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(54) WASHING MACHINE DETERGENT DISPENSER

(57) Washing machine comprising a detergent dispenser (11), wherein the detergent dispenser comprises a drawer (16) housed in a wall (7) of the washing machine, and at least one container (23) adapted to be loaded with a detergent product, wherein the at least one container being pivot able about a pivot axis (31) relative to the drawer, such that the container is stable in a first and in a second position.

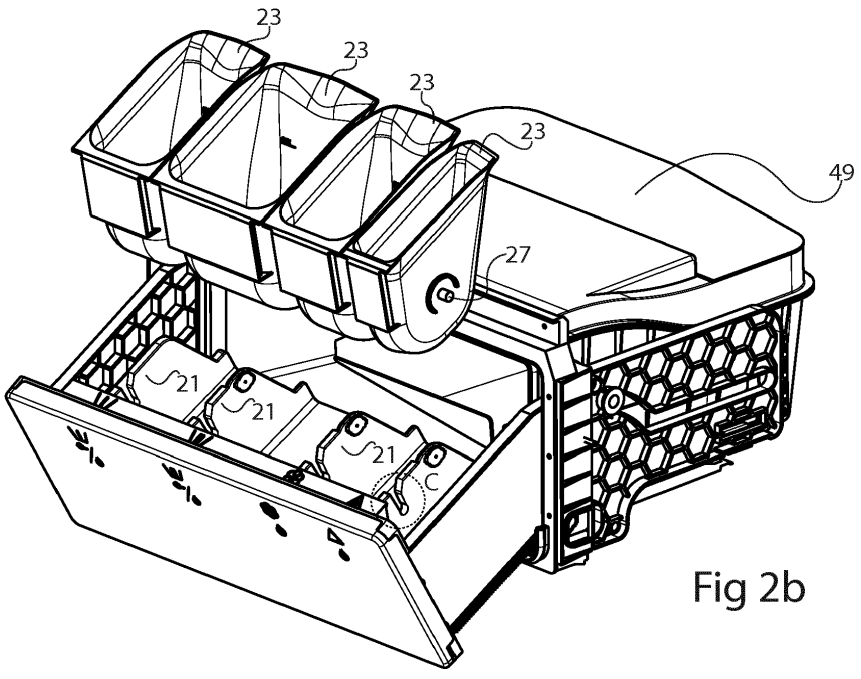

Fig 2b

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Description

Field of the invention

[0001] The present invention relates to a washing machine, especially a washing machine detergent dispenser.

Background of the invention

[0002] During a conventional washing operation in an automatic washing machine, it is both necessary and desirable to add washing additives such as detergents, bleaching agents, fabric softeners, and the like, to the washing drum. These additives can be a particulate product, such as a powder, an agglomerate, a granulate, a liquid or a gel. Frequently, therefore, automatic laundry washing machines are provided with dispensers for dispensing wash additives to the washing machine at predetermined times during the washing process, which generally includes a fill cycle, a wash cycle, a rinse cycle, and a centrifugation cycle.

[0003] In many automatic laundry washing machines, the dispensing device for particulate detergent products comprises a box shaped recess and a drawer which is slidably mounted in said recess. The drawer may be provided with a plurality of separate compartments containing detergent products. The detergent product is held in place until flushed by an incoming water flow into the washing drum, the compartments being provided with a falling slope towards the washing drum. When adding detergent products in form of a liquid or a gel, the compartments are designed so the liquid or gel is kept in place by the walls of the compartments and is added to the washing drum by a flush of water filling up the compartments so that it overflows and drains into the washing drum. When the flush of water has stopped, the remaining water may be drained out from the compartments by a siphon. These dispensing devices requires different compartments for particulate and liquid/gel detergent products and a part of the detergent product tend to remain on the walls of the compartments and form a sticky coating and requires often to be manually cleaned.

[0004] In US 5 875 655, a detergent dispenser consists of a cup for receiving and dispensing the detergent product, a tray pivotally supporting the cup for movement between an upright orientation for retaining the detergent in the cup and a dumping orientation in which the detergent in the cup is distributed into the washing drum. An actuation system comprising a solenoid, operated by the inlet water flow is provided for rotation of the cup. Such a detergent dispenser is complicated, relatively costly to manufacture and difficult to assemble.

Summary of the invention

[0005] It is one object of the present invention to provide a washing machine detergent dispenser, where the above-mentioned drawbacks are eliminated wholly or at least partly.

[0006] According to one aspect of the invention there is provided a washing machine comprising a detergent dispenser, wherein the detergent dispenser comprises a drawer housed in a wall of the washing machine, and at least one container adapted to be loaded with a detergent product. The at least one container is pivotable about a pivot axis relative to the drawer, such that the container is stable in a first and in a second position. The first position may be an upright position, in which the container is upright to be loaded with the detergent product, and the second position may be a tilted position, in which the container is tilted for discharging of the detergent product into a washing compartment of the washing machine.

[0007] Since the container is stable in a first, upright and a second tilted position, the same type of detergent dispenser can be used for detergent products in different shapes, such as liquids, tablets, powder etc. and a siphon used in detergent dispensers for liquid detergents in prior art becomes redundant.

[0008] A smaller quantity of detergent products can be loaded into the detergent dispenser, as the detergent product becomes very effectively discharged into the washing compartment of the washing machine. This solution also makes it possible to flush the container with water when the container has been tilted and thereby more or less eliminating any film of residues on the container walls that otherwise would be needed to be cleaned manually.

[0009] The drawer may also contain several containers of different volume sizes depending of the detergent product that is loaded in the container. A modular system with containers of different volume sizes can be built, that depends on the size of the washing machine.

[0010] The container may have an asymmetric shape with respect to the pivot axis, such that, when filled with water of a first level, a common center of mass is shifted from one side of the pivot axis to the other, whereby the container is tilted from the upright to the tilted position by being filled with water. The container may have such a shape that the container has differently angled side walls on either side of the pivot axis, in such way that one side wall is more vertical relative to the pivot axis and the other side wall is more inclined away from the pivot axis.

[0011] By adapting the shape of the container on each side with respect to the pivot axis, a simple and reliability solution accomplishes the tilting of the container, such as movement of a common center of mass due to the water weight.

[0012] The common center of mass may be configured to remain on the other side of the pivot point when the container has been tilted and emptied.

[0013] This makes it possible to flush the container in the tilted position so that the detergent product is very effectively discharged into the washing compartment of the washing machine, and the container is cleaned from detergent. Thereby, a smaller amount of detergent prod-

uct may be used since most of the detergent product is discharged into the washing compartment. Films of detergent residues on the container walls are further more or less avoided.

[0014] The container may further comprise a counterweight, which keeps the container in an upright position until the container has been filled with water to a certain level and keeps the container in the tilted positon after being emptied.

[0015] The counterweight may be attached to or integral with a side wall of the container which is relatively vertical as compared to the opposing side wall on the opposite side of the pivot axis.

[0016] The vertical side wall of the container may comprise a compartment for the counterweight. Hereby it is possible to easily replace or change the counterweight.

[0017] The inclined side wall of the container may comprise a lip curving away from the interior of the container. This forms a jug-shaped container that further facilitates the tilting of the container and acts as a guide for a mixture of water and detergent product into the washing compartment of the washing machine when the container is being tilted.

[0018] The washing machine may further comprise a frame with an attached casing disposed in a front wall of the washing machine, wherein the drawer is movable in a displacement direction between a retracted position, in which the drawer is inserted in the casing, and an extracted position, in which the drawer partially extends from the casing to expose the container, wherein the drawer further comprises a hinge mechanism to provide a tipping of the drawer downwards when the drawer is in the extracted position.

[0019] Hereby the drawer will in a smooth, subtle motion expand from the casing towards the user and then slightly tip forward and expose the container in an ergonomic working level, especially with large industrial washing machines. The tilting may also move the centre of mass of a tilted container to the other side of the pivot, such that the container returns to the upright position if tilted.

[0020] The opening angle of the drawer when tipped downwards may be adjustable to control the maximal quantity of detergent product that is loaded into the container.

[0021] Water may be added to the container by a nozzle, wherein the nozzle is protruding into the container. Hereby splashing of water into the drawer is prevented.

[0022] Preferably, water from the nozzle rinses the inner side of the container when the container is in the tilted position.

[0023] When the container has been filled with water to a certain level, the center of mass is displaced and the container is tilted, wherein the position of the nozzle relative to the container is displaced so that water from the nozzle rinses the inner walls of the container. Hereby, most of the detergent product will follow the water flow into the washing compartment of the washing machine.

[0024] Compared to known washing machine detergent dispensers, especially compared to US 5 875 655, this detergent dispenser is cheap to manufacture, have a great reliability due to simple components, have a positive impact on the environment, thanks to allowing use of less detergent products, and allows a good ergonomic working position for the user.

Brief description of the drawings

[0025] The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Fig. 1 is a schematic perspective view of an automatic washing machine featuring an embodiment of the detergent dispenser according to the present invention.

Fig. 2a is a perspective view of a detergent dispenser containing several containers.

Fig. 2b is the same view as in Fig. 2a where the containers have been removed from the drawer.

Fig. 2c is an enlarge view of the portion C in Fig 2b.

Fig. 3a is a perspective view of a container, and fig 3b shows a cross section therethrough.

Fig. 4a-f are perspective views of the container showing movement of common center of mass relative the pivot axis when the container is filled with water.

Fig. 5a-c are perspective views of how the drawer is movable relative to the casing.

Detailed description of the exemplary embodiments

[0026] Fig. 1 illustrates schematically a frontloaded washing machine 1 comprising a parallelepiped-shaped casing 3, a cylindrical washing compartment 5, arranged inside the casing 3 and an electrically-powered motor (not shown), which is adapted to drive a drum in the washing compartment 5. A door 9 is attached to a front wall 7 of the casing 3 for watertight sealing of the washing compartment 5. Inside the casing 3, typically above the washing compartment 5 is a detergent dispenser 11 located, which is adapted for feeding a given quantity of detergent products into the washing compartment 5. The washing machine 1 further comprises an appliance control panel 13 located on the front wall 7 of the casing 3, which allows the user to manually select a desired washing cycle among several available washing cycles. A freshwater supply circuit (not shown) is connected to the water main for providing a flow of fresh water from the water main to the detergent dispenser 11 and/or to the washing compartment 5 according to the washing cycle selected by the user.

[0027] With reference to Figs. 2a-b and 5a- 5c, the detergent dispenser 11 comprises a drawer 15, located inside the front wall 7 of the washing machine 1, typically above the washing compartment 5 and beside the appliance control panel 13. An outer handle 17, may be flush with the front wall 7 when the drawer 15 is closed. Two horizontal side walls 19 can be attached to the handle 17. Partitions 21 (cf. figs 2b-2c) may be disposed inside the drawer 15, to which partitions at least one container 23 can be attached. In the illustrated case four containers 23 are used, having different sizes and intended uses. The containers 23 may be adapted to be loaded with detergent products, such as detergents, bleaching agents, fabric softeners and like in the form of a powder, a liquid, or a tablet etc.

[0028] The partitions 21 can be provided with vertical slots 25 (cf. fig 2c), to which pivot pins 27 of the containers 23 may be attached and pivotally suspended (cf. fig 2b) by means of a snap fit. According to the shown embodiment of Fig. 2b, the detergent dispenser 11 contains four containers 23 in three different volume sizes, but other variations are possible. By changing the number and volume size of the containers 23 and corresponding partitions 21, a modular system can be created adapted to the size of the washing machine 1.

[0029] As shown in Fig. 3a and 3b, the container 23 may be shaped like a cup. The container 23 can be made of a plastic material, such as polypropylene, by injection moulding. Polypropylene T20 is one example of a suitably used material. A pin 27 may be formed in each side of the container 23. Each vertical slot 25 in the partitions 21 can be provided with a recess 29, which acts as a snap lock preventing the pin 27 from moving once attached to the slot 25 (cf. fig 2c). By inserting the pins 27 into the slots 27 of the partitions 21, the container 23 becomes pivotable about a pivot axis 31 relative to the drawer 15, such that the container 23 is stabile in first and a second position. That is, the pivot axis 31 is low enough in relation to the volume of the container 23, so that the container can tilt forwards or backwards and remain in either position. In the upright position the container may rest against the front wall of the drawer 15 and in the tilted position against the floor thereof.

[0030] The first position may be an upright position (A), as seen in Fig. 4a, in which the container 23 may be filled with a detergent product 57. The second stabile position may be a tilted position (B), as seen in Fig. 4e, for discharging of the detergent product mixed with water in the container 23 into the washing compartment 5 of the washing machine 1.

[0031] The container 23 may have an asymmetrical shape in form of different angled walls 33, 35 on either side of the pivot axis 31 as shown in the cross-section in fig 3b. A front wall 33, facing the front of the compartment, may be more vertical relative to the pivot axis 31 or lean towards the pivot axis and the rear wall 35, facing the interior of the machine 1, may be inclined away from the pivot axis 31 when rising from the container 23 bottom. The rear wall 35 can have a lip 37 curving away from the interior of the container 23, which creates a jug-like configuration of the container 23. Both the asymmetrical shape and the jug-like configuration of the container 23 facilitates tilting of the container 23 from the upright position (A) to the tilted position (B).

[0032] The container 23 can have an opening 39, directed upwards when the container is in the upright position (A). The opening 39 can be provided with a circumferential flange 41, preventing detergent products from falling between the containers 23 and possibly clogging the pins 27 preventing pivoting with respect to the slots 25. A crescent formed lip 43 may be arranged above the pins 27 for further prevention of the pins 27 being clogged by detergent products. The container 23 may also comprise a counterweight 45, which can be attached to or integral with the front wall 33 of the container 23. The counterweight 45 may be made of stainless steel or some other high-density material compared to the plastic used and may have the shape of a rectangle, although other shapes are possible. The counterweight 45 can be glued to the container 23 or as illustrated inserted into a compartment created by a pocket 61 arranged at the more vertical front sidewall 33 of the container 23. The counterweight 45 could also be provided as a thicker portion of the vertical side wall 33 in the container 23. By attaching or integration of a counterweight 45 to the container 23, it is facilitated that the container 23 remains in an upright position (A) until the container 23 has been filed with water to a certain level and remain the container 23 in the tilted positon (B) after being emptied.

[0033] A shown in to Figs. 2a-2b and 5a-5c, the detergent dispenser 11 may further comprise a frame 47 and a casing 49 attached to the frame 47. These parts 47, 49 can be made of a plastic material, such as polypropylene by injection molding. The drawer 15 can be movable inside the casing 49 in a substantially horizontally-orientated displacement direction d (cf. fig 5a). The drawer 15 may be movable between an inserted position (Fig. 5a), in which the drawer 15 is inserted into the casing 49 and an extracted position (Fig. 5b), in which the drawer 15 partly extends out of the casing 49 to expose the containers 23 attached therein. The horizontal side walls 19 of the drawer 15 are moved in vertical pockets 51 created between the frame 47 and the casing 49 to obtain the retracted and extracted position of the drawer 15.

[0034] The inner end of each horizontal side wall 19, opposite to the handle 17, can be provide with a hinge mechanism. As shown in Figs, 5a-5c, the hinge device may comprise knobs 63 attached on the inner end of each horizontal side wall 19. The knobs 63 is run in grooves 65 on a horizontal side wall 67 of the frame 47 while the horizontal side walls 19 of the drawer 15 are moved in the vertical pockets 51 created between the frame 47 and the casing 49. This hinge mechanism provides a tipping of the drawer 15 downwards, towards the front wall 9 of the washing machine 1, when the drawer 15 is in the extracted position. Thanks to the hinge-mech-

anism, the drawer 15 can in a smooth, motion expand towards the user and then slightly tip forward and expose the containers 23 in an ergonomic working height, especially at big industrial washing machines. Once the container 23 is exposed to the user, the container 23 can be filled with the detergent product. The opening angle of the tipped drawer 15 can be adjustable and controls the quantity of detergent product that can be filled into the container 23. The tipping is also one way of making a container return from a tilted position to an upright position, although other ways of achieving this motion of course are possible.

[0035] When the container 23 has been filled with an appropriate quantity of the detergent product, the drawer 15 is manually pushed into the casing 49 by the user. A washing program is selected from the appliance control panel 13 and the washing cycles according to the selected washing program starts. At some point, a flow of fresh water is added to the detergent dispenser 11 and/or the washing compartment 5 according to the selected washing cycles. A flow of fresh water is supplied from a fresh water supply circuit (not shown), connected to the water main. Water is added into the container 23 by a nozzle 55 located in the casing 49 (cf. fig 3b). The nozzle 55 may be controlled by a separate valve (not shown), connected to the fresh water supply circuit, according to the selected washing cycles.

[0036] When the container 23 has been filled with the detergent product 57, the container may be in an upright position (A) as illustrated in fig 4a. A common center of mass 59 is then at the bottom of the container 23, at the side of the pivot axis 31 closest to the front surface of the machine1, as seen in Fig. 4a. In this position A, the container 23 can be in a first stable position, e.g. resting against the inner front wall of the drawer.

[0037] When the container 23 is filled with water from the nozzle 55, the common center of mass 59 will move from the bottom of the container 23 towards the pivot axis 31, as seen is Fig. 4b and 4c. The container 23 is still stable in the upright position (A) due to the counterweight 45. The nozzle 55 may protrude into the container 23, as seen in Fig. 3b, when the container is in the upright position A, so most water ends up in the container 23 and is prevented from splashing into the rest of the detergent dispenser 11.

[0038] When the container 23 has been filled with water to a threshold level, the common center of mass 59 has moved above and past the pivot axis 31, as seen in fig 4d, the container 23 is not stable anymore and will tilt backwards towards the drum. The asymmetrical shape of the container 23 facilitates the tilting, e.g. the rear wall 35 allows water to be contained on the rear side of the pivot axis which moves the common center of mass 59 to the right in the drawing.

[0039] When tilted, the container 23 remains in a tilted position (B), as seen in Fig. 4e, where water and detergent is discharged into the washing compartment 5 guided by the lip 37 of the rear wall 35 of the container 23. The container 23 remains stable in this position, for instance resting against the floor of the drawer, even when the container 23 is empty the counterweight 45 now contributing to retain the common center of mass 59 on the rear side of the pivot axis 31, as seen in fig. 4f. By the counterweight 45 retaining the container 23 in the tilted position (B), most of the detergent product will be discharged into the washing compartment 23 and does not to any greater extent form a film of residues on the interior of the container 23 that needs to be manually cleaned. The position of the nozzle 55 relative the container 23 is changed when the container 23 is tilted, as seen in Fig. 6b, wherein the water flow from the nozzle 55 may follow the interior walls of the container 23 and thereby rinse the container 23 from detergent product. The shape and the tilting of the container 23, allows the same type of detergent dispenser to be used independently of the type of detergent product.

[0040] The container 23 may be retained in the tilted position B until the drawer 15 is moved from the retracted position according to Fig. 5a to the extracted position and tipped downwards towards the front of the washing machine 1 according to Fig. 5c. The tipping motion of the drawer 15 moves the container 23 from the tilted position (B) to the upright position (A). The common center of mass 59 is returned to the other side of the pivot axis 31, as seen in Fig 4a. Needless to say, other ways of raising the container 23 exists. The drawer 15 could for instance be provided with a bump or like to provide the tipping motion when the drawer 15 is drawn from the inserted position to the extracted position.

[0041] The drawer 15 can also be provided with a blocking mechanism (not shown), preventing movement of the container 23 from the upright position A to the tilted position B due to other forces than the water weight, as for example due to gravity when the drawer 15 is pushed hard from the extracted position into the retracted position. This blocking mechanism may work as a cradle that releases the container 15 only due to the water pressure created by the nozzle 55.

[0042] The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

[0043] For instance, this detergent dispenser has only been shown on a front- loaded washing machine but it will also be possible to use the detergent dispenser on a top-loaded washing machine.

Claims

1. A washing machine (1) comprising a detergent dispenser (11),
   wherein the detergent dispenser (11) comprises
   a drawer (15) housed in a wall (7) of the washing

machine (1), and
at least one container (23) adapted to be loaded with a detergent product, **characterized by**
the at least one container (23) being pivotable about a pivot axis (31) relative to the drawer (15), such that the container (23) is stable in a first and in a second position.

2. Washing machine (1) according to claim 1, wherein the first position is an upright position (A), in which the container (23) is upright to be loaded with the detergent product, and
wherein the second position is a tilted position (B), in which the container (23) is tilted for discharging of the detergent product into a washing compartment (5) of the washing machine (1).

3. Washing machine (1) according to claim 1, wherein the container (23) has an asymmetric shape with respect to the pivot axis (31), such that, when filled with water of a first level, a common center of mass (59) is shifted from one side of a pivot axis (31) to the other, whereby the container (23) is tilted from the upright (A) to the tilted (B) position.

4. Washing machine (1) according to claim 3, wherein the container (23) comprises differently angled walls (33, 35) on either side of the pivot axis (31).

5. Washing machine (1) according to claim 4, wherein a front wall (33) is more vertical relative to the pivot axis (31) than a rear wall (35), which is inclined away from the pivot axis (31).

6. Washing machine (1) according to claim 3, wherein the common center of mass (59) is configured to remain on the other side of the pivot axis (31) when the container (23) has been tilted and emptied.

7. Washing machine (1) according to any of the preceding claims, wherein the container (23) further comprises a counterweight (45).

8. Washing machine (1) according to claim 7, wherein the counterweight (45) is attached to or integral with the front wall (33) of the container (23) which is relatively vertical as compared to the opposing rear wall (35) on the opposite side of the pivot axis (31).

9. Washing machine according to claim 8, wherein the front wall (33) of the container (23) comprises a pocket (61) to provide a compartment (61) for the counterweight (35).

10. Washing machine according to claim 5, wherein the rear wall (33) of the container (23) comprises a lip (37) curving away from the interior of the container (23).

11. Washing machine (1) according to any of the preceding claims, further comprising a frame (47) with an attached casing (49) disposed in a front wall (7) of the washing machine (1),
wherein the drawer (15) is movable in a displacement direction (d) between an inserted position, in which the drawer (15) is recessed in the casing (49), and an extracted position, in which the drawer (15) partially extends from the casing (49) to expose the container (23),
wherein the drawer (15) further comprises a hinge mechanism to provide a tipping of the drawer (15) downwards when the drawer (15) is in the extracted position.

12. Washing machine (1) according to any of the preceding claims, wherein water is added to the container (23) by a nozzle (55), wherein the nozzle (55) is protruding into the container (23).

13. Washing machine (1) according to any of the preceding claims, wherein the inner side of the container (23) is rinsed by water from the nozzle (55) when the container (23) is in the tilted position (B).

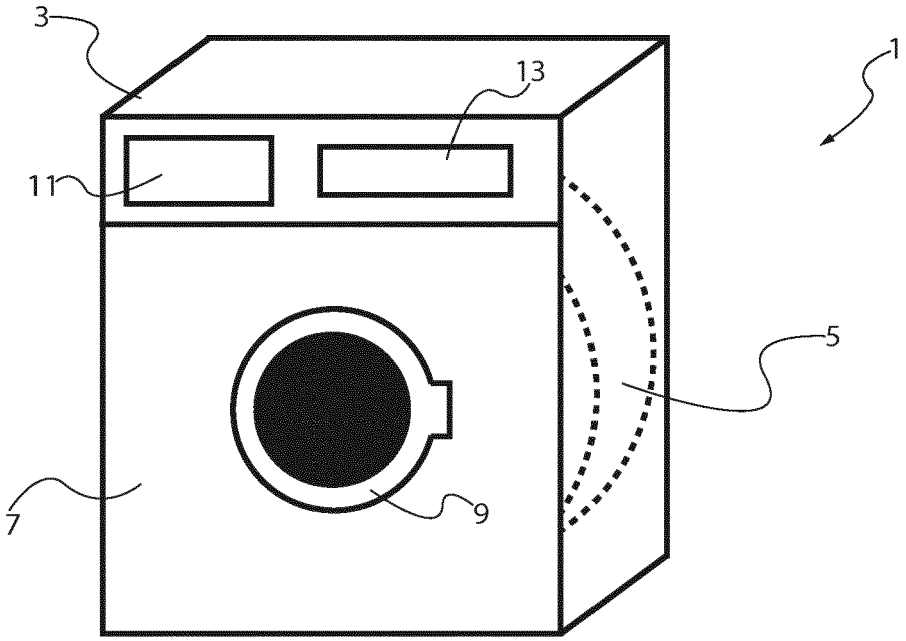

Fig 1

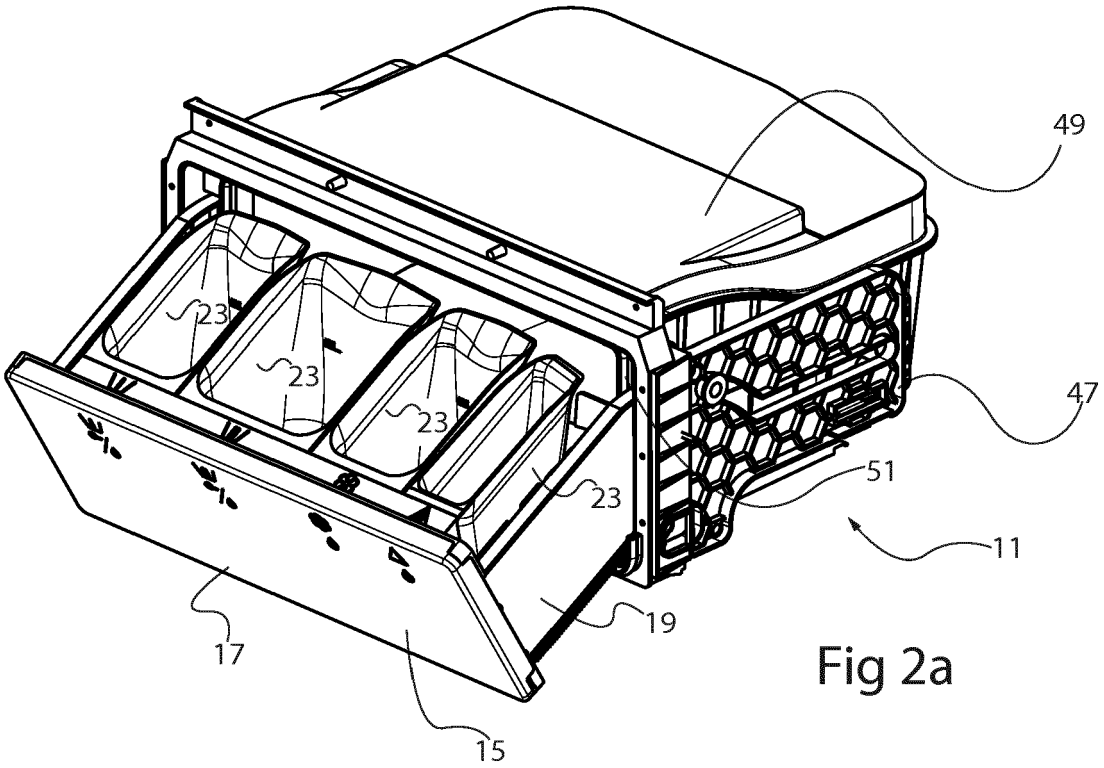

Fig 2a

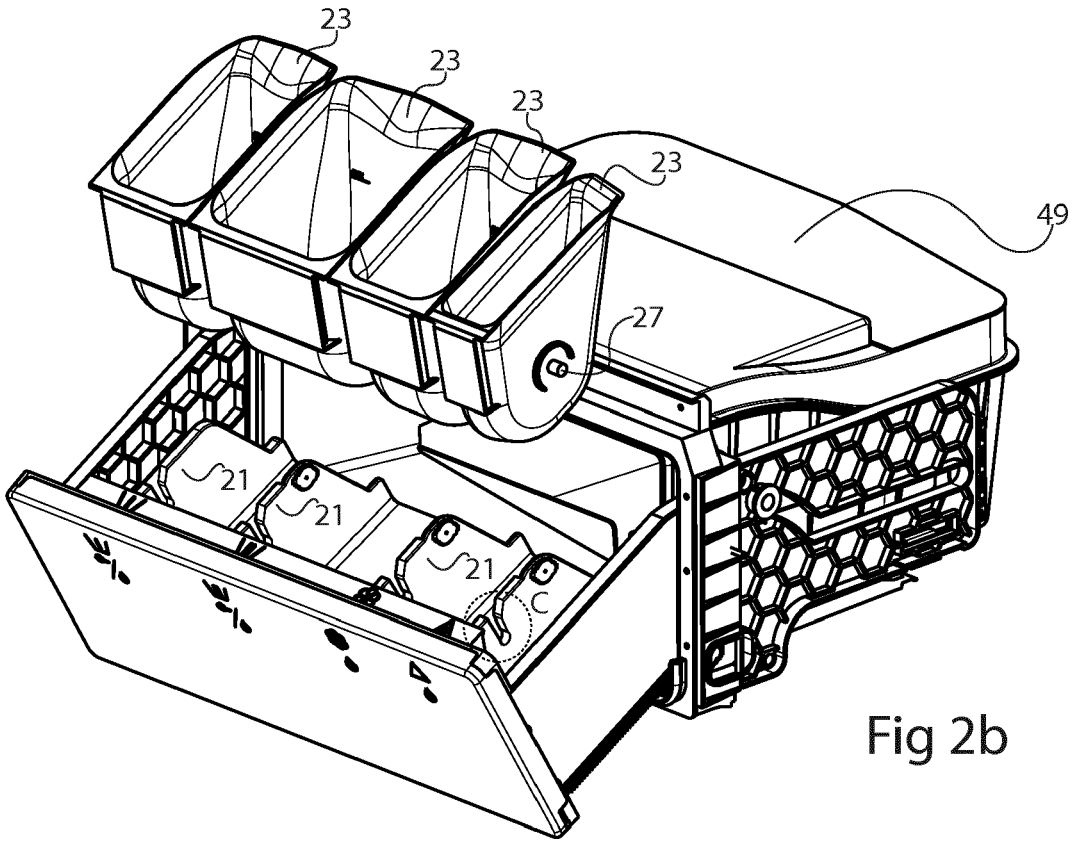

Fig 2b

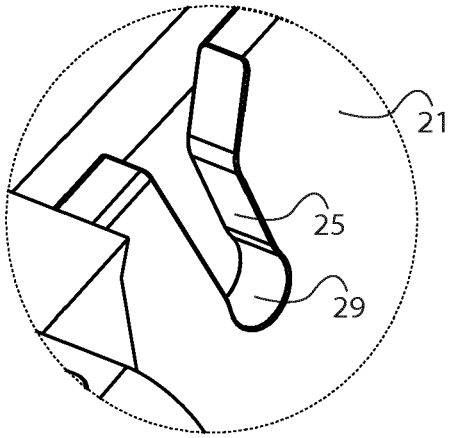

Fig 2c

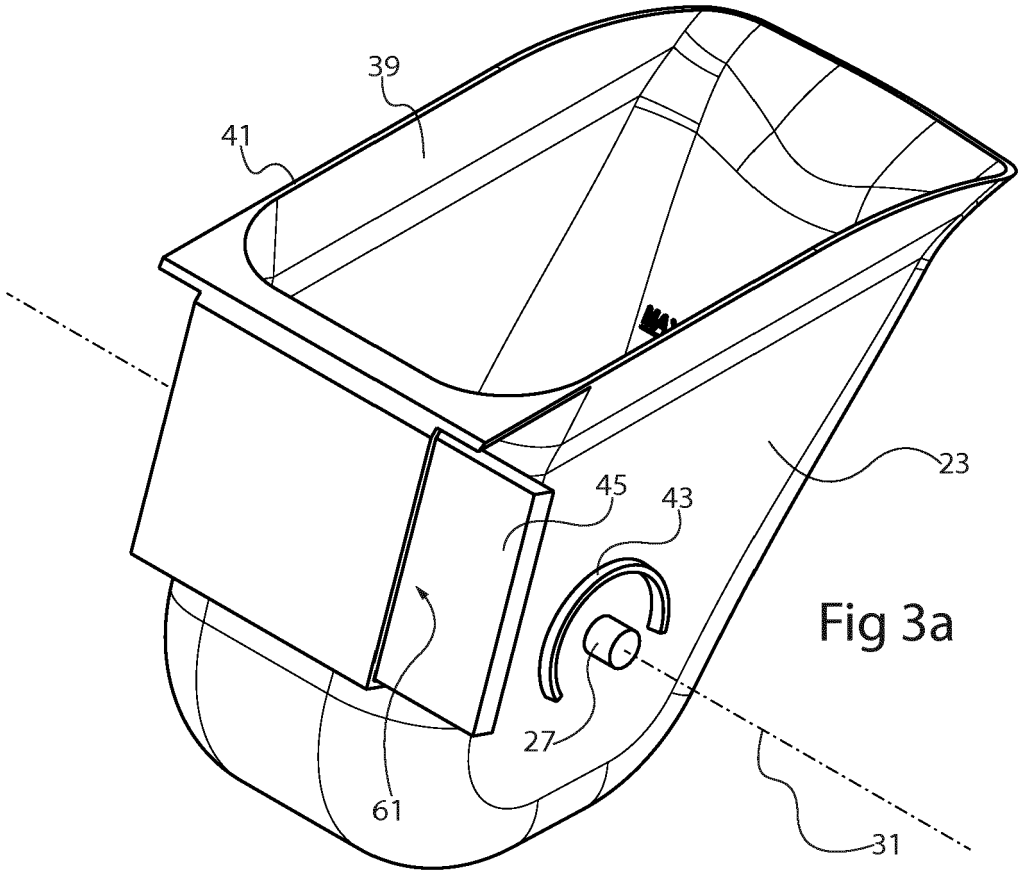

Fig 3a

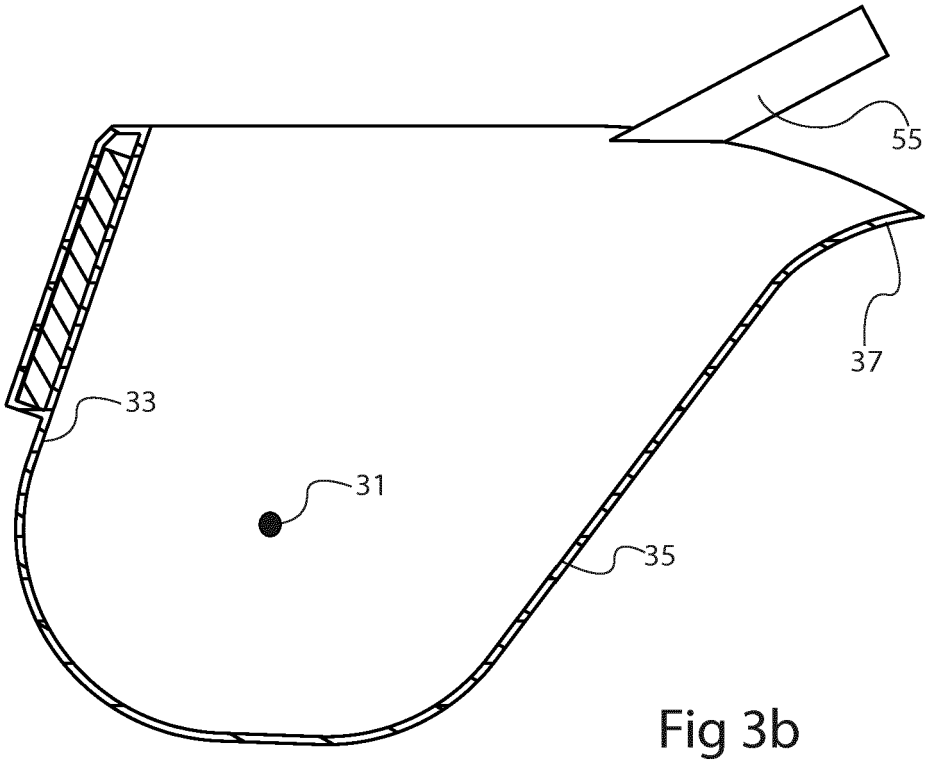

Fig 3b

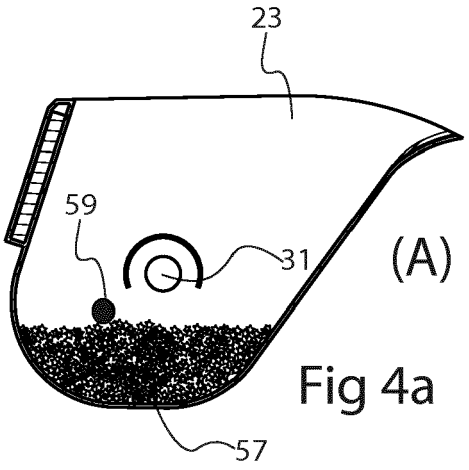

Fig 4a

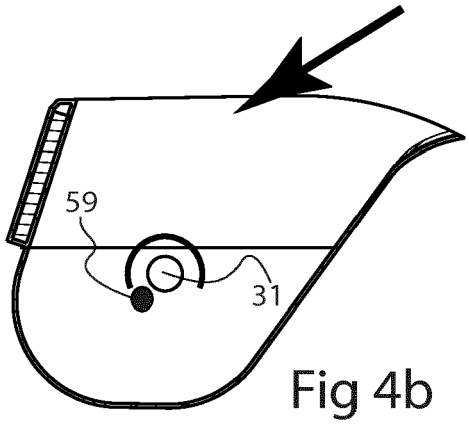

Fig 4b

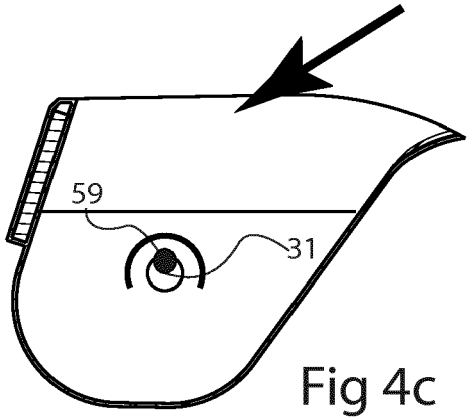

Fig 4c

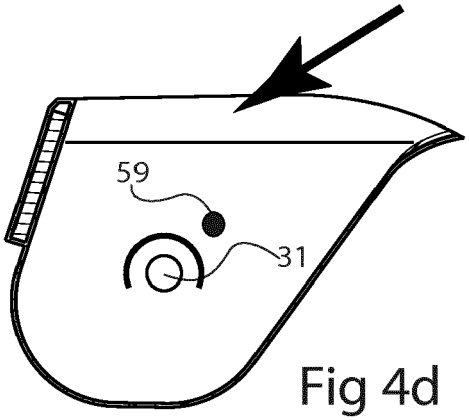

Fig 4d

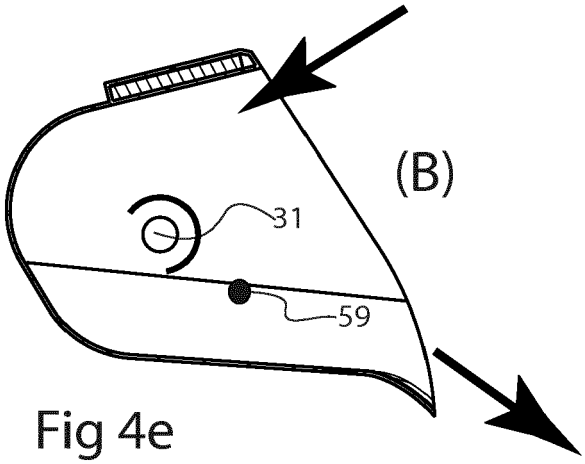

Fig 4e

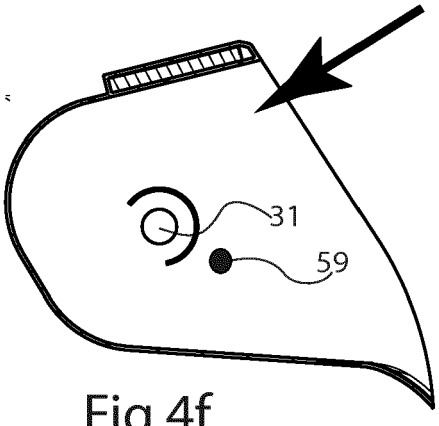

Fig 4f

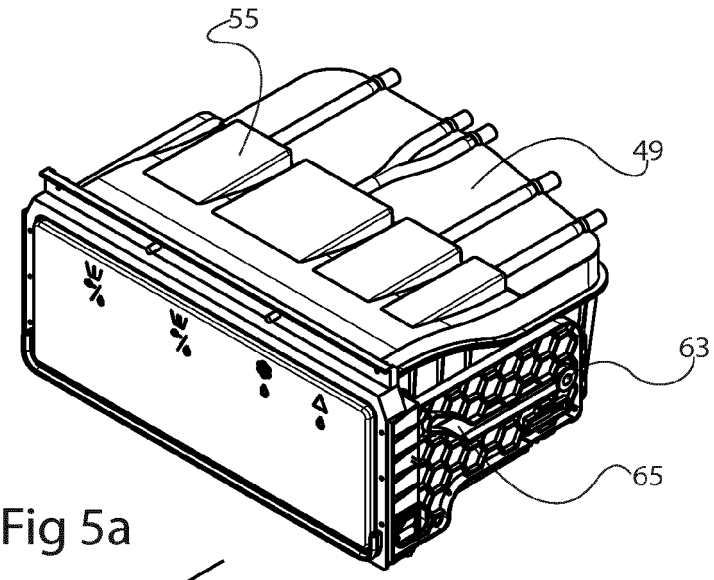

Fig 5a

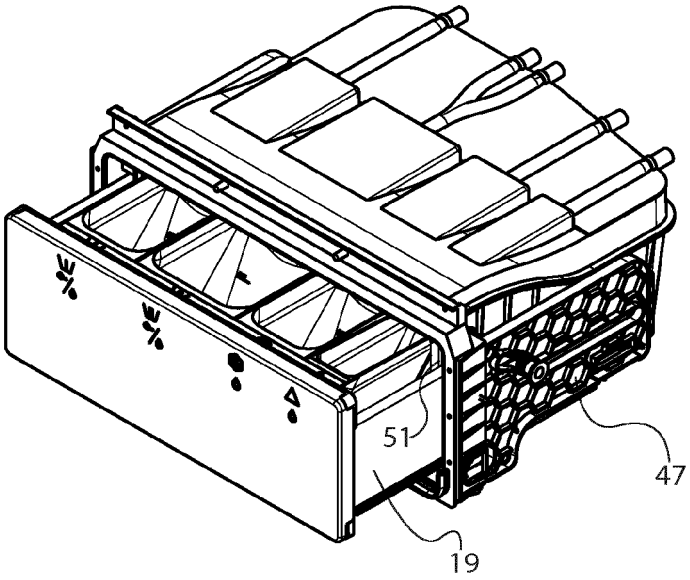

Fig 5b

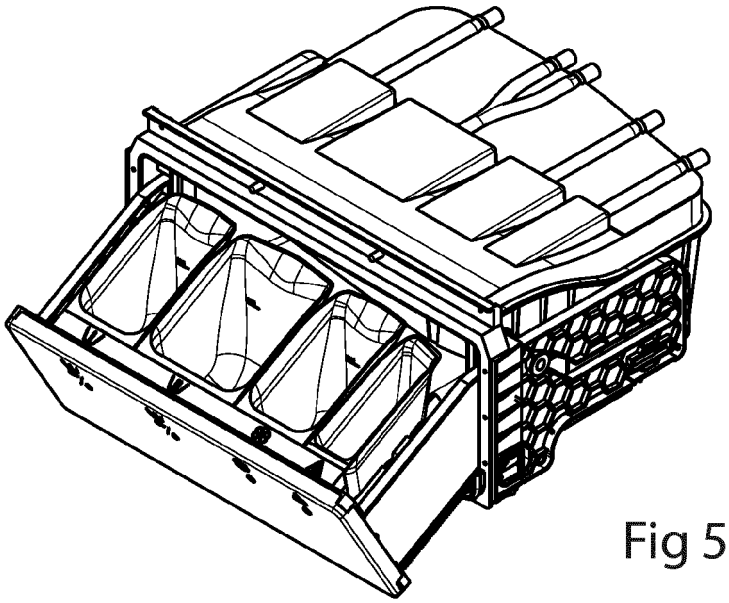

Fig 5c

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7074

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Munich	23 February 2018	Stroppa, Giovanni

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