting the number of actuations of the dosing device 19 and/or by adjusting the volume of the dosing space 25 and/or by adjusting the number of switches of the dosing space 25 into communication with the dispensing opening 17 and with the dispensing conduit 22.

[0038] The dispensing actuator 20 may comprise a single actuator controlled by the control unit 13, which moves the shutter member 18, switches the dosing space 25 and, if provided, adjusts the volume of the dosing space 25, e.g. a linear actuator (linear motor, solenoid), rotary actuator (electric motor) or roto-translating actuator (linear electric motor and rotary switch assembly).

[0039] **Figure 10** shows an example of a linear and rotary flow actuator 20 which displaces the shutter member 18 and the dosing container 26 by means of the linear motion and displaces the wall 27 of the dosing container 26 by means of the rotational movement and a worm screw mechanism 28 to adjust the volume of the dosing space 25.

[0040] Alternatively, the dispensing actuator 20 may comprise a plurality of single actuators controlled by the control unit 13, which move the shutter member 18, switch the dosing space 25 and, if provided, adjust the volume of the dosing space 25, e.g. one or more linear, rotary or roto-translating actuators.

[0041] According to an embodiment, the dosing device 19 may be permanently fixed to the detergent container 14 and detached together with it from the dishwasher 1. Alternatively, the dosing device 19 can be permanently fixed in the dishwasher 1.

[0042] In order to avoid the risk of deterioration of the detergent 16 inside the detergent container 14, due to a

prolonged and repeated exposure to high operating temperatures of the dishwasher 1, a layer of temperature-insulating material 29, for example a single or multiple air gap or foam material is advantageously provided between the inner space 15 of the detergent container 14 and the inner space of the washing container 2 and/or a cooling system 30, e.g. a cool water conduction system, in heat exchange relationship with the inner space 15 of the detergent container 14 (**figure 7**).

[0043] According to an embodiment, the dishwasher 1 comprises a system 31 for detecting the quantity of dishes 3 and/or of the dirt intensity of the dishes 3 arranged in the washing container 2, and the control circuit 13 adjusts the partial volume of detergent 16 for the single wash cycle according to the quantity of dishes 3 and/or the dirt intensity detected.

[0044] The detecting system 31 may comprise a temperature sensor 32 of the washing liquid, connected to the control circuit 13, which control circuit 13 calculates a temperature gradient during the heating of the washing liquid, said temperature gradient being indicative of the mass and thermal capacity of the dishes 3.

[0045] Either additionally or alternatively, the detection system 31 may comprise a washing liquid turbidity sensor 33 (e.g. optical), connected to the control circuit 13, said detected turbidity being indicative of dirt of the dishes 3. The turbidity sensor 33 and/or the temperature sensor 32 may be positioned in the collection tank 10.

[0046] Furthermore, it is noted that the detergent container 14 and the dosing device 19 are provided in addition to, and preferably distanced from, a rinse-aid container and doser 34.

[0047] **Figures from 2 to 6** show the function of dispensing and dosing of the detergent 16. With the detergent container 14 engaged with the coupling seat 21, the shutter member 18 is engaged by a coupling portion 40 of the dosing container 26 so as to be displacable together between:

- a first position (**figures 2**, **4**), in which the dispensing opening 17 is closed by means of the shutter member 18 and the dosing space 25 is in communication with the dispensing conduit 22 or directly with the washing tank 2,
- a second position **(figure 3**), in which the dispensing opening 17 is open and the dosing space 25 is in communication with the dispensing conduit 17.

[0048] By displacing the shutter 18 and the dosing container 26 from the first position to the second position **(figure 3**), the dosing space 25 fills with detergent 16. Successively, by displacing the shutter 18 and the dosing container 26 from the second position back to the first position **(figure 4**), the dispensing opening 22 is closed again and the dosing space 25 releases the volume of detergent 16 precisely dosed.

[0049] Advantageously, the used detergent is a liquid detergent, a powder detergent or a granular detergent.

[0050] Obviously, a person skilled in art may make further changes and variants to the dishwasher 1 and detergent container 14 described hereto without departing from the scope of protection of the invention, as defined in the following claims.

Claims

1. A dishwasher (1), comprising:

- a washing container (2) for accommodating dishes (3) to be washed,
- a spraying device (5, 6, 7) for spraying a washing liquid onto the dishes (3) in the washing container (2),
- a detergent container (14) forming an inner space (15) for containing a detergent (16), a dispensing opening (17) for dispensing the detergent (16) from the inner space (15) towards the washing container (2), and a shutter member (18) for opening and closing the dispensing opening (17),
- an electronic control device (13) which controls the activation of the spraying device (5, 6, 7) and of a dispensing actuator (20) acting on the shutter member (18),

characterized in that:

- the inner space (15) of the detergent container (14) is adapted for accommodating a total volume of detergent (16) sufficient for a plurality of wash cycles,
- the dishwasher (1) further comprises a dosing device (19) in communication with the dispensing opening (17) and which can be activated by means of the dispensing actuator (20) for dosing and dispensing, during a single wash cycle, a partial volume of detergent provided for said single wash cycle.

2. A dishwasher (1) according to claim 1, wherein the detergent container (14) can be extracted from the dishwasher (1).

3. A dishwasher (1) according to claim 1 or 2, wherein the detergent container (14) forms a loading opening (23) for pouring the detergent (16) in the inner space (15) of the detergent container (14), wherein the loading opening (23) is larger than the dispensing opening (17) and can be opened and closed by means of a cover (24).

4. A dishwasher (1) according to one of the preceding claims, wherein the shutter member (18) is selected in the group consisting of:

- a translatable shutter,
- a gate valve,
- a piston,
- a rotating shutter,
- a ball,
- a cylinder,
- a plate,
- an elastically deformable shutter,
- a membrane.

5. A dishwasher (1) according to one of the preceding claims, wherein the shutter member (18) is permanently elastically urged in a closed position to ensure the airtight seal of the dispensing opening (17) when the detergent container (14) is detached from the dishwasher and when the dispensing actuator (20) is deactivated.

6. A dishwasher (1) according to one of the preceding claims, wherein the shutter member (18) is shaped and movable so as to:

- always block the passage of detergent when the shutter member (18) is stationary in any one position, and
- allow the passage of detergent when the shutter member (18) is moved with respect to the dispensing opening (17).

7. A dishwasher (1) according to one of the preceding claims, wherein the dosing device (19) delimits a dosing space (25) which is smaller than the inner space (15) of the detergent container (14),
said dosing space (25) being switchable by means of the dispensing actuator (20):

- in communication with the dispensing opening (17) to fill the dosing space (25) by means of a dosed quantity of detergent (16) and
- in communication with a dispensing conduit (22) to release the dosed quantity of detergent (16) into the washing container (2).

8. A dishwasher (1) according to claim 7, wherein the dosing space (25) is formed in a dosing container (26) which is separate from the shutter (20) and installed permanently in the dishwasher (1), or
wherein the dosing space (25) is directly formed in the shutter member (18).

9. A dishwasher (1) according to one of claims 7 to 8, wherein the dosing space (25) is switchable by means of the dispensing actuator (20) in communication with a water conduit (36) to completely empty the dosed detergent (16) and to wash the dosing space (25).

10. A dishwasher (1) according to one of the preceding claims, wherein the partial volume of detergent (16) for the single wash cycle is adjustable in an automatic manner.

11. A dishwasher (1) according to claim 10, comprising a system for detecting the quantity of dishes (3) arranged in the washing container (2), and the control device (13) adjusts the partial volume of detergent (16) for the single wash cycle according to the quantity of dishes (3) detected.

12. A dishwasher (1) according to claim 11, wherein the system for detecting the quantity of dishes (3) comprises a temperature sensor (32) of the washing liquid connected with the control device (13), wherein the control circuit (13) calculates a temperature gradient during the heating of the washing liquid, said temperature gradient being indicative of the quantity of dishes (3).

13. A dishwasher (1) according to one of claims 10 to 12, comprising a system for detecting the dirt intensity of the dishes (3) arranged in the washing container (2), and the control device (13) adjusts the partial volume of detergent (16) for the single wash cycle according to the detected dirt intensity.

14. A dishwasher (1) according to claim 13, wherein the system for detecting the dirt intensity comprises a turbidity sensor (33) of the washing liquid, connected with the control device (13), said turbidity detected being indicative of the dirt of the dishes (3).

15. A dishwasher (1) according to one of the preceding claims, comprising:

- a temperature-insulating layer (29) between the inner space (15) of the detergent container (14) and an inner space of the washing container (2), and/or
- a cooling system (30) in heat exchange relation with the inner space (15) of the detergent container (14), and/or

said detergent container (14) and the dosing device (19) are provided in addition to a container and dosing device for the rinse-aid (34).

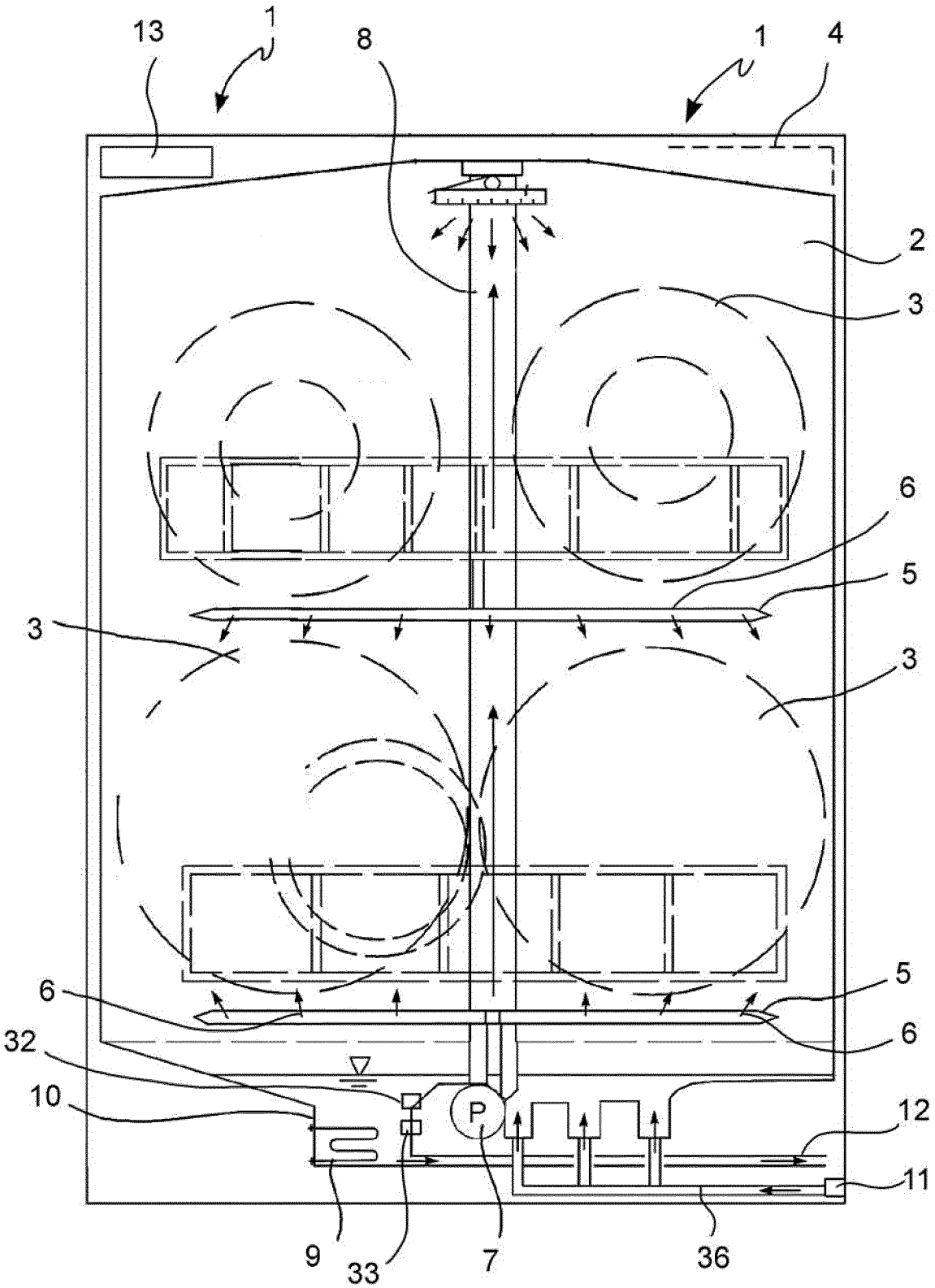

FIG. 1

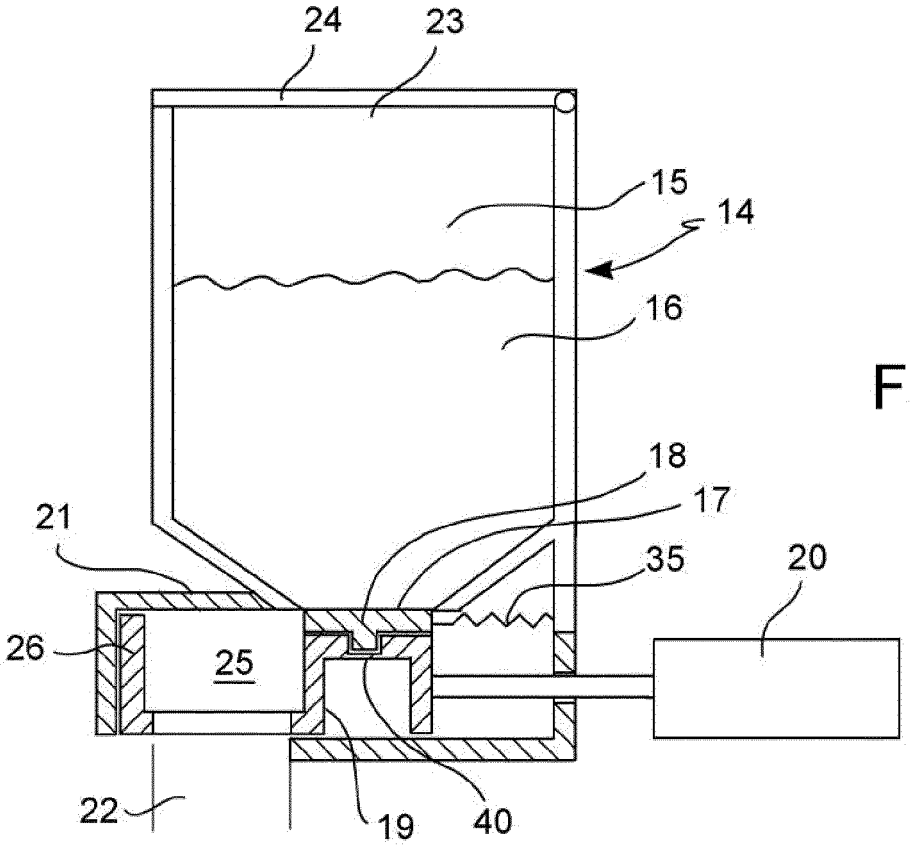
24
23
15
14
16
18
17
21
35
20
26
25
22
19
40

FIG. 2

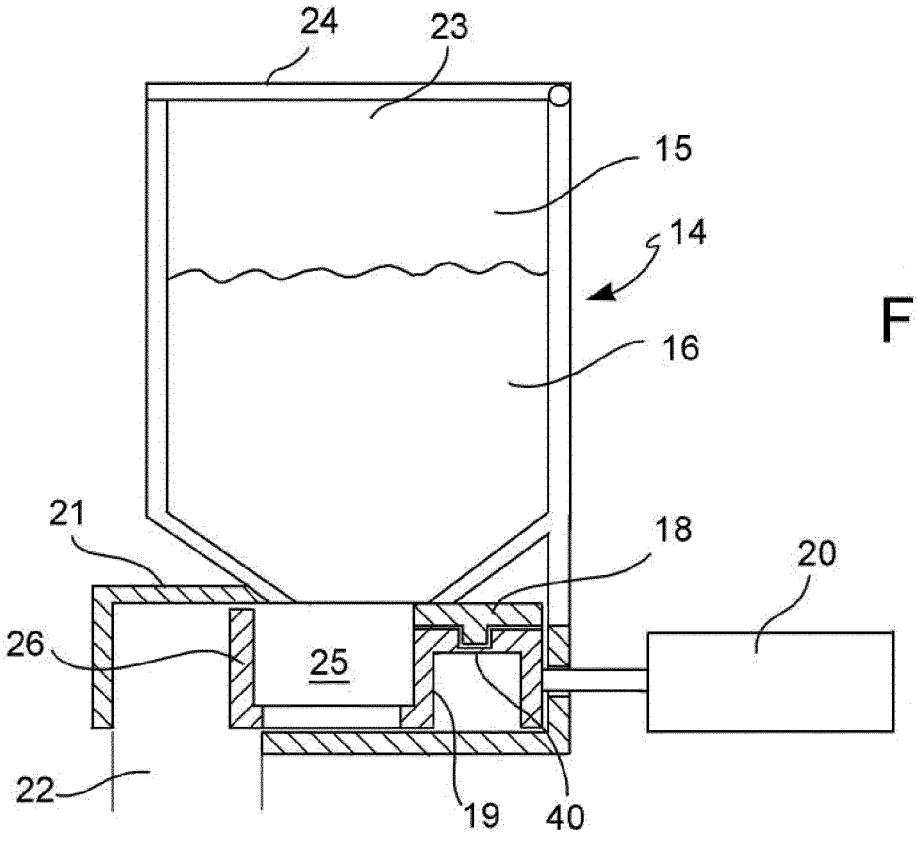
24
23
15
14
16
21
18
20
26
25
22
19
40

FIG. 3

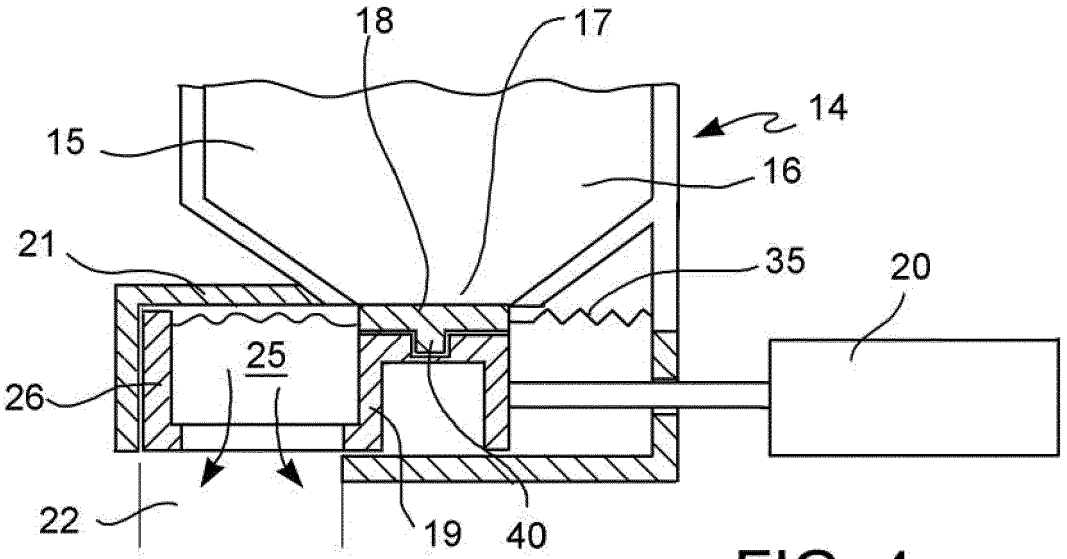

FIG. 4

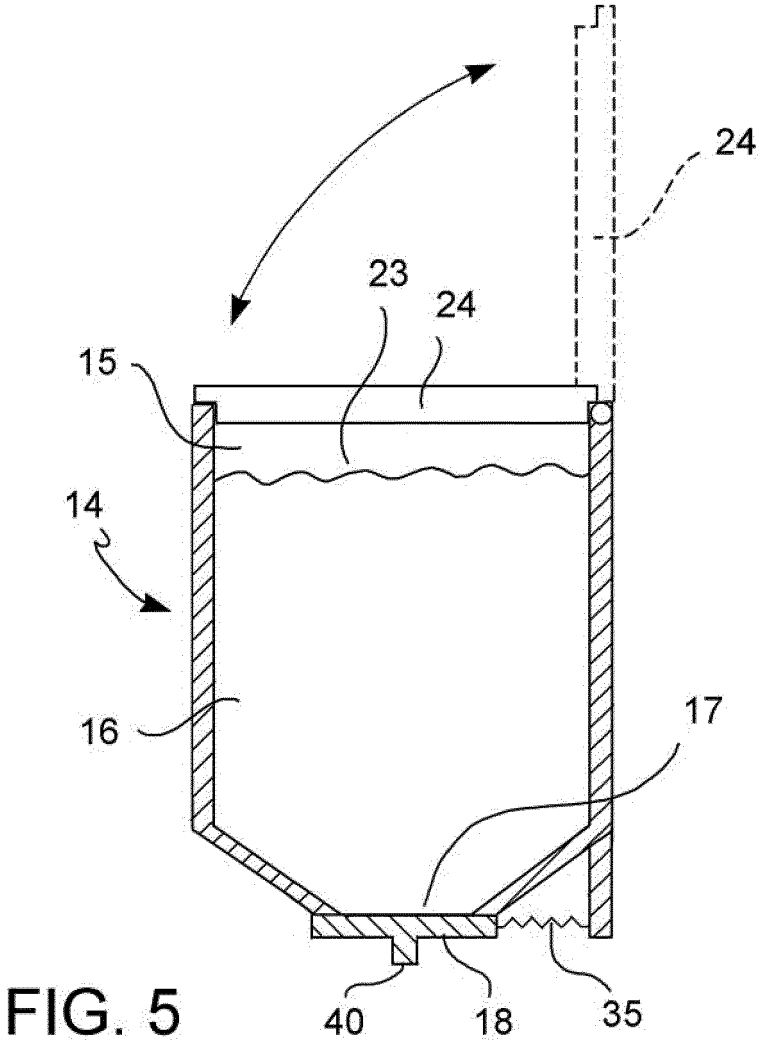

FIG. 5

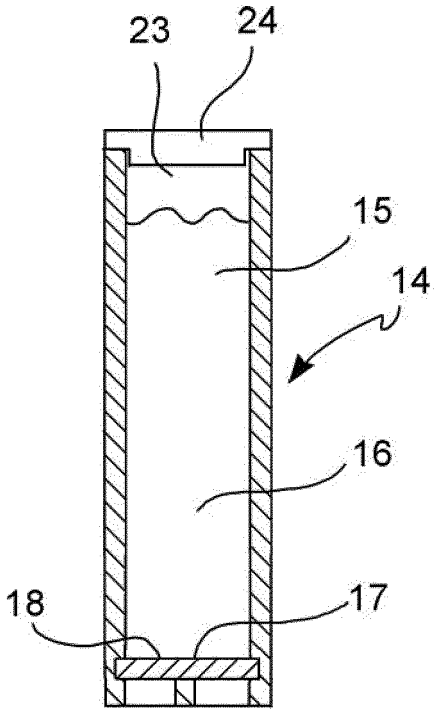

FIG. 6

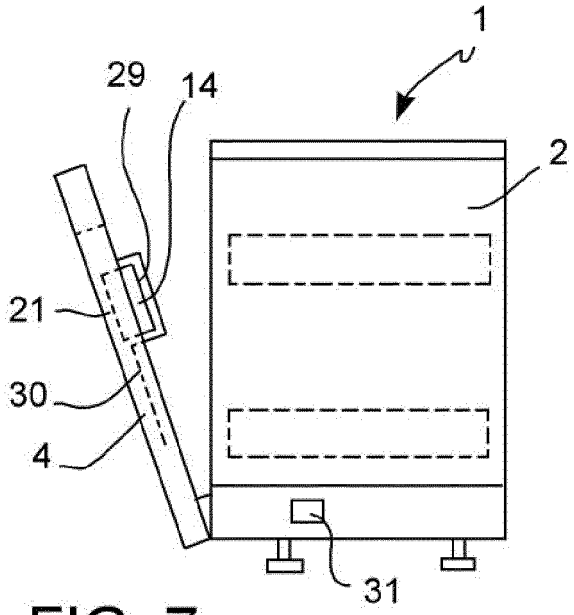

FIG. 7

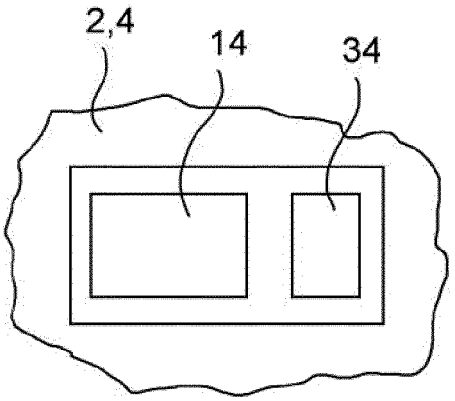

FIG. 8

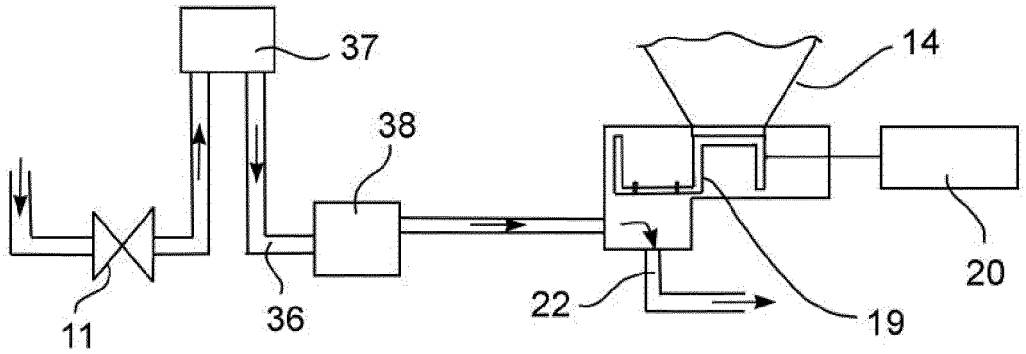

FIG. 9

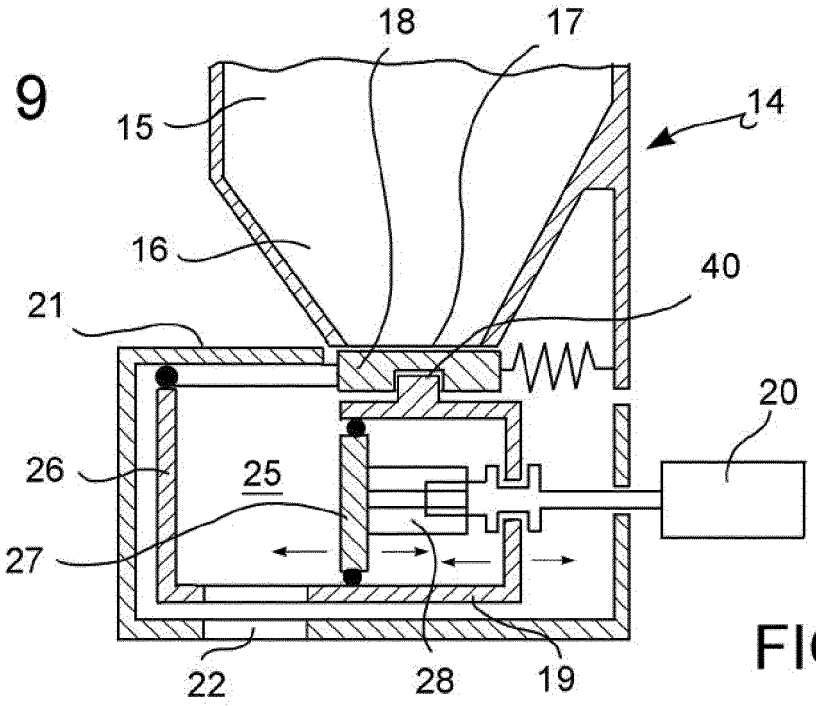

FIG. 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 16 8227

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 A	US 2006/059958 A1 (BYRNE ROBERT M [US] ET AL) 23 March 2006 (2006-03-23) * the whole document * -----	1-4,8, 10-15 5,6,9	INV. A47L15/44
X A	US 2009/000644 A1 (DRUECKER MARKUS [DE] ET AL) 1 January 2009 (2009-01-01) * paragraph [0009] - paragraph [0034] * -----	1,3,4,7, 8,10, 13-15 2,5,6,9, 11,12	
X A	EP 1 228 736 A2 (MERLONI ELETTRODOMESTICI SPA [IT]) 7 August 2002 (2002-08-07) * paragraph [0006] - paragraph [0082] * -----	1-4,7,15 5,6,8-14	
A	WO 2009/033828 A1 (HENKEL AG & CO KGAA [DE]; KESSLER ARND [DE]; HOHENADEL KARL-HEINZ [DE]) 19 March 2009 (2009-03-19) * page 1 - page 6 * * page 9 - page 11 * -----	1-15	

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	16 August 2018	Jezierski, Krzysztof

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 16 8227

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-08-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006059958 A1	23-03-2006	NONE	
US 2009000644 A1	01-01-2009	DE 102005059343 A1	14-06-2007
		EP 1956961 A1	20-08-2008
		US 2009000644 A1	01-01-2009
		WO 2007065529 A1	14-06-2007
EP 1228736 A2	07-08-2002	EP 1228736 A2	07-08-2002
		IT TO20010085 A1	30-07-2002
WO 2009033828 A1	19-03-2009	DE 102007042863 A1	12-03-2009
		WO 2009033828 A1	19-03-2009

EPO FORM P0459

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