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(54) **FRONT-LOADING HOUSEHOLD WASHING MACHINE, IN PARTICULAR A LAUNDRY WASHING
OR WASHING/DRYING MACHINE**

HAUSHALTSWASCHMASCHINE MIT FRONTBESCHICKUNG, INSBESONDERE AUCH
WASCHTROCKNER

MACHINE À LAVER DOMESTIQUE À CHARGEMENT FRONTAL, EN PARTICULIER MACHINE À
LAVER OU MACHINE À LAVER/SÉCHER

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Description

[0001] The present invention relates to a front-loading household washing machine, in particular a laundry washing or washing/drying machine, according to the preamble of claim 1.

[0002] The invention is applicable to the field of front-loading household washing machines, in particular laundry washing or washing/drying machines, wherein the dispenser of washing agents (detergent, softener, bleach, etc.) is located in the door that closes the load opening of the machine.

[0003] In front-loading household washing machines known in the art, a door is used for closing the load opening through which the laundry to be washed is placed into a drum rotating inside a wash tub. The door usually includes a transparent porthole glass, which allows the user to see the internal portion of the rotary drum and the laundry loaded therein.

[0004] Patent GB2029862 discloses a door for front-loading household washing machines that comprises a porthole glass within which a washing agent dispenser is provided.

[0005] In GB2260770, on the other hand, the door and the porthole glass are fitted with a housing wherein an extractable dispenser is inserted, which is shaped like a small basket open on top.

[0006] Document WO 2004/055253 A1 relates to a washing machine door comprising a container for the washing products. The upper central part of the glass (6) of the loading door (4) comprises a built-in removable container (7) for the washing products. Moreover, at least one water conduit (8), which is used to convey water the washing products, accesses the aforementioned container (7) through the hinged portion of the door (4) and is guided through the frame (5) of same.

[0007] In the washing agent dispensers known from patents GB2029862 and GB2260770, it has been observed that residual water drops, possibly with a washing agent dissolved in them, tend to remain in the dispenser at the end of a wash cycle, thus causing the problem of water and washing agent percolation when the door is opened, in particular onto the floor in front of the washing machine.

[0008] Besides posing the risk of considerable percolation or dripping, a further problem suffered by the washing machines known from the above-mentioned documents is that the washing agent dispenser built in the porthole glass may cause a leak of washing agents onto the floor in front of the washing machine, especially when the user pours into the dispenser a quantity of washing agents in excess of the maximum allowable or recommended level. This drawback is particularly critical when liquid detergents or additives are used.

[0009] It is also apparent that the washing agent dispenser built in the porthole glass does not allow the user to adequately see the internal portion of the rotary drum and the laundry loaded therein.

[0010] Moreover, the washing machines described in the above-mentioned documents oblige the user to take a rather uncomfortable position in order to pour the washing agents into the appropriate dispenser, since the latter is located in a relatively low position.

[0011] In this frame, it is the main object of the present invention to overcome the above-mentioned drawbacks by providing a front-loading household washing machine, in particular a laundry washing or washing/drying machine, so conceived as to eliminate or significantly reduce both the percolation and dripping of water from the door when the latter is opened and the leakage of washing agents, in particular when the user pours into the dispenser a quantity of washing agents in excess of the maximum allowable or recommended level.

[0012] It is another object of the present invention to provide a front-loading household washing machine, in particular a laundry washing or washing/drying machine, which allows the user to adequately see the internal portion of the rotary drum and the laundry loaded therein.

[0013] It is yet another object of the present invention to provide a front-loading household washing machine, in particular a laundry washing or washing/drying machine, which allows the user to pour the washing agents comfortably into the appropriate dispenser. In order to achieve these objects, the present invention provides a front-loading household washing machine, in particular a laundry washing or washing/drying machine, incorporating the features set out in the annexed claims, which are intended as an integral part of the present description.

[0014] Further objects, features and advantages of the present invention will become apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

- Fig. 1 is a sectional view of a front-loading household washing machine, in particular a laundry washing or washing/drying machine, according to the present invention;
- Fig. 2 shows a door of a washing machine according to the present invention;
- Fig. 3 is an exploded view of a first possible embodiment of a washing machine door according to the present invention;
- Fig. 4 is an exploded view of a second possible embodiment of a washing machine door according to the present invention;
- Figs. 5a and 5b are perspective views, respectively from the top and from the bottom, of a variant implementation of an element of the washing machine door according to the present invention.

[0015] For clarity, in the present description the same reference numerals will be used for designating identical or equivalent items shown in the annexed drawings.

[0016] Fig. 1 is a sectional view of a front-loading household washing machine 1, in particular a laundry

washing or washing/drying machine, according to the present invention. The washing machine 1 comprises a cabinet 2 within which a wash tub 3 is arranged in a known manner. Inside the latter, a drum 4 is rotated about a horizontal or substantially horizontal axis X.

[0017] The laundry to be washed is placed inside the drum 4 through a load opening 5 associated with a front part 21 of the cabinet 2.

[0018] As can be seen in particular in Fig. 1, the axis X of the drum 4 is preferably slightly inclined, in that it is raised towards the front part 21 of the cabinet; this allows a user to load the laundry into the drum 4 more easily.

[0019] The load opening 5 is closed by a door 6 that comprises a porthole glass 61 made of transparent material and a frame 62 for supporting said porthole glass, said porthole glass 61 preferably protruding in the direction of the axis of the drum 4 with respect to the frame 62.

[0020] When the door 6 is closed, the porthole glass 61 is inserted into the load opening 5 and enters partially into the tub 3 and, possibly, into the drum 4; the frame 62 abuts on the front part 21 of the cabinet 2, adjacent to the load opening 5 of said cabinet 2. According to the present invention, said door 6 comprises a washing agent dispenser 7 arranged in the frame 62 above said porthole glass 61.

[0021] The special arrangement of the washing agent dispenser 7 according to the present invention allows to make a washing machine 1 which allows the user to:

- adequately see the inner portion of the drum 4 and the laundry loaded therein, since the porthole glass 61 does not house the washing agent dispenser 7;
- comfortably load the washing agents into the appropriate dispenser 7, which is located at an adequate height.

[0022] The washing machine 1 also comprises a hydraulic system 8 adapted to carry water from the household water main to a distributor 81 arranged in an upper portion 22 of the cabinet 2 and adapted to precipitate the water into a plurality of compartments 71A, 71B, 71C, 71D (visible in Figs. 2 to 4) for feeding the washing agents (e.g. softener, detergent, etc.) contained into the dispenser 7.

[0023] In particular, said plurality of compartments includes:

- a first compartment 71A adapted to contain a detergent for a wash phase;
- a second compartment 71B adapted to contain a softener;
- a third compartment 71C adapted to contain a bleach;
- a fourth compartment 71D adapted to contain a detergent for a prewash phase.

[0024] Each of said compartments 71 A, 71B, 71C, 71D has an aperture through which the washing agents

contained therein are released. The third compartment 71C is a removable compartment that can be inserted by a user into the fourth compartment 71D when he/she wants to use bleach for a subsequent treatment of the washing machine 1, or extracted when he/she wants to use a prewash detergent. Preferably, said first compartment 71A may be designed in a manner such as to accommodate a removable bulkhead (not shown in the drawings), in particular of the non-hermetic type. For example, it is possible to use a vertical bulkhead in which apertures have been obtained for defining a restricted overall outflow section, thus slowing down the detergent flow from the first compartment 71A to the wash tub 3, in particular when said detergent is a liquid one.

[0025] Referring now to Fig. 2, it can be noticed therein that the rotation of the door 6 relative to the cabinet 2 is ensured, in a known manner, by at least one hinge 63 that constrains the door 6 to the cabinet 2. Also, in order to keep the door 6 closed when the washing machine 1 is in operation, the door 6 is fitted, in a known manner, with a catch 64 adapted to be coupled to a corresponding hook (not shown in the drawings) fitted to the cabinet 2.

[0026] The door 6 of the washing machine 1 according to the present invention comprises means for connecting the washing agent dispenser 7 hydraulically to the tub 3, said connection means being hydraulically connected to an inlet hole (not shown in the drawings) obtained in the wash tub 3 through a connection duct 73, preferably made of elastic material, e.g. rubber.

[0027] In particular, said hydraulic connection means may comprise a joint 72 that provides a continuous connection between the dispenser 7 and the connection duct 73 both when the door 6 is closed and when the door 6 is open.

[0028] The particular arrangement of the washing agent dispenser 7 and the provision of the joint 72 allow the washing machine 1 to be so designed as to eliminate any risk of washing agent leakage, even should any residual water drops, possibly with a washing agent dissolved in them, remain in the dispenser 7 at the end of a wash, or should the user pour an excessive quantity of washing agents into the dispenser 7; in fact, the coupling between the joint 72 and the dispenser 7 arranged in the frame 62 above the porthole glass 61 allows all the washing agent placed in the dispenser 7 to enter directly into the wash tub 3, in particular when the door 6 is opened. This prevents water percolation, possibly with a dissolved washing agent, onto the floor in front of the washing machine, unlike what happens with known washing machines, especially at the end of a wash cycle.

[0029] Furthermore, the joint 72 may be coupled to the door 6 in a manner such that its axis of rotation does not coincide with the axis of rotation of said door 6. In particular, the joint 72 may be coupled to the door 6 in a manner such as to make a complex movement relative to the cabinet 2, said movement consisting of a combination of the rotation of the door 6 about the axis of said at least one hinge 63 and the rotation of the joint 72 about

its own axis. Said complex movement of the joint 72 allows to obtain a greater opening angle of said door 6, said opening angle being in particular approximately 135°.

[0030] When using a joint 72 with an axis of rotation coinciding with the axis of rotation of the door 6, in particular with the axis of said at least one hinge 63, the smaller maximum opening angle of the door 6 is counterbalanced by the possibility of using a fixed joint 72.

[0031] Figs. 3 and 4 are exploded views of a first and a second possible embodiments of the door 6 of the washing machine 1 according to the present invention.

[0032] Such drawings clearly show that the frame 62 of the door 6 comprises a front portion 62A and a rear portion 62B, the porthole glass 61 fitting into a passage 62C obtained in the rear portion 62B and being coupled to said rear portion 62B through an element 65, in particular the latter having substantially a truncated-cone shape.

[0033] The porthole glass 61 is secured by glueing or welding (in particular by vibration welding) or by means of screw or joint connections between the element 65 and the rear portion 62B with the porthole glass 61 sandwiched in between, so as to form an assembly as per the process specified in patent application for invention WO2007/000645 in the name of the present Applicant, the teachings of which are intended as an integral part of the present description.

[0034] The door 6 also comprises a hopper compartment 66 adapted to house the dispenser 7 and to convey the washing agents into a coupling 67 connected to the joint 72, preferably by interposing at least a first sealing element 67A between the coupling 67 and the joint 72.

[0035] The assembly consisting of the porthole glass 61, the truncated-cone element 65 and the rear portion 62B is then connected, by glueing or welding (in particular by vibration welding) or by means of screw or joint connections, to the front portion 62A, with the hopper compartment 66 in between. As a consequence, in this condition the hopper compartment 66 stays locked between the front portion 62A and the assembly consisting of the porthole glass 61, the truncated-cone element 65 and the rear portion 62B, while still being in a position that provides easy access for cleaning (after removing the drawer above).

[0036] In particular, in the first embodiment shown in Fig. 3 it can be noted that:

- the coupling 67 is made as one piece with the hopper compartment 66;
- the hopper compartment 66 is made separately from the truncated-cone element 65;
- the dispenser 7, the hopper compartment 66, the coupling 67 and the joint 72 come directly in contact with the detergent and are made of a plastic material resistant to the chemical agents included in the detergent, preferably PP (polypropylene);

- the porthole glass 61 and the front portion 62A are made of a substantially transparent material, preferably the porthole glass 61 being made of glass and the front portion 62A being made of a plastic material such as, for example, SAN (styrene acrylonitrile copolymer) or mass metallized ABS (acrylonitrile-butadiene-styrene) or PC (polycarbonate);
- the rear portion 62B and the truncated-cone portion 65 are made of a different plastic material, preferably ABS (acrylonitrile-butadiene-styrene).

[0037] The second embodiment shown in Fig. 4 is very similar to the first embodiment of Fig. 3, the main differences being that in the second embodiment of Fig. 4:

- the coupling 67 is manufactured separately from the hopper compartment 66. With this design, it is appropriate to insert a second sealing element 67B to prevent any leakage of wash liquid between the hopper compartment 66 and the coupling 67;
- the hopper compartment 66 is made as one piece with the truncated-cone element 65 by means of a single moulding operation. The truncated-cone element 65 and the hopper compartment 66 are both made of ABS (acrylonitrile-butadiene-styrene), i.e. a plastic material which preferably must not regularly come in contact with chemical agents contained in detergents.

[0038] Consequently, in the second embodiment of Fig. 4 the dispenser 7 comprises an upper drawer 74 and a lower drawer 75 connected to each other so as to form one piece, in particular by glueing or welding, preferably by vibration welding. Preferably, said lower drawer 75 is made of a plastic material resistant to the chemical agents contained in the detergent, in particular PP (polypropylene). Thanks to its particular design, the lower drawer 75 has the function of conveying the washing agents from the compartments 71A, 71B, 71C, 71D towards the coupling 67 without the chemical agents contained in the detergents coming in contact with and damaging the hopper compartment 66.

[0039] It is however apparent that in the practical implementation the details shown in Figs. 3 and 4 may have different shapes and be replaced with other technically equivalent elements.

[0040] In Figs. 3 and 4 it is also possible to see that the dispenser 7 may comprise one or more of the following elements:

- a first cover 91 adapted to be associated with the plurality of compartments 71A, 71B, 71C, 71D;
- a siphon 76 for at least one of said plurality of compartments 71A, 71B, 71C, 71D, in particular for a second compartment 71B intended for a softener;
- a second cover 92 adapted to be associated with at least one compartment of said plurality of compartments 71A, 71B, 71C, 71D, in particular said at least

one compartment being a third compartment 71C intended for a bleach.

[0041] Figs. 3 and 4 also show that the door 6 comprises a printed circuit board 68 for controlling the operation of the washing machine 1 according to the present invention, said printed circuit board 68 being associated with a control box 68A and a keyboard 68B.

[0042] The door 6 also comprises an inspection hatch 69 that provides access to the printed circuit board 68. Preferably, said inspection hatch 69 is fitted with sealing means, in particular a co-moulded gasket (not shown in the drawings), which allow the printed circuit board 68 to be kept isolated from water and wash liquid.

[0043] The advantages offered by a front-loading household washing machine, in particular a laundry washing or washing/drying machine, according to the present invention are apparent from the above description.

[0044] In particular, such advantages lie in that the arrangement of the washing agent dispenser 7 in the frame 62 above said porthole glass 61 allows to reduce the percolation or dripping of water from the door 6 when the latter is opened. The dispenser 7 and the joint 72 allow the washing machine 1 to be so designed as to prevent any leakage of washing agents, in particular when some residual wash liquid remains in the dispenser 7 at the end of the wash; in fact, the coupling between the joint 72 and the dispenser 7 arranged in the frame 62 above the porthole glass 61 allows all the washing agent placed in the dispenser 7 to enter directly into the tub 3 also after opening the door 6. This prevents water percolation, possibly with a dissolved washing agent, onto the floor in front of the washing machine, unlike what happens with known washing machines, especially at the end of a wash cycle.

[0045] Thus, the dispenser 7 and the joint 72 allow the washing machine 1 to be designed in a manner such as to prevent any leakage of washing agents, even when the user pours a quantity of washing agents into the dispenser 7 in excess of the maximum allowable or recommended level, since said washing agents are in any case fed into the wash tub 3.

[0046] Furthermore, the special arrangement of the dispenser 7 in accordance with the present invention allows to provide a washing machine 1 that allows the user to adequately see the inner portion of the wash tub 3 and the laundry loaded in the drum 4, as well as to comfortably pour the washing agents into the appropriate dispenser 7.

[0047] Another advantage of the washing machine according to the present invention is that a single operation, i.e. opening the door 6, is required to gain access both to the dispenser 7 for pouring in the washing agents and to the load opening 5 for loading the textile items to be treated. What is more, the machine according to the present invention is characterized by including components, such as the compartments 71A, 71B, 71C, 71D, the hopper compartment 66 and the nozzles of the dis-

tributor 81, which are easily accessible for cleaning.

[0048] The front-loading household washing machine described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0049] For example, Figs. 5a and 5b show perspective views, respectively a top and a bottom views, of a variant implementation of the first cover 91 according to the present invention.

[0050] In Fig. 5a, said first cover 91 is made of polypropylene and comprises a rear wall 93 resting on the rear portion 62B of the frame 62 and/or on the inspection hatch 69 when the first cover 91 is mounted on the dispenser 7. Preferably, said rear wall 93 is an integral part of the first cover 91 and is therefore made of polypropylene as well, thus protecting the other components of the door 6 from the chemical agents contained in the washing agents. The provision of the rear wall 93 also gives the door 6 a more pleasant aesthetic appearance in that, for example, it covers any fastening means used for securing the rear portion 62B to the front portion 62A of the frame 62 and/or any means, such as screws, used for securing the inspection hatch 69 to the hopper compartment 66.

[0051] Said first cover 91 also comprises at least one rib 94 adapted to separate said compartments 71A, 71B, 71C, 71D from one another and to prevent the washing agents contained therein from mixing together when they are poured in.

[0052] In addition, Fig. 5b shows that the lower portion of said first cover 91 comprises at least one small wavebreaker wall 95 adapted to fit into said compartments 71A, 71B, 71C, 71D to prevent a washing agent, in particular a liquid one, from overflowing, especially when said door 6 is closed too quickly and/or abruptly.

[0053] Preferably, the second cover 92 comprises a small wavebreaker wall 95 too, as shown in particular in Figs. 3 and 4.

[0054] In another variant embodiment of the washing machine 1 according to the present invention, the means for connecting the washing agent dispenser 7 hydraulically to the wash tub 3 may be such as to provide a hydraulic connection between the dispenser 7 and the connection duct 73 only when the door 6 is closed. In this case, the hydraulic connection means differ from those shown in Fig. 2 in that the joint 72 is replaced by a valve adapted to intercept a flow section obtained on the rear portion 62B, said flow section being connected to the hopper compartment 66 and being positioned in a manner such that the flow it carries is directed towards the connection duct 73. This on-off valve allows the washing agents and/or the wash liquid to be sealingly confined within the door 6 when the latter is open, and to be released only after the door 6 has been properly closed. To this end, the on-off valve is connected, e.g. mechanically, to a drive element applied to the front part 21 of

the cabinet 2, which causes the valve to open automatically when the door 6 is closed. Furthermore, the valve is equipped with a device, such as a spring or an electromechanic actuator, suitable for keeping the valve closed when the door 6 is open.

[0055] In another variant implementation (not shown in the drawings) of the washing machine 1 according to the present invention, the washing agent dispenser 7 is so designed as to have a substantially cylindrical shape, in particular the axis of said cylinder being substantially horizontal to allow the dispenser 7 to be positioned in the frame 62 above said porthole glass 61.

[0056] The washing agent dispenser 7 having a substantially cylindrical shape allows the user to see the quantity of washing agent poured in the dispenser 7 more easily, thus facilitating a correct dosage thereof.

[0057] Preferably, said substantially cylindrical dispenser 7 comprises at least one upper aperture and a shelf adjacent thereto; preferably, said shelf is made as one piece with another component of the dispenser 7 (e.g. with the upper drawer 74) and/or is substantially parallel to the floor or slightly inclined upwards, and can support a measure cup or a container of washing agent so that the latter can be poured more easily into the dispenser 7 through said upper aperture; it can also accommodate labels and/or icons to facilitate the identification of each compartment of said plurality of compartments 71A, 71B, 71C, 71D. Preferably, the width of the upper aperture is at least 65 mm, while the width of the shelf is at least 10 mm. Preferably, the distance between the upper aperture and the upper edge of the door 6 is at least 85 mm. Furthermore, the substantially cylindrical dispenser 7 has at least a lower aperture for feeding the washing agents into the wash tub 3, and may comprise at least one draft adapted to facilitate the loading of the washing agents into said dispenser 7.

[0058] The substantially cylindrical dispenser 7 may be fixed or, advantageously, it may be so designed as to either:

- include at least one small rotary door adapted to switch from a first operating position, wherein an upper aperture for feeding the washing agents into the dispenser 7 is open and a lower aperture for feeding the washing agents into the wash tub 3 is closed, to a second operating position, wherein the upper aperture is closed and the lower aperture is open, so as to allow the washing agents to be fed into the wash tub 3. Preferably, said first operating position is set automatically when the door 6 of the washing machine 1 is opened, whereas said second operating position is set automatically when said door 6 is closed;
- or
- rotate about its own axis in order to switch from a first washing agent loading position, wherein an aperture of the dispenser 7 is directed substantially upwards, to a second washing agent release position

for feeding the washing agents into the wash tub 3, wherein the aperture of the dispenser 7 is directed substantially downwards. Preferably, said first loading position is set automatically when the door 6 is opened, whereas said second release position is set automatically when said door 6 is closed.

[0059] By designing the dispenser 7 in a manner such that it includes at least one small rotary door or that it can rotate about its own axis, it is possible to provide a dispenser 7 which is suitable for preventing the washing agents from flowing directly into the wash tub 3 after having been poured into the dispenser 7. In this case, references such as notches or the like, adapted to inform the user about the required quantities of washing agents, are preferably associated with the compartments 71A, 71B, 71C, 71D. As a matter of fact, these embodiments of the dispenser 7 according to the present invention allow said washing agents to be fed into the wash tub 3 only after the door 6 has been closed. In particular, in the case of the cylindrical dispenser 7 comprising a small rotary door, the latter switches automatically from the first to the second operating position and vice versa when the door 6 is closed and/or opened; in the case of the cylindrical dispenser 7 adapted to rotate about its own axis, the aperture of the dispenser 7 is automatically directed substantially downwards when the door 6 is closed, so as to obtain the release of the washing agents into the wash tub 3, whereas the aperture of the dispenser 7 is automatically directed substantially upwards when the door 6 is opened, so as to allow the washing agents to be poured into the dispenser 7.

[0060] In a further variant embodiment (not shown in the drawings) of the washing machine 1 according to the present invention, the washing agent dispenser 7 is substantially wedge-shaped, with the vertex of said wedge facing downwards, said dispenser 7 comprising an upper aperture for loading the washing agents into the dispenser 7 and a lower aperture for feeding the washing agents into the wash tub 3.

[0061] The particular shape of the dispenser 7 allows the user to see the quantity of washing agent poured in the dispenser 7 more easily, thus facilitating a correct dosage thereof. In this case as well, the dispenser preferably comprises:

- a shelf adjacent to the upper aperture of the dispenser 7, made as one piece with another component of the dispenser 7 (e.g. with the upper drawer 74) and/or substantially parallel to the floor or slightly inclined upwards. The shelf can support a measure cup or a container of washing agent, so that the latter can be poured more easily into the dispenser 7 through said upper aperture; it can also accommodate labels and/or icons to facilitate the identification of each compartment of said plurality of compartments 71A, 71B, 71C, 71D. Preferably, the width of the upper aperture is at least 65 mm, while the width

of the shelf is at least 10 mm. Preferably, the distance between the upper aperture and the upper edge of the door 6 is at least 85 mm;

- at least one draft to facilitate the loading of the washing agents into said dispenser 7.

[0062] The substantially wedge-shaped dispenser 7 may be fixed or, advantageously, it may be so designed as to either:

- pivot about said downward-facing vertex in order to switch from a first operating position, wherein the dispenser 7 is substantially housed in the frame 62 above said porthole glass 61 and said upper aperture is minimally open, to a second operating position, wherein the dispenser 7 is substantially extracted from the frame 62 and said upper aperture is fully open. Preferably, said first operating position is set automatically when the door 6 of the washing machine 1 is closed, whereas said second operating position is set automatically when said door 6 is opened. The pivoting action determines, for example, a forward movement of the front portion of the dispenser 7 by approximately 30 mm;
- or
- comprise side walls made of a deformable material, in particular an elastomeric material (rubber and/or silicone), so as to obtain a "bellows-like" opening and/or closing of the dispenser 7 relative to the frame 62. In this case as well, the dispenser 7 can thus switch from a first operating position, wherein the upper aperture is fully open, to a second operating position, wherein the upper aperture is minimally open. Preferably, said first operating position is set automatically when the door 6 of the washing machine 1 is opened, whereas said second operating position is set automatically when said door 6 is closed.

[0063] By designing the dispenser 7 in a manner such that it is substantially wedge-shaped, it is possible to provide a washing machine 1 which facilitates the loading of washing agents into said dispenser 7 without having to subject the washing machine 1 and/or components thereof, such as the door 6, to significant modifications.

[0064] In addition, the fact that the substantially wedge-shaped dispenser 7 can:

- pivot, or
- comprise side walls made of a deformable material, so as to obtain a "bellows-like" opening and/or closing action,

allows to increase the washing agent capacity of the dispenser 7 without having to obtain spaces specifically for that purpose within the washing machine 1, in particular in the door 6. Finally, it is advantageously conceivable that, in the substantially wedge-shaped dispenser 7,

each compartment of said plurality of compartments 71A, 71B, 71C, 71D is designed to be individually extractable.

- [0065]** It can therefore be easily understood that the present invention is not limited to the above-described front-loading household washing machine, in particular a laundry washing or washing/drying machine, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. Front-loading household washing machine (1), in particular a laundry washing or washing/drying machine, comprising a cabinet (2) within which a wash tub (3) is arranged, and having a load opening (5) that can be closed by a door (6) constrained to said cabinet (2), said door (6) comprising a porthole glass (61) adapted to fit at least partly into said load opening (5) and a frame (62) supporting said porthole glass (61),
characterized in that
said door (6) comprises a washing agent dispenser (7) arranged in the frame (62) above said porthole glass (61).
2. Washing machine (1) according to claim 1, **characterized in that** said door (6) comprises means for connecting the washing agent dispenser (7) hydraulically to said wash tub (3), said connection means being hydraulically connected to an inlet hole obtained in the wash tub (3) through a connection duct (73) preferably made of elastic material.
3. Washing machine (1) according to claim 2, **characterized in that** said hydraulic connection means comprise a joint (72) that provides a continuous connection between the dispenser (7) and the connection duct (73) both when the door (6) is closed and when the door (6) is open.
4. Washing machine (1) according to claim 2, **characterized in that** said hydraulic connection means comprise a valve adapted to provide the hydraulic connection between the dispenser (7) and the wash tub (3) when said door (6) is closed and to break the hydraulic connection between the dispenser (7) and the wash tub (3) when said door (6) is open.
5. Washing machine (1) according to claim 1, **characterized in that** said frame (62) of the door (6) comprises a front portion (62A) and a rear portion (62B), said porthole glass (61) fitting into a passage (62C) obtained in the rear portion (62B) and being coupled to said rear portion (62B) through an element (65), in particular the latter having substantially a truncat-

ed-cone shape.

6. Washing machine (1) according to claim 1, **characterized by** comprising a printed circuit board (68) for controlling the operation of said washing machine (1), said printed circuit board (68) being preferably associated with a control box (68A) and a keyboard (68B), said door (6) comprising an inspection hatch (69) that provides access to the printed circuit board (68).
7. Washing machine (1) according to claim 1, **characterized by** comprising a hydraulic system (8) adapted to carry water from the household water main to a distributor (81) arranged in an upper portion (22) of the cabinet (2) and to precipitate the water into a plurality of compartments (71A, 71B, 71C, 71D) for feeding the washing agents contained in the dispenser (7).
8. Washing machine (1) according to claim 7, **characterized in that** said dispenser (7) comprises a first cover (91) adapted to be associated with said plurality of compartments (71A, 71B, 71C, 71D).
9. Washing machine (1) according to claim 7, **characterized in that** said dispenser (7) comprises a second cover (92) adapted to be associated with at least one compartment of said plurality of compartments (71A, 71B, 71C, 71D), in particular said at least one compartment being a third compartment (71C) intended for bleach.
10. Washing machine (1) according to claim 1, **characterized in that** said washing agent dispenser (7) has a substantially cylindrical shape, in particular the axis of said cylinder being substantially horizontal in order to allow the dispenser (7) to be positioned in the frame (62) above said porthole glass (61).
11. Washing machine (1) according to claim 10, **characterized in that** said dispenser (7) having a substantially cylindrical shape is so designed as to include at least one lower aperture for feeding the washing agents into the wash tub (3).
12. Washing machine (1) according to claim 10, **characterized in that** said dispenser (7) having a substantially cylindrical shape is so designed as to include at least one small rotary door adapted to switch from a first operating position, wherein an upper aperture for feeding the washing agents into the dispenser (7) is open and a lower aperture for feeding the washing agents into the wash tub (3) is closed, to a second operating position, wherein the upper aperture is closed and the lower aperture is open.
13. Washing machine (1) according to claim 10, **char-**

acterized in that said dispenser (7) having a substantially cylindrical shape is so designed as to rotate about its own axis in order to switch from a first washing agent loading position, wherein an aperture of the dispenser (7) is directed substantially upwards, to a second washing agent release position for feeding the washing agents into the wash tub (3), wherein the aperture of the dispenser (7) is directed substantially downwards.

14. Washing machine (1) according to claim 1, **characterized in that** said washing agent dispenser (7) is substantially wedge-shaped, with the vertex of said wedge facing downwards, said dispenser (7) comprising an upper aperture for loading the washing agents into the dispenser (7) and a lower aperture for feeding the washing agents into the wash tub (3).
15. Washing machine (1) according to claim 14, **characterized in that** said substantially wedge-shaped dispenser (7) is so designed as to pivot about said downward-facing vertex in order to switch from a first operating position, wherein the dispenser (7) is substantially housed in the frame (62) above said porthole glass (61) and said upper aperture is minimally open, to a second operating position, wherein the dispenser (7) is substantially extracted from the frame (62) and said upper aperture is fully open.
16. Washing machine (1) according to claim 14, **characterized in that** said substantially wedge-shaped dispenser (7) is so designed as to provide a "bellows-like" opening and/or closing of the dispenser (7) relative to the frame (62) in order to switch from a first operating condition, wherein the upper aperture is fully open, to a second operating position, wherein the upper aperture is minimally open.

Patentansprüche

1. Frontlade-Haushaltswaschmaschine (1), insbesondere eine Wäsche-Wasch- oder Wasch-/Trocknungsmaschine, umfassend ein Gehäuse (2), innerhalb welcher ein Waschbottich (3) angeordnet ist, und welche eine Ladeöffnung (5) aufweist, die mit einer Tür (6), die an dem Gehäuse (2) angebracht ist, geschlossen werden kann, wobei die Tür (6) ein Lukenglas (61), das dafür ausgelegt ist, wenigstens teilweise in die Ladeöffnung (5) zu passen, und einen Rahmen (62), der das Lukenglas (61) stützt, umfasst,
dadurch gekennzeichnet, dass
die Tür (6) einen Waschmittelspender (7) umfasst, der an dem Rahmen (62) oberhalb des Lukenglases (61) angeordnet ist.
2. Waschmaschine (1) nach Anspruch 1, **dadurch ge-**

- kennzeichnet, dass** die Tür (6) Mittel umfasst, um den Waschmittelspender (7) hydraulisch mit dem Waschbottich (3) zu verbinden, wobei die Verbindungsmittel hydraulisch mit einem Zulaufloch verbunden sind, das in dem Waschbottich (3) durch eine vorzugsweise aus elastischem Material hergestellte Verbindungsleitung (73) erhalten ist.
3. Waschmaschine (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die hydraulischen Verbindungsmittel ein Gelenk (72) umfassen, das eine permanente Verbindung zwischen dem Spender (7) und der Verbindungsleitung (73) herstellt, sowohl wenn die Tür (6) geschlossen ist, als auch wenn die Tür (6) offen ist.
4. Waschmaschine (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die hydraulischen Verbindungsmittel ein Ventil umfassen, das dafür ausgelegt ist, die hydraulische Verbindung zwischen dem Spender (7) und dem Waschbottich (3) herzustellen, wenn die Tür (6) geschlossen ist, und die hydraulische Verbindung zwischen dem Spender (7) und dem Waschbottich (3) zu unterbrechen, wenn die Tür (6) offen ist.
5. Waschmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Rahmen (62) der Tür (6) einen vorderen Abschnitt (63A) und einen hinteren Abschnitt (62B) umfasst, wobei das Lukenglas (61) in einen Durchgang (62C) passt, der in dem hinteren Abschnitt (62B) erhalten ist und an den hinteren Abschnitt (62B) durch ein Element (65) gekoppelt ist, wobei insbesondere letzteres im wesentlichen eine Kegelstumpf-Form aufweist.
6. Waschmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie eine Leiterplatte (68) umfasst, um den Betrieb der Waschmaschine (1) zu steuern/regeln, wobei der Leiterplatte (68) vorzugsweise ein Steuer-/Regelkasten (68A) und eine Tastatur (68B) zugeordnet ist, und wobei die Tür (6) eine Inspektionsklappe (69) umfasst, die Zugriff auf den Steuer-/Regelkasten (68) bietet.
7. Waschmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie ein Hydrauliksystem (8) umfasst, das dafür ausgelegt ist, Wasser von der Haushalts-Hauptwasserleitung zu einem Verteiler (81) zu transportieren, der in einem oberen Abschnitt (22) des Gehäuses (2) angeordnet ist, und das Wasser in eine Mehrzahl an Kammern (71A, 71B, 71C, 71D) abzuscheiden, um die enthaltenen Waschmittel in den Spender (7) einzufüllen.
8. Waschmaschine (1) nach Anspruch 7, **dadurch gekennzeichnet, dass** der Spender (7) eine erste Abdeckung (91) umfasst, die dafür ausgelegt ist, der Mehrzahl an Kammern (71A, 71B, 71C, 71D) zugeordnet zu sein.
9. Waschmaschine (1) nach Anspruch 7, **dadurch gekennzeichnet, dass** der Spender (7) eine zweite Abdeckung (92) umfasst, die dafür ausgelegt ist, wenigstens einer Kammer der Mehrzahl an Kammern (71A, 71B, 71C, 71D) zugeordnet zu sein, wobei die wenigstens eine Kammer insbesondere eine dritte Kammer (71C), vorgesehen für Bleichmittel, ist.
10. Waschmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Waschmittelspender (7) eine im wesentlichen zylindrische Form aufweist, wobei insbesondere die Achse des Zylinders im wesentlichen horizontal verläuft, um dem Spender (7) zu ermöglichen an dem Rahmen (62) oberhalb des Lukenglases (61) positioniert zu sein.
11. Waschmaschine (1) nach Anspruch 10, **dadurch gekennzeichnet, dass** der Spender (7), der eine im wesentlichen zylindrische Form aufweist, so gestaltet ist, dass er wenigstens eine untere Öffnung umfasst, um die Waschmittel in den Waschbottich (3) zu füllen.
12. Waschmaschine (1) nach Anspruch 10, **dadurch gekennzeichnet, dass** der Spender (7), der eine im wesentlichen zylindrische Form aufweist, so gestaltet ist, dass er wenigstens eine kleine Drehtür umfasst, die dafür ausgelegt ist, von einer ersten Betriebsposition, in der eine obere Öffnung zum Füllen der Waschmittel in den Spender (7) geöffnet ist und eine untere Öffnung zum Füllen der Waschmittel in den Waschbottich (3) geschlossen ist, zu einer zweiten Betriebsposition, in der die obere Öffnung geschlossen und die untere Öffnung geöffnet ist, zu schalten.
13. Waschmaschine (1) nach Anspruch 10, **dadurch gekennzeichnet, dass** der Spender (7), der eine im wesentlichen zylindrische Form aufweist, so gestaltet ist, dass er um seine eigene Achse rotiert, um von einer ersten Waschmittel-Befüllungs-Position, in der eine Öffnung des Spenders (7) im wesentlichen nach oben gerichtet ist, zu einer zweiten Waschmittel-Freigabe-Position zu schalten, um die Waschmittel in den Waschbottich (3) zu füllen, wobei die Öffnung des Spenders (7) im wesentlichen nach unten gerichtet ist.
14. Waschmaschine (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Waschmittelspender (7) im wesentlichen keilförmig ist, wobei der Eckpunkt des Keils nach unten gerichtet ist und wobei der Spender (7) eine obere Öffnung umfasst, die dazu dient, die Waschmittel in den Spender (7) zu füllen und eine untere Öffnung, die dazu dient, die Waschmittel in

den Waschbottich (3) zu füllen.

15. Waschmaschine (1) nach Anspruch 14, **dadurch gekennzeichnet, dass** der im wesentlichen keilförmige Spender (7) so gestaltet ist, dass er sich um den nach unten gerichteten Eckpunkt dreht, um von einer ersten Betriebsposition, in der der Spender (7) im wesentlichen in dem Rahmen (62) oberhalb des Lukenglases (61) aufgenommen ist und die obere Öffnung minimal geöffnet ist, zu einer zweiten Betriebsposition, in der der Spender (7) im wesentlichen aus dem Rahmen (62) herausgezogen ist und die obere Öffnung ganz offen ist, zu schalten.
16. Waschmaschine (1) nach Anspruch 14, **dadurch gekennzeichnet, dass** der im wesentlichen keilförmige Spender (7) so gestaltet ist, dass er ein "blasenbalgartiges" Öffnen und/oder schließen des Spenders (7) bezüglich des Rahmens (62) ermöglicht, um von einem ersten Betriebszustand, in dem die obere Öffnung ganz offen ist, zu einer zweiten Betriebsposition, in der die obere Öffnung minimal geöffnet ist, zu schalten.

Revendications

1. Machine à laver domestique à chargement frontal (1), en particulier machine à laver ou machine à laver/sécher du linge, comportant une carrosserie (2) à l'intérieur de laquelle une cuve de lavage (3) est disposée, et présentant une ouverture de chargement (5) pouvant être fermée par une porte (6) retenue à ladite carrosserie (2), ladite porte (6) comportant une vitre de hublot (61) agencée pour s'ajuster au moins partiellement dans ladite ouverture de chargement (5) et une armature (62) supportant ladite vitre de hublot (61), **caractérisée en ce que** ladite porte (6) comprend un distributeur d'agents de lavage (7) disposé dans l'armature (62) au-dessus de ladite vitre de hublot (61).
2. Machine à laver (1) selon la revendication 1, **caractérisée en ce que** ladite porte (6) comprend des moyens pour raccorder le distributeur d'agents de lavage (7) de façon hydraulique à ladite cuve de lavage (3), lesdits moyens de raccordement étant raccordés hydrauliquement à un orifice d'entrée réalisé dans la cuve de lavage (3) par l'intermédiaire d'un conduit de raccordement (73) constitué, de préférence, d'un matériau élastique.
3. Machine à laver (1) selon la revendication 2, **caractérisée en ce que** lesdits moyens de raccordement hydraulique comportent une articulation (72) qui fournit un raccordement continu entre le distributeur (7) et le conduit de raccordement (73), à la fois lors-

que la porte (6) est fermée et lorsque la porte (6) est ouverte.

4. Machine à laver (1) selon la revendication 2, **caractérisée en ce que** lesdits moyens de raccordement hydraulique comportent une vanne agencée pour assurer le raccordement hydraulique entre le distributeur (7) et la cuve de lavage (3) lorsque ladite porte (6) est fermée et pour interrompre le raccordement hydraulique entre le distributeur (7) et la cuve de lavage (3) lorsque ladite porte est ouverte.
5. Machine à laver (1) selon la revendication 1, **caractérisée en ce que** ladite armature (62) de la porte (6) comporte une partie avant (62A) et une partie arrière (62B), ladite vitre de hublot (61) s'ajustant dans un passage (62C) réalisé dans la partie arrière (62B) et étant couplée à ladite partie arrière (62B) par l'intermédiaire d'un élément (65), ce dernier présentant, en particulier, une configuration sensiblement tronconique.
6. Machine à laver (1) selon la revendication 1, **caractérisée en ce qu'elle** comporte une carte de circuit imprimé (68) pour commander le fonctionnement de ladite machine à laver (1), ladite carte de circuit imprimé (68) étant, de préférence, associée à un boîtier de commande (68A) et à un clavier (68B), ladite porte (6) comportant une trappe de visite (69) fournissant un accès à la carte de circuit imprimé (68).
7. Machine à laver (1) selon la revendication 1, **caractérisée en ce qu'elle** comporte un système hydraulique (8) agencé pour transporter l'eau depuis l'alimentation principale en eau domestique vers un distributeur (81) disposé dans une partie supérieure (22) de la carrosserie (2) et pour précipiter l'eau dans une pluralité de compartiments (71A, 71B, 71C, 71D) en vue d'alimenter les agents de lavage contenus dans le distributeur (7).
8. Machine à laver (1) selon la revendication 7, **caractérisée en ce que** ledit distributeur (7) comporte un premier couvercle (91) agencé pour être associé à ladite pluralité de compartiments (71A, 71B, 71C, 71D).
9. Machine à laver (1) selon la revendication 7, **caractérisée en ce que** ledit distributeur (7) comporte un deuxième couvercle (92) agencé pour être associé à au moins un compartiment de ladite pluralité de compartiments (71A, 71B, 71C, 71D), en particulier audit au moins un compartiment qui est un troisième compartiment (71C) agencé pour un agent de blanchiment.
10. Machine à laver (1) selon la revendication 1, **caractérisée en ce que** ledit distributeur d'agents de la-

vage (7) présente une forme sensiblement cylindrique, l'axe dudit cylindre, en particulier, étant sensiblement horizontal afin de permettre au distributeur (7) d'être positionné dans l'armature (62) au-dessus de ladite vitre de hublot (61).

11. Machine à laver (1) selon la revendication 10, **caractérisée en ce que** ledit distributeur (7) présentant une forme sensiblement cylindrique est conçu de façon à inclure au moins une ouverture inférieure permettant de fournir les agents de lavage dans la cuve de lavage (3).
12. Machine à laver (1) selon la revendication 10, **caractérisée en ce que** ledit distributeur (7) présentant une forme sensiblement cylindrique est conçu de façon à comporter au moins une petite porte rotative agencée pour commuter d'une première position de fonctionnement, dans laquelle une ouverture supérieure permettant de fournir les agents de lavage dans le distributeur (7) est ouverte, et dans laquelle une ouverture inférieure permettant de fournir les agents de lavage dans la cuve de lavage (3) est fermée, à une deuxième position de fonctionnement, dans laquelle l'ouverture supérieure est fermée et l'ouverture inférieure est ouverte.
13. Machine à laver (1) selon la revendication 10, **caractérisée en ce que** ledit distributeur (7) présentant une forme sensiblement cylindrique est conçu de façon à tourner autour de son axe afin de commuter d'une première position de chargement des agents de lavage, dans laquelle une ouverture du distributeur (7) est dirigée sensiblement vers le haut, à une deuxième position de libération des agents de lavage permettant de fournir les agents de lavage dans la cuve de lavage (3), dans laquelle l'ouverture du distributeur (7) est dirigée sensiblement vers le bas.
14. Machine à laver (1) selon la revendication 1, **caractérisée en ce que** ledit distributeur d'agents de lavage (7) est sensiblement en forme de coin, le sommet dudit coin étant orienté vers le bas, ledit distributeur (7) comportant une ouverture supérieure pour charger les agents de lavage dans le distributeur (7) et une ouverture inférieure permettant de fournir les agents de lavage dans la cuve de lavage (3).
15. Machine à laver (1) selon la revendication 14, **caractérisée en ce que** ledit distributeur sensiblement en forme de coin (7) est conçu de façon à pivoter autour dudit sommet orienté vers le bas afin de commuter d'une première position de fonctionnement, dans laquelle le distributeur (7) est sensiblement logé dans l'armature (62) au-dessus de ladite vitre de hublot (61) et dans laquelle ladite ouverture supérieure est ouverte a minima, à une deuxième position de fonctionnement dans laquelle le distributeur (7)

est sensiblement extrait de l'armature (62) et dans laquelle ladite ouverture supérieure est complètement ouverte.

- 5 16. Machine à laver (1) selon la revendication 14, **caractérisée en ce que** ledit distributeur sensiblement en forme de coin (7) est conçu de façon à fournir une ouverture et/ou une fermeture de type « à soufflet » pour le distributeur (7) par rapport à l'armature (62) afin de commuter d'une première position de fonctionnement, dans laquelle l'ouverture supérieure est complètement ouverte, à une deuxième position de fonctionnement, dans laquelle l'ouverture supérieure est ouverte a minima.

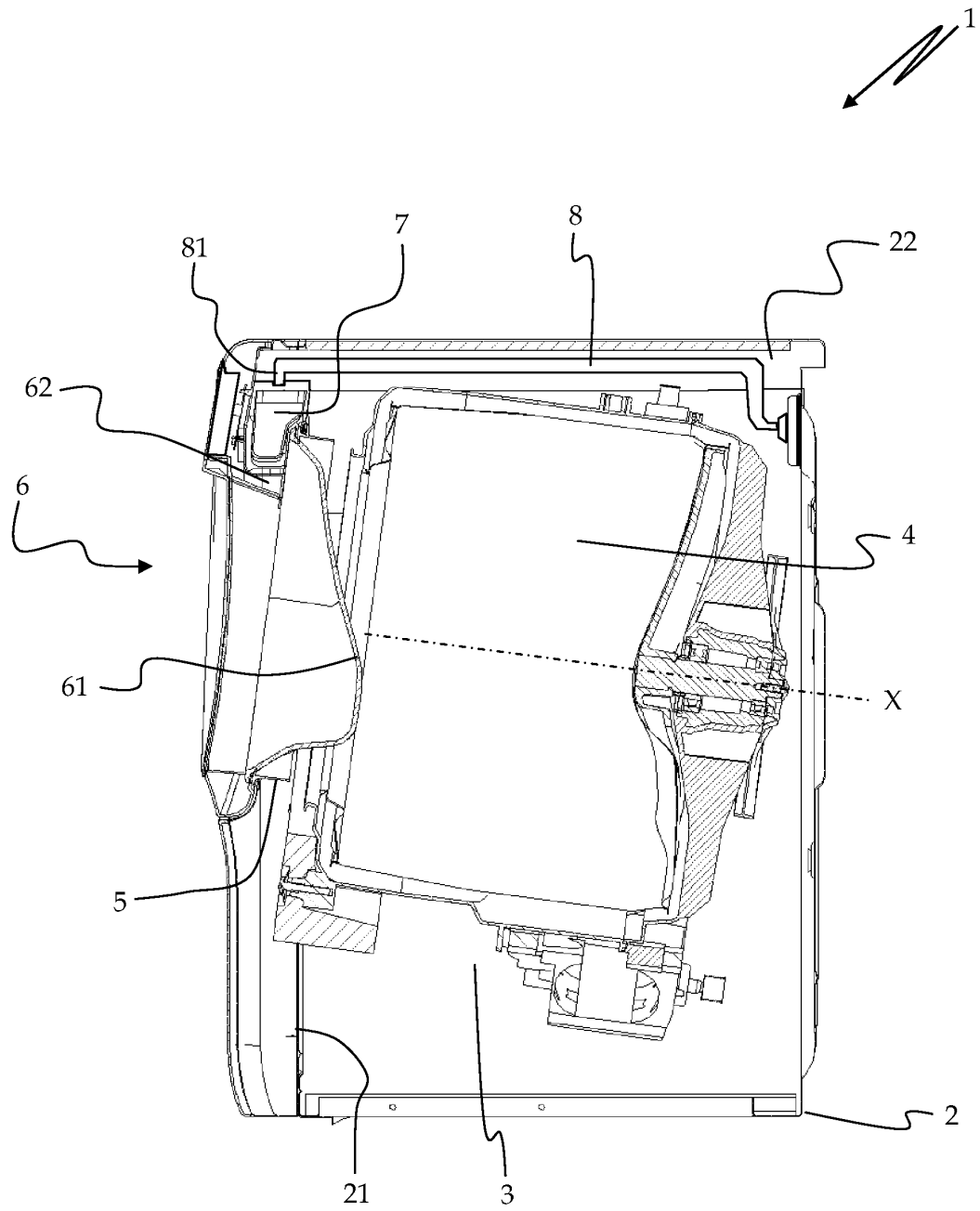


Fig. 1

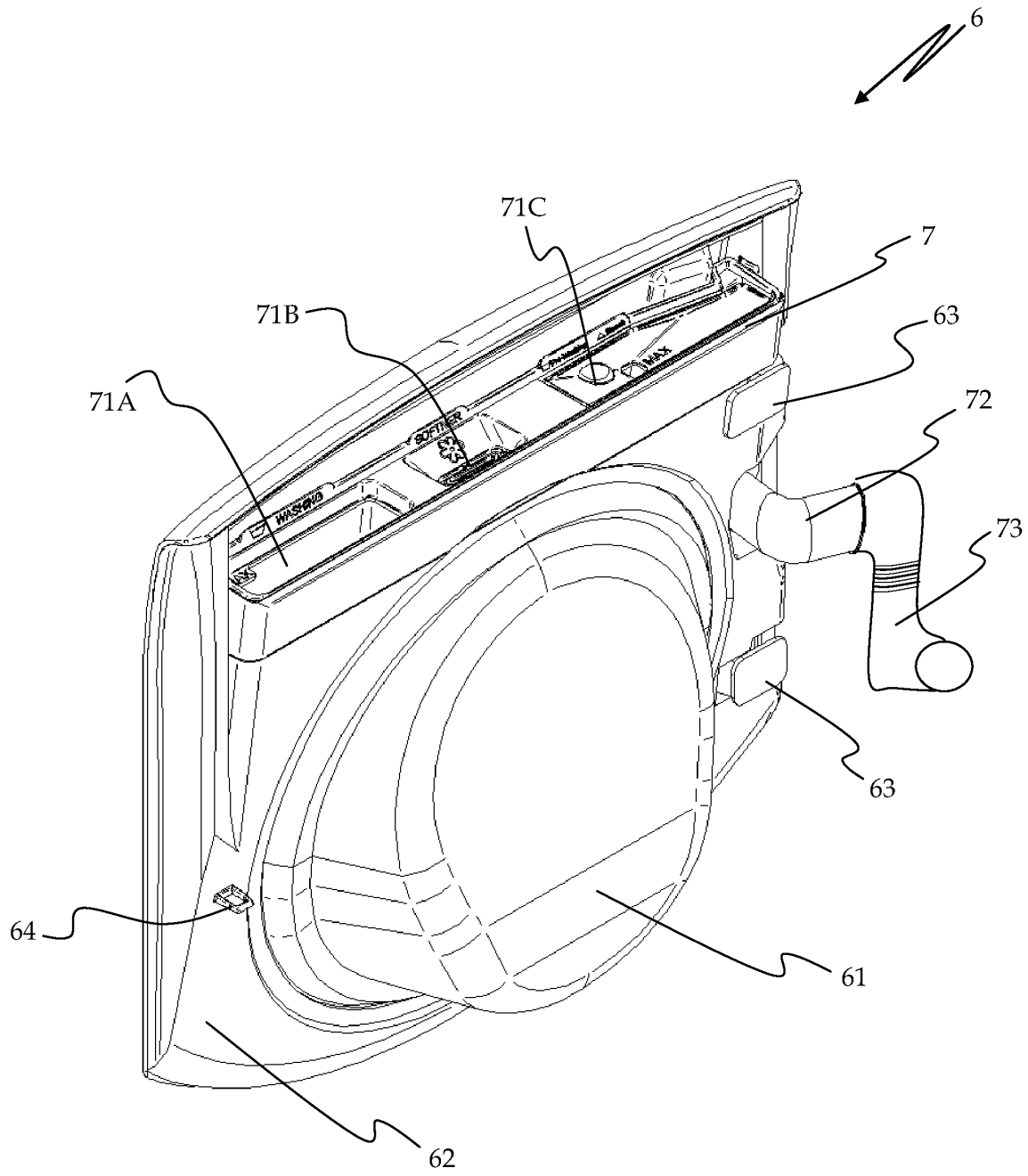


Fig. 2

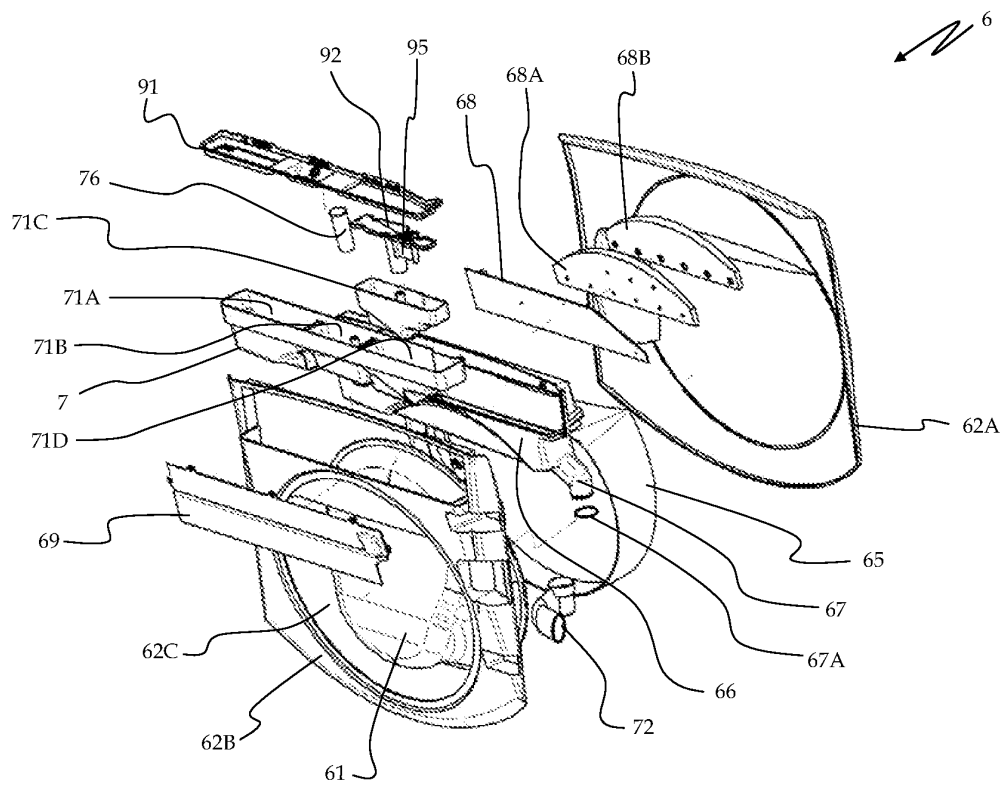


Fig. 3

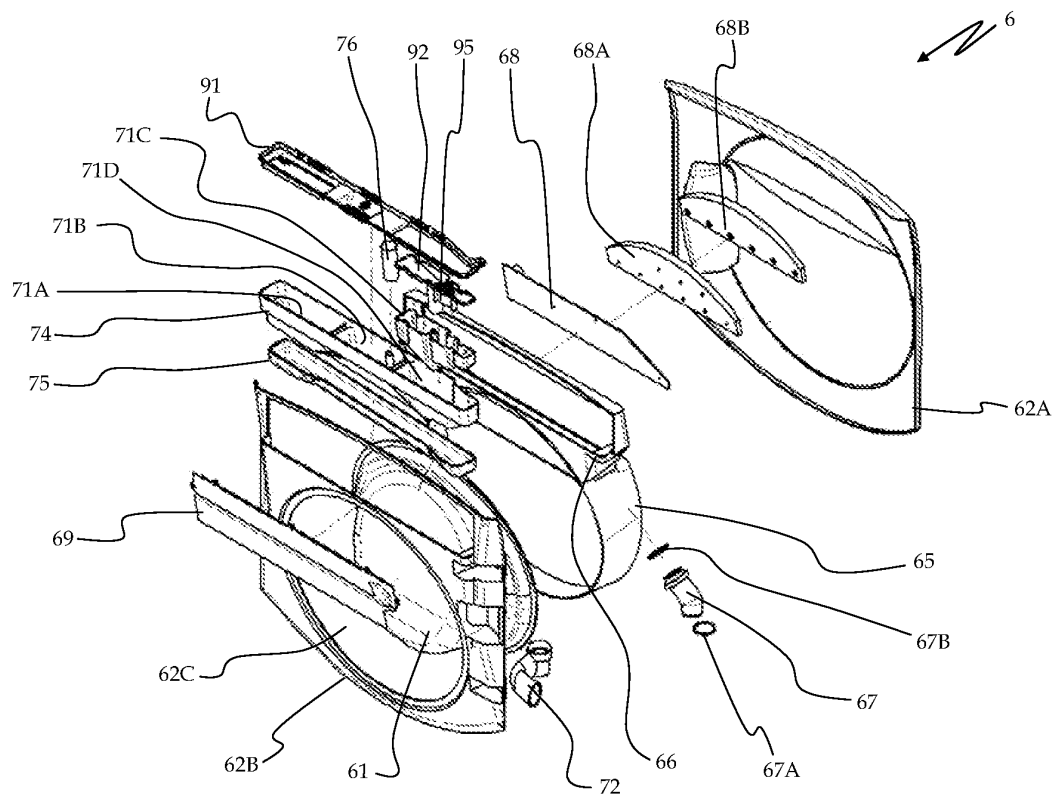


Fig. 4

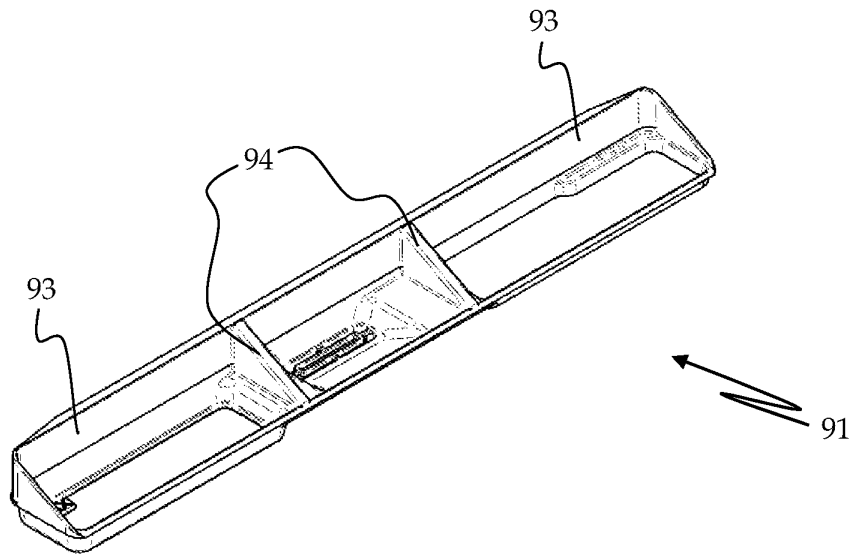


Fig. 5a

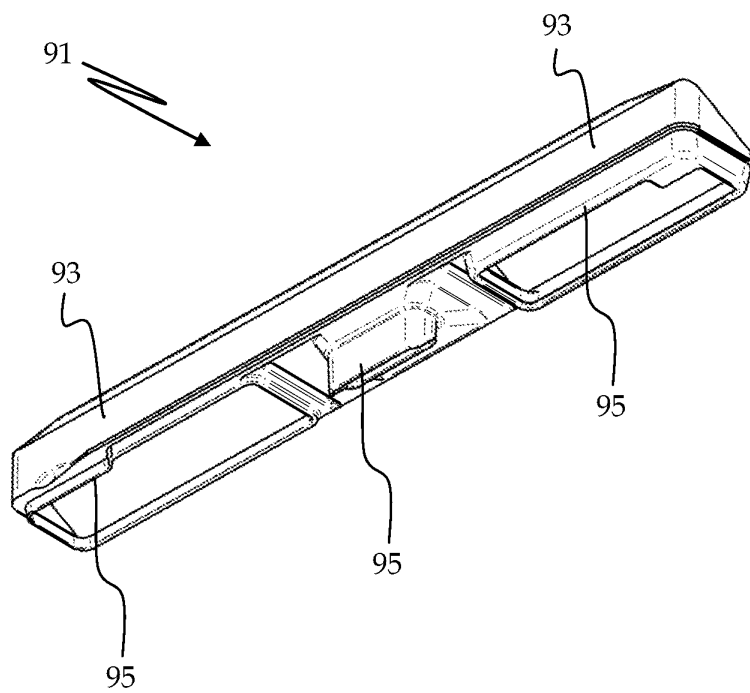


Fig. 5b

REFERENCES CITED IN THE DESCRIPTION

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