



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.06.2014 Bulletin 2014/25

(51) Int Cl.:
D06F 39/02 (2006.01) D06F 39/14 (2006.01)

(21) Application number: **13196806.7**

(22) Date of filing: **12.12.2013**

(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

(72) Inventors:
• **Pierucci, Gianluca**
60030 Maiolati Spontini (AN) (IT)
• **Baldini, Maurizio**
60044 Fabriano (AN) (IT)

(30) Priority: **13.12.2012 IT TO20121072**

(74) Representative: **Reposio, Giancarlo et al**
c/o Metroconsult S.r.l.
Via Sestriere 100
10060 None (TO) (IT)

(71) Applicant: **Indesit Company S.p.A.**
60044 Fabriano (AN) (IT)

(54) **A front-loading laundry washing machine for household use, in particular a washing or washing/drying machine**

(57) The present invention relates to a front-loading laundry washing machine (1) for household use, in particular a washing or washing/drying machine, comprising a cabinet (2) within which a tub (3) is arranged, and having a load opening (4) that can be closed by a door (6) constrained to said cabinet (2), said door (6) comprising:
- a porthole glass (7);
- a frame (8) supporting said porthole glass (7) and adapted to abut against said cabinet (2), in particular in adjacency to the load opening (4);
- dispensing means (9) for dispensing at least one agent for treating at least one laundry item.

The invention is characterized in that said door (6) comprises coupling means (7C, 7E) adapted to associate said porthole glass (7) with the frame (8) so as to allow said porthole glass (7) to move in order to switch from a closed position to an open position relative to the frame (8), and vice versa, and so as to allow said porthole glass (7) to stay in said closed position relative to the frame (8), said dispensing means (9) comprising at least one reservoir (91, 92) associated with said porthole glass (7), in particular with an inner surface (71) of said porthole glass (7).

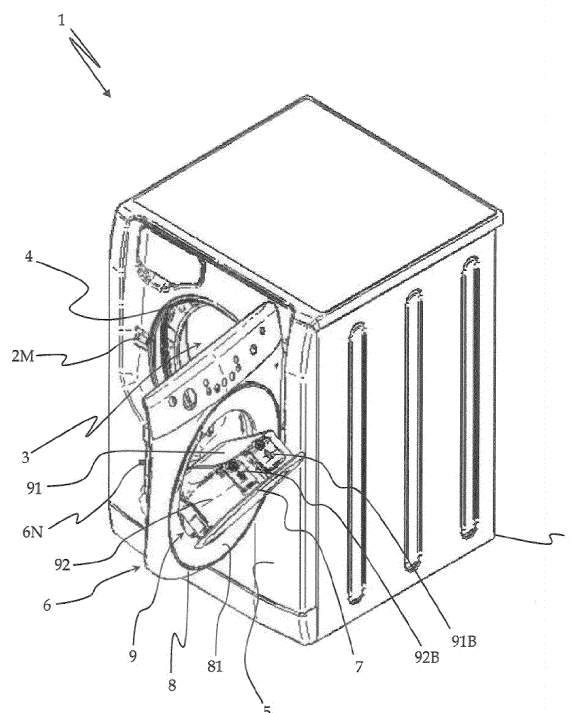


Fig. 2

Description

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

[0002] The invention is applicable to the field of front-loading laundry washing machines for household use, in particular washing or washing/drying machines, provided with means for dispensing at least one agent for treating at least one laundry item (wherein said at least one agent may comprise a washing agent, such as detergent, softener, bleach, etc., or additives of various kinds), said dispensing means being located in the door that closes the load opening of the machine.

[0003] In the front-loading laundry washing machines for household use known in the art, a door is used for closing the load opening, through which the laundry to be washed is placed into a wash tub, which typically includes a rotary drum. 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] As is known, prior to each operating cycle the user of a washing machine pours a dose of a washing agent (e.g. detergent and/or softener) into a single-dose drawer in fluidic communication with the wash tub; a water duct afferent to the drawer floods the latter while the machine is in operation, so as to deliver the washing agent into the tub.

[0005] The term "single-dose drawer" refers herein to a drawer which can only contain a quantity of washing agent which is sufficient for one operating cycle of the machine, corresponding to treating one load of laundry (normally 3 to 7 Kg).

[0006] The capacity of the drawer is limited to one wash cycle; in fact, in order to prevent any washing agent deposits in the drawer, the drawer is completely emptied and must then be refilled by the user before starting the next operating cycle of the washing machine.

[0007] Such a system is *per se* functional, but requires that the drawer be filled each time by the user.

[0008] Consequently, washing machines have been developed which are equipped with at least one long-fill reservoir for washing agents; such machines allow to exploit the multi-dose capacity of the reservoir, so that a number of wash cycles can be carried out without the user having to refill the machine with a new dose of washing agent.

[0009] Washing machines of this type have been described, for example, in British patent No. GB 2 214 524 in the name of Industrie Zanussi S.p.A. In this case, the washing machine base includes a certain number of washing agent bags, which are installed in the machine after having been filled with washing agent, and which are then gradually emptied during the various operating cycles of the washing machine; for this purpose, the bags are made of a deformable plastic material (so that no air

can enter because the bags can adapt themselves to their decreasing contents), and are in fluidic communication with a duct through which, usually by means of a pump, the washing agent is delivered to the tub. Although it is no longer necessary to pour in washing agent before each operating cycle of the machine, this solution still suffers from the drawback that the entire washing agent bags must be replaced when they become empty, and the user has to carry out this task in non-optimal conditions, since the bags are located in the machine base, in a position which is not easily accessible.

[0010] Moreover, the bags are made of flexible plastic, and presumably imply a certain purchase cost in addition to that of the washing agent alone; it follows that their complete replacement is not advantageous from an economical viewpoint.

[0011] In other systems known in the art (e.g. from European patent No. EP 0 379 950 in the name of Miele & Cie GmbH & CO.), in the base of the washing machine there is at least one rigid reservoir adapted to contain a volume of washing agents which is sufficient for several working cycles of the washing machine; said washing agents are then usually fed to the wash tub through suitable ducts.

[0012] These solutions, although they can overcome some drawbacks of the system previously described (such as, for example, having to replace the entire bag), still suffer from the problem that pouring in the washing agents is not an ergonomic task; in fact, it is quite common that the user has to stoop to the base of the washing machine in order to pour the washing agent into said at least one rigid reservoir.

[0013] Alternatively, the washing agent is loaded into said at least one rigid reservoir through a washing agent filling drawer, usually consisting of the drawer used for loading single doses of washing agents; said drawer is located in a remote position with respect to the reservoir, and is in fluidic communication therewith by means of suitable ducts and pumps; inevitably, these solutions increase the costs incurred for manufacturing the whole washing machine. A similar solution is described in European patent application No. EP1884584 in the name of the present Applicant.

[0014] Another problem of these solutions is that said at least one rigid reservoir is fixedly associated with the base of the washing machine; as a consequence, this inevitably implies that maintenance of said at least one rigid reservoir is more costly and difficult, in that it is also necessary to carry out specific cycles of the washing machine in order to clean said at least one rigid reservoir.

[0015] Front-loading laundry washing machines for household use, in particular washing or washing/drying machines, are also known in the art (e.g. from United States patent No. US3,595,036 in the name of General Electric Company) in which the means for dispensing the agents for treating at least one laundry item are arranged in the door that closes the load opening of the machine.

[0016] However, such types of washing machines suf-

fer from the important drawback that, in order to pour suitable agents into said dispensing means, the user must necessarily open the door of the washing machine; it is clear that this door opening operation can be very uncomfortable and may cause a problem of percolation of water and washing agent from the door opening, particularly onto the floor in front of the washing machine.

[0017] Besides posing the potential risk of considerable percolation or dripping, a further problem suffered by such known type of washing machine is that the positioning of the dispensing means in the door or in the porthole glass may cause leakage of said washing agents onto the floor in front of the washing machine, especially when the user pours into the dispensing means 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.

[0018] In addition, this necessary task of pouring in the washing agents with the door open may turn out to be particularly uncomfortable and difficult whenever the laundry items to be treated have already been inserted into the washing machine, e.g. because they might come out of the drum.

[0019] In this frame, it is the main object of the present invention to overcome the above-mentioned drawbacks by providing a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, which is so realized as to not require opening the door that closes the load opening of the washing machine in order to fill with suitable agents the dispensing means positioned in the door of the washing machine; consequently, it is one object of the present invention to realize said washing machine in such a way as to limit any possible problems of water percolation from the door.

[0020] It is another object of the present invention to provide a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, which is so realized as to ensure a comfortable and easy filling of the dispensing means with agents even when the laundry items to be treated have already been inserted into the washing machine.

[0021] It is a further object of the present invention to provide a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, which is so realized as to not require a user to manually fill the drawer each time.

[0022] It is another object of the present invention to provide a laundry washing machine which is so realized that the long-fill reservoirs (which may also be defined as high-capacity reservoirs) need not be replaced when they become empty, so that the user is not required to carry out such a task in non-optimal conditions.

[0023] It is a further object of the present invention to provide a laundry washing machine which is so designed as to allow a user to load the washing agents into at least one long-fill reservoir easily and ergonomically, in particular without having to stoop to the base of the washing machine in order to load said washing agents.

[0024] It is another object of the present invention to provide a laundry washing machine which is so realized as to require less costly and simpler maintenance for the machine itself and for at least one rigid washing agent reservoir.

[0025] It is a further object of the present invention to provide a laundry washing machine which is so realized as to include at least one rigid washing agent reservoir, said at least one rigid reservoir being so designed and associated with the washing machine as to not require, in order to be cleaned, the execution of specific cycles of the washing machine. In order to achieve these objects, the present invention provides a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, incorporating the features set out in the appended claims, which are intended to be an integral part of the present description.

[0026] 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:

- Figs. 1 and 2 are a first and a second perspective views, respectively, of a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, incorporating the features of the present invention;
- Figs. 3a, 3b, 3c are a first, a second and a third perspective views, respectively, of a door of the washing machine according to the present invention, in Fig. 3a some door components being transparent;
- Figs. 4a and 4b are a first and a second different perspective views, respectively, of the door of Figs. 3a, 3b and 3c, in Fig. 4a some components of the door being transparent;
- Figs. 5a and 5b show, respectively, a different perspective view of the door of Figs. 3a to 3c and a sectional perspective view of the door according to the present invention.

[0027] Figures 1 and 2 are a first and a second perspective views, respectively, of a front-loading laundry washing machine 1 for household use, in particular a washing or washing/drying machine, according to the present invention.

[0028] The washing machine 1 comprises a cabinet 2, within which a tub 3 is arranged in a known manner. Inside the latter, a drum (not shown in the drawings) is rotated, preferably about a horizontal or substantially horizontal axis (not shown in the drawings). The laundry items to be treated are placed inside the drum through a load opening 4 associated with a front part 5 of the cabinet 2.

[0029] In particular, the axis of the drum may be slightly inclined, so that it is raised towards the front part 5 of the cabinet 2; this allows a user to load the laundry into the drum more easily.

[0030] The load opening 4 can be closed by means of

a door 6 constrained to said cabinet 2; in Fig. 1 said door 6 is shown in the closed condition, whereas in Fig. 2 the door 6 is shown in an open condition, i.e. in the condition that allows placing laundry items to be washed into the drum through the load opening 4.

[0031] When comparing Figures 1 and 2, one can notice that the door 6 can switch from a closed condition (shown in Fig. 1) to an open condition (shown in Fig. 2); in particular, in said open condition of the door 6 it is possible to insert at least one laundry item to be treated into the tub 3. The switching from the open condition to the closed condition (and vice versa) of the door 6 is preferably obtained, in a known manner, through at least one hinge 6C (shown in Figures 3a to 3c and in Fig. 4b); also, in order to keep the door 6 in the closed condition, it is preferably fitted, in a known manner, with a catch 6N adapted to be associated with coupling means 2M of the cabinet 2.

[0032] Said door 6 comprises a porthole glass 7 and a frame 8 for supporting said porthole glass 7, the porthole glass 7 and the frame 8 being preferably included in a single front element of the door 6.

[0033] Preferably, the part of said door 6 that faces the load opening 4 protrudes in the direction of the tub 3 relative to the frame 8, so that, when the door 6 is closed, it will at least partially enter into the load opening 4; moreover, when the door 6 is closed, it can at least partially enter into the tub 3 and possibly into the drum. When the door 6 is closed, the frame 8 abuts (whether directly or through the interposition of a further element, such as, for example, a gasket not shown in the drawings) against the front part 5 of the cabinet 2, in adjacency to the load opening 4 of said cabinet 2.

[0034] The door 6 of the washing machine 1 according to the present invention further comprises dispensing means (designated as a whole by reference numeral 9 in the annexed drawings) for dispensing at least one (washing and/or additive) agent for treating at least one laundry item (not shown in the drawings).

[0035] Figures 3a, 3b, 3c show, respectively, a first, a second and a third perspective views of the door 6 of the washing machine 1 according to the present invention, whereas Figures 4a and 4b show, respectively, a first and a second different perspective views of the door 6 of Figures 3a, 3b and 3c. In particular, said Figures show a portion of the door 6 facing outwards from the washing machine 1 when said door 6 is closed. Furthermore, in Figures 3a and 4a the porthole glass 7 is shown as if it were made of transparent material, thus making it possible to observe the components associated with an inner portion of said porthole glass 7, i.e. a portion of said porthole glass 7 facing towards the tub 3 of the washing machine 1 when the door 6 is closed.

[0036] In said Figures one can notice that, in accordance with the present invention, said door 6 comprises coupling means 7C, 7E adapted to associate said porthole glass 7 with the frame 8 so as to allow said porthole glass 7 to move in order to switch from a closed position

(shown in Figures 1, 3a, 4a, 4b, 5b) to an open position (shown in Figures 2, 3b, 3c) relative to the frame 8, and vice versa, and so as to allow said porthole glass 7 to stay in said closed position relative to the frame 8, said dispensing means 9 comprising at least one reservoir 91, 92 associated with said porthole glass 7, in particular with an inner surface 71 of said porthole glass 7.

[0037] In particular, said coupling means adapted to associate said porthole glass 7 to the frame 8 comprise a hinge 7C (visible in Figures 3a and 4a) adapted to act as a pin for a rotational movement of said porthole glass 7 relative to the frame 8 from said closed position (shown in Figures 1, 3a, 4a, 4b, 5b) to said open position (shown in Figures 2, 3b, 3c), and vice versa. Preferably, said at least one hinge 7C is positioned (as shown in Figures 3a and 4a) in correspondence to a lower end of the porthole glass 7, in particular in a manner such that said inner surface 71 substantially faces upwards in said open position of said porthole glass 7.

[0038] It must be pointed out that, in the present description, terms such as "lower", "high", "upper" and the like refer to a condition wherein said components have been mounted on the washing machine 1 of the present invention.

[0039] In addition, said coupling means comprise a catching element 7E (shown in Figures 3b and 3c) that allows the porthole glass 7 to stay in said closed position (Figures 1, 3a, 4a, 4b, 5b) relative to the frame 8, in particular said catching element 7E being positioned in correspondence to an upper end of the porthole glass 7 when the latter is in the closed position.

[0040] In a preferred embodiment, said catching element 7E is of the "push to open" type, i.e. a type that allows a user to open the porthole glass 7 by exerting pressure upon said porthole glass 7 when the latter is in the closed position.

[0041] Preferably, said coupling means also comprise a braking device (not shown in the drawings), preferably associated with the hinge C, which ensures a slow, progressive opening of the porthole glass 7; in addition, said coupling means further comprise an end-of-travel element (not shown in the drawings), which is also preferably associated with the hinge 7C.

[0042] The particular provision of the coupling means 7C, 7E allows associating the porthole glass 7 with the frame 8 in such a way as to allow said porthole glass 7 to move in order to switch from a closed position to an open position, and vice versa, relative to the frame 8. As a result, said coupling means 7C, 7E allow providing a washing machine 1 which is so realized as to not require opening the door 6 in order to fill the dispensing means 9 with suitable agents; in fact, the washing machine 1 of the present invention allows said dispensing means 9 to be filled very easily, since it is sufficient to open the porthole glass 7 relative to the frame 8 to gain access to said at least one reservoir 91, 92. In particular, considering that said at least one reservoir 91, 92 is associated with an inner surface 71 of said porthole glass 7, it becomes

immediately available to the user after the porthole glass 7 has been opened, and can be moved to a position external to the washing machine 1 (i.e. a position where it can be filled with agents in an extremely comfortable and simple manner) following a simple action of opening said porthole glass 7.

[0043] As a consequence, the particular provisions of the present invention allow realizing said washing machine 1 in a manner such as to limit any possible problems of percolation of water and/or agents from the door 6, such problems resulting from the necessity of opening the door 6 in order to fill said dispensing means 9.

[0044] In addition, the particular realization of the washing machine 1, which comprises a porthole glass 7 adapted to open relative to the frame 8, allows filling the dispensing means 9 with agents in a comfortable and easy manner even when the laundry items to be treated have already been placed into the tub 3 of the washing machine 1.

[0045] It must be noted that, in the embodiment shown in the annexed drawings, said door 6 comprises an edge 81 which is so shaped as to substantially surround said porthole glass 7, in particular said edge 81 being that part of the frame 8 which connects the porthole glass 7 to said frame 8.

[0046] Preferably, the door 6 comprises a handle 81A allowing the user to open the door 6, in particular said handle 81A being associated with said edge 81.

[0047] It should be observed that said edge 81 may be made either as one piece with the frame 8 or as a part distinct from the frame 8 and then secured to the frame 8.

[0048] Furthermore, said edge 81 may be made either of a material substantially corresponding to that of the frame 8 or of a material substantially corresponding to that of the porthole glass 7. It is however clear that the washing machine 1 according to the present invention may also be realized in a manner such that the frame 8 and the edge 81 constitute a single element, e.g. the frame 8 having, near the area where it connects to the porthole glass 7, a shape similar to that shown in the annexed drawings for the edge 81.

[0049] Preferably, said at least one reservoir 91, 92 is of the long-fill type and is adapted to contain a quantity of agent (washing and/or additive agent) which is sufficient for multiple operating cycles of the washing machine 1.

[0050] Moreover, said at least one reservoir 91, 92 is made of a transparent or translucent rigid material; for example, said at least one reservoir 91, 92 may be made of plastic material, such as, for example, PMMA or polypropylene or polyethylene.

[0051] Preferably, said at least one reservoir 91, 92 comprises a first reservoir 91 for containing a first agent (e.g. a detergent) and a second reservoir 92 for containing a second agent (e.g. a softener); it is however clear that said at least one reservoir 91, 92 may comprise a larger number of reservoirs 91, 92, e.g. also a third reservoir (not shown in the annexed drawings) for containing

an additional agent (e.g. a dye fixative, a dye or the like).

[0052] In a preferred embodiment, said at least one reservoir 91, 92 comprises at least one first aperture 91A, 92A associated with an upper portion of said at least one reservoir 91, 92 for filling it with agents (e.g. softener, detergent, etc.).

[0053] Said first apertures 91A, 92A, when not in use, can be kept closed with respective plugs 91B, 92B (visible in particular in Figures 3b and 3c).

[0054] Advantageously, said at least one reservoir 91, 92 comprises a gripping element 91P, 92P (visible in particular in Figures 1, 3a to 3c, 5a and 5b), which is preferably made as one piece with the reservoir 91, 92; said gripping element 91P, 92P makes it easier for the user to extract said at least one reservoir 91, 92, fill it with an agent, transport it and insert it into the washing machine 1.

[0055] Figures 5a and 5b show, respectively, a perspective view of the inner surface 71 of the porthole glass 7 (i.e. that portion of the porthole glass 7 which faces towards the tub 3 when the door 6 is in the closed condition and the porthole glass 7 is in the closed position) and a sectional view of the porthole glass 7 according to the present invention.

[0056] In particular, in Figures 3c and 5a the porthole glass 7 of the washing machine 1 is shown in a condition wherein said at least one reservoir 91, 92 has been removed (for example, through a movement shown by means of a dashed-dotted arrow in Figures 3c and 5a) relative to the inner surface 71 of the porthole glass 7.

[0057] By observing Figures 3a to 5b, one can see that the dispensing means 9 according to the present invention comprise at least one pump 93, 94 adapted to be associated with said at least one reservoir 91, 92.

[0058] Preferably, said dispensing means 9 comprise a number of pumps 93, 94 corresponding to the number of reservoirs 91, 92 associated with the porthole glass 7 of the door 6 according to the present invention. Consequently, in a preferred embodiment said at least one pump 93, 94 comprises a first pump 93 adapted to be associated with the first reservoir 91, and a second pump 94 adapted to be associated with the second reservoir 92.

[0059] Advantageously, the first pump 93 and the second pump 94 share a same motor and are fitted to a same shaft (said motor and shaft not being shown in the drawings); in this manner, when the motor is turning in a first direction of rotation the first pump 93 is activated, whereas when the motor is turning in a second direction of rotation, opposite to the first one, the second pump 94 is activated.

[0060] It is however clear that the number of reservoirs 91, 92 and of the associated pumps 93, 94 may also differ from that shown in the annexed drawings.

[0061] In a preferred embodiment, said at least one pump 93, 94 is of the volumetric or peristaltic or vibration type and ensures an accurate and optimal metering of the agent to be supplied into the tub 3, said metering being advantageously estimated by the electronic control

system of the washing machine 1 as a function of parameters such as cycle type and quantity of laundry. Said at least one pump 93, 94 is electrically powered by suitable wires (not shown in the drawings), which in particular are routed through the hinges 6C. If the viscosity of the agents allows, said at least one pump 93, 94 may be replaced by at least one electrovalve (not shown in the drawings), in which case the agents will be released by gravity.

[0062] Figures 5a and 5b also show that said dispensing means 9 comprise at least one intake duct 95 associated with said at least one pump 93, 94 for taking in agent from said at least one reservoir 91, 92.

[0063] In particular, said at least one intake duct 95 is so realized as to comprise a first section 95A extending outside said at least one reservoir 91, 92 and a second section 95B extending inside said at least one reservoir 91, 92, in particular said first section 95A and second section 95B being connected to each other by means of a sealed coupling element 95C.

[0064] Advantageously, the first section 95A extends along the inner surface 71 up to a height corresponding to the upper portion of said at least one reservoir 91, 92. In this way, the second section 95B, in particular consisting of a hose, extends from the upper portion of said at least one reservoir 91, 92 to the bottom of the same. This allows providing said at least one reservoir 91, 92 with a bottom with no apertures, and this is very advantageous to avoid percolation from said at least one reservoir 91, 92 when it is separated from the washing machine 1.

[0065] Furthermore, in Fig. 4a one can notice that said at least one pump 93, 94 is associated with delivery means 96, 97 for delivering into the tub 3 of the washing machine 1 the agents contained in said at least one reservoir 91, 92.

[0066] Preferably, said delivery means comprise at least one pipe 96 preferably ending with an outlet nozzle 97 adapted to release the agents directly into said tub 3; in order to ensure adequate visibility of said at least one pipe 96 preferably ending with an outlet nozzle 97, the porthole glass 7 (which is preferably made of prevalently non-transparent material) is shown to be transparent in Fig. 4a.

[0067] The special provision of the dispensing means 9 according to the present invention allows to provide a washing machine 1 that can carry out a certain number of wash cycles without the user having to refill the machine with a new dose of agent before each wash or operating cycle of said washing machine 1.

[0068] Also, the washing machine 1 according to the present invention does not require said at least one reservoir 91, 92 to be replaced when it becomes empty, so that the user is not compelled to carry out such a task in non-optimal working conditions.

[0069] The particular arrangement of said dispensing means 9 according to the present invention then allows the agents to be easily and ergonomically loaded into said at least one reservoir 91, 92, in particular without

the user having to stoop to the base of the washing machine 1 in order to load the agents.

[0070] Furthermore, the provisions of the present invention ensure simpler and cheaper maintenance of the washing machine 1, in particular said washing machine 1 being so realized as to require no specific cycles for cleaning said at least one reservoir 91, 92; in fact, said at least one reservoir 91, 92 can be cleaned after simply having extracted it from the inner surface 71 of the porthole glass 7, in particular after having rotated the porthole glass 7 into the open condition relative to the frame 8.

[0071] In accordance with the present invention, the door 6 comprises joining means (designated as a whole by reference numeral 10 in Figures 5a and 5b) adapted to allow said at least one reservoir 91, 92 to be coupled to said inner surface 71 of the porthole glass 7.

[0072] Preferably, said joining means 10 comprise a base 101 adapted to act as a supporting surface for said at least one reservoir 91, 92, said base 101 being coupled to the inner surface 71 of the porthole glass 7, in particular by means of fastening means not shown in the drawings (typically screws or joints).

[0073] As can be seen in Fig. 5a, the base 101 is coupled to the inner surface 71 of the porthole glass 7 in such a way as to be substantially perpendicular to said inner surface 71.

[0074] In addition, said joining means 10 comprise at least one first guide 102 (shown in Fig. 5a) associated with said base 101, in particular said at least one first guide 102 being adapted to fit into a first groove 91S, 92S (shown by means of a dashed line in Fig. 5a and through an inside view of said at least one reservoir 91, 92 in Fig. 5b) of said at least one reservoir 91, 92.

[0075] The joining means 10 further comprise at least one locking element 103 (shown in Fig. 5a), in particular of the elastic type, which is associated with said base 101 in a manner such that it couples to an outer surface of said at least one reservoir 91, 92 for the purpose of securing said at least one reservoir 91, 92 when it is resting on said base 101, in particular said locking element 103 matching a corresponding third groove 103A formed on the outer surface of said at least one reservoir 91, 92.

[0076] Preferably, the joining means 10 according to the present invention comprise at least one second guide 104 associated with the inner surface 71 of the porthole glass 7, in particular said at least one second guide 104 being adapted to fit into a second groove 91T, 92T (shown in Fig. 3a and, by means of a dashed line, in Fig. 5a) of said at least one reservoir 91, 92.

[0077] In a preferred embodiment (shown in Fig. 5a), said at least one second guide 104 is so realized as to accommodate at least a part of the first section 95A of said at least one intake duct 95. When said at least one reservoir 91, 92 gets to the end of its travel and is substantially lying on said base 101, the connection between the first section 95A and the second section 95B is automatically established through the sealed coupling element 95C. The joining means 10 according to the present

invention make said at least one reservoir 91, 92 movable relative to the porthole glass 7 without however making it susceptible of undesired removal; this turns out to be particularly advantageous in that said joining means 10 allow to prevent said at least one reservoir 91, 92 from accidentally detaching from the inner surface 71 of the porthole glass 7.

[0078] Furthermore, said joining means 10 facilitate both the coupling of said at least one reservoir 91, 92 to the inner surface 71 of the porthole glass 7 and the decoupling or removal of the same from said inner surface 71 (e.g. for filling it with an agent); in fact, the provision of at least one first guide 102 and/or at least one second guide 104 ensures an accurate and guided insertion of said at least one reservoir 91, 92, so that it will rest properly on the base 101, and a correct connection between the first section 95A and the second section 95B, as well as easy removal from the inner surface 71 of the porthole glass 7.

[0079] While observing Figures 1, 3b, 3c, 4b, 5a and 5b, one can notice that said porthole glass 7 comprises at least one inspection window 72 for verifying and checking the level of the agents contained in said at least one reservoir 91, 92. In particular, the porthole glass 7 is prevalently non-transparent and comprises at least one transparent or translucent inspection window 72 that allows verifying and checking the level of the agents contained in said at least one reservoir 91, 92.

[0080] Preferably, said at least one inspection window 72 is so realized as to be positioned in front of said at least one reservoir 91, 92, so that the user can verify, said at least one reservoir 91, 92 being transparent or translucent, the level of the agent contained in said at least one reservoir 91, 92.

[0081] The advantages offered by a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, according to the present invention are apparent from the above description.

[0082] In particular, the provision of the coupling means 7C, 7E allows to provide a washing machine 1 which is so designed as to not require opening the door 6 in order to fill the dispensing means 9 with suitable agents; in fact, the washing machine 1 of the present invention allow the dispensing means 9 to be filled very easily, since it is sufficient to open the porthole glass 7 relative to the frame 8 to gain access to said at least one reservoir 91, 92.

[0083] In particular, considering that said at least one reservoir 91, 92 is associated with an inner surface 71 of said porthole glass 7, it becomes immediately available to the user after the porthole glass 7 has been opened, and can be moved to a position external to the washing machine 1 (i.e. a position where it can be filled with agents in an extremely comfortable and simple manner) following a simple action of opening said porthole glass 7.

[0084] As a consequence, the particular provisions of the present invention allow realizing said washing ma-

chine 1 in a manner such as to limit any possible problem of percolation of water and/or agents from the door 6, such problems resulting from the necessity of opening the door 6 in order to fill said at least one reservoir 91, 92.

[0085] Furthermore, the particular realization of the washing machine 1, which comprises a porthole glass 7 adapted to open relative to the frame 8, allows filling the dispensing means 9 with agents in a comfortable and easy manner even when the laundry items to be treated have already been placed into the tub 3 of the washing machine 1, since the laundry items are prevented from coming out of the tub 3 by the fact that the door 6 can be left closed while filling said at least one reservoir 91, 92.

[0086] Another advantage of the washing machine 1 according to the present invention is that the special provision of the dispensing means 9 allows to make said washing machine 1 suitable for executing a certain number of wash cycles without the user having to refill the machine with a new dose of (washing or additive) agent before each wash or operating cycle of said washing machine 1.

[0087] Also, the washing machine 1 according to the present invention does not require said at least one reservoir 91, 92 to be replaced when it becomes empty, so that the user is not compelled to carry out such a task in non-optimal working conditions.

[0088] Another advantage of the washing machine according to the present invention is that the particular arrangement of said dispensing means 9 allows the agents to be easily and ergonomically loaded into said at least one reservoir 91, 92, in particular without the user having to stoop to the base of the washing machine 1 in order to load the agents. Furthermore, the special provisions of the present invention ensure simpler and cheaper maintenance of the washing machine 1, in particular said washing machine 1 being so realized as to require no specific cycles for cleaning said at least one reservoir 91, 92; in fact, said at least one reservoir 91, 92 can be cleaned after simply having extracted it from the inner surface 71 of the porthole glass 7, in particular after having rotated the porthole glass 7 relative to the frame 8.

[0089] A further advantage of the washing machine 1 according to the present invention is that the joining means 10 make said at least one reservoir 91, 92 movable relative to the porthole glass 7 without however making it susceptible of undesired removal; this turns out to be particularly advantageous in that said joining means 10 allow to prevent said at least one reservoir 91, 92 from accidentally detaching from the inner surface 71 of the porthole glass 7.

[0090] Furthermore, said joining means 10 facilitate both the coupling of said at least one reservoir 91, 92 to the inner surface 71 of the porthole glass 7 and the decoupling of the same from said inner surface 71 (e.g. for filling it with an agent); in fact, the provision of at least one first guide 102 and/or at least one second guide 104 ensures an accurate and guided insertion of said at least one reservoir 91, 92, so that it will rest properly on the

base 101, as well as easy removal thereof from the inner surface 71 of the porthole glass 7.

[0091] The provision of said at least one inspection window 72 then allows verifying and checking the level of the agent contained in said at least one reservoir 91, 92 without having to open the porthole glass 7 and/or to extract said at least one reservoir 91, 92 from the washing machine 1.

[0092] The front-loading laundry washing machine for household use, in particular a washing or washing/drying 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.

[0093] For example, the washing machine 1 according to the present invention may be so realized as to additionally comprise a traditional system for loading the agents into the tub 3. In such a case, the control system (not shown in the drawings) of the washing machine 1 preferably recognizes said traditional type of loading (e.g. carried out by pouring a powder agent into a suitable drawer of said washing machine), and will accordingly execute an appropriate operating program in which said at least one pump 93, 94 is not activated.

[0094] In particular, said recognition of the type of agent loading may occur by measuring the conductivity of the liquid present in the tub 3, since the water supplied into the tub 3 will flow through said traditional loading system.

[0095] It is apparent that such a provision allows to provide a washing machine 1 which is extremely versatile, in that it can be indifferently loaded with liquid agents (preferably poured into said at least one long-fill reservoir 91, 92) or with powder agents (preferably poured into a suitable drawer of the washing machine 1).

[0096] It can therefore be easily understood that the present invention is not limited to the above-described front-loading laundry washing machine for household use, in particular a 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. A front-loading laundry washing machine (1) for household use, in particular a washing or washing/drying machine, comprising a cabinet (2) within which a tub (3) is arranged, and having a load opening (4) that can be closed by a door (6) constrained to said cabinet (2), said door (6) comprising:
 - a porthole glass (7);
 - a frame (8) supporting said porthole glass (7)

and adapted to abut against said cabinet (2), in particular in adjacency to the load opening (4);
 - dispensing means (9) for dispensing at least one agent for treating at least one laundry item,

characterized in that

said door (6) comprises coupling means (7C, 7E) adapted to associate said porthole glass (7) with the frame (8), so as to allow said porthole glass (7) to move in order to switch from a closed position to an open position relative to the frame (8), and vice versa, and so as to allow said porthole glass (7) to stay in said closed position relative to the frame (8), said dispensing means (9) comprising at least one reservoir (91, 92) associated with said porthole glass (7), in particular with an inner surface (71) of said porthole glass (7).

2. A laundry washing machine (1) according to claim 1, **characterized in that** said coupling means comprise a hinge (7C) adapted to act as a pin for a rotational movement of said porthole glass (7) relative to the frame (8) from said closed position to said open position, and vice versa.
3. A laundry washing machine (1) according to claim 2, **characterized in that** said at least one hinge (7C) is located in correspondence to a lower end of the porthole glass (7C), in particular in a manner such that said inner surface (71) substantially faces upwards in said open position of the porthole glass (7).
4. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said coupling means comprise a catching element (7E) that allows the porthole glass (7) to stay in said closed position relative to the frame (8), in particular said catching element (7E) being positioned in correspondence to an upper end of the porthole glass (7).
5. A laundry washing machine (1) according to claim 4, **characterized in that** said catching element (7E) is of the "push to open" type, i.e. of the type that allows a user to open the porthole glass (7) by exerting pressure upon said porthole glass (7) when the latter is in the closed position.
6. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said coupling means comprise a braking device that ensures a slow, progressive opening of the porthole glass (7).
7. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said coupling means comprise an end-of-travel element.

8. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said at least one reservoir (91, 92) is of the long-fill type and is adapted to contain a quantity of agent which is sufficient for multiple operating cycles of the washing machine (1). 5
9. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said dispensing means (9) comprise at least one pump (93, 94) adapted to be associated with said at least one reservoir (91, 92). 10
10. A laundry washing machine (1) according to claim 9, **characterized in that** said dispensing means (9) comprise at least one intake duct (95) associated with said at least one pump (93, 94) for taking in agent from said at least one reservoir (91, 92), in particular said at least one intake duct (95) being so realized as to comprise a first section (95A) extending outside said at least one reservoir (91, 92) and a second section (95B) extending inside said at least one reservoir (91, 92). 15 20
11. A laundry washing machine (1) according to one or more of claims 9 and 10, **characterized in that** said at least one pump (93, 94) is associated with delivery means (96, 97) for delivering into the tub (3) of the washing machine (1) the agents contained in said at least one reservoir (91, 92), in particular said delivery means comprising at least one pipe (96) preferably ending with an outlet nozzle (97) adapted to release the agents into said tub (3). 25 30
12. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said door (6) comprises joining means (10) adapted to allow said at least one reservoir (91, 92) to be coupled to said inner surface (71) of the porthole glass (7). 35 40
13. A laundry washing machine (1) according to claim 11, **characterized in that** said joining means (10) comprise a base (101) adapted to act as a supporting surface for said at least one reservoir (91, 92), said base (101) being coupled to the inner surface (71) of the porthole glass (7). 45
14. A laundry washing machine (1) according to claim 11, **characterized in that** said joining means (10) comprise at least one first guide (102) associated with said base (101), in particular said at least one first guide (102) being adapted to fit into a first groove (91S, 92S) of said at least one reservoir (91, 92). 50 55
15. A laundry washing machine (1) according to one or more of the preceding claims 10 to 12, **characterized in that** said joining means (10) comprise at least one locking element (103), in particular of the elastic type, which is associated with said base (101) in a manner such that it couples to an outer surface of said at least one reservoir (91, 92) for the purpose of securing said at least one reservoir (91, 92) when it is resting on said base (101).
16. A laundry washing machine (1) according to one or more of the preceding claims 10 to 13, **characterized in that** said joining means (10) comprise at least one second guide (104) associated with the inner surface (71) of the porthole glass (7), in particular said at least one second guide (104) being adapted to fit into a second groove (91T, 92T) of said at least one reservoir (91, 92).
17. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** said porthole glass (7) comprises at least one inspection window (72) for verifying and checking the level of the agents contained in said at least one reservoir (91, 92).
18. A laundry washing machine (1) according to one or more of the preceding claims, **characterized in that** the bottom of said at least one reservoir (91, 92) has no openings.

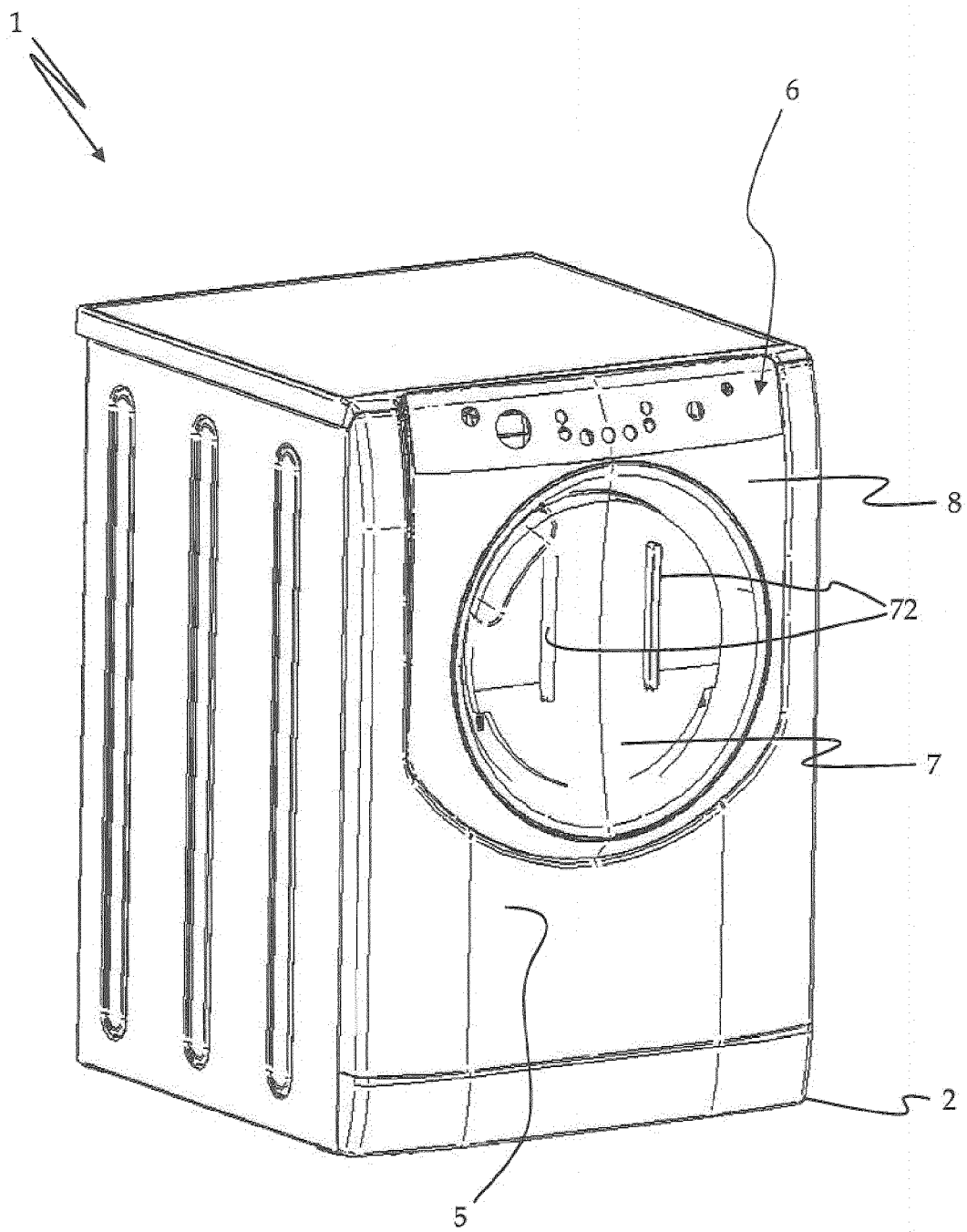


Fig. 1

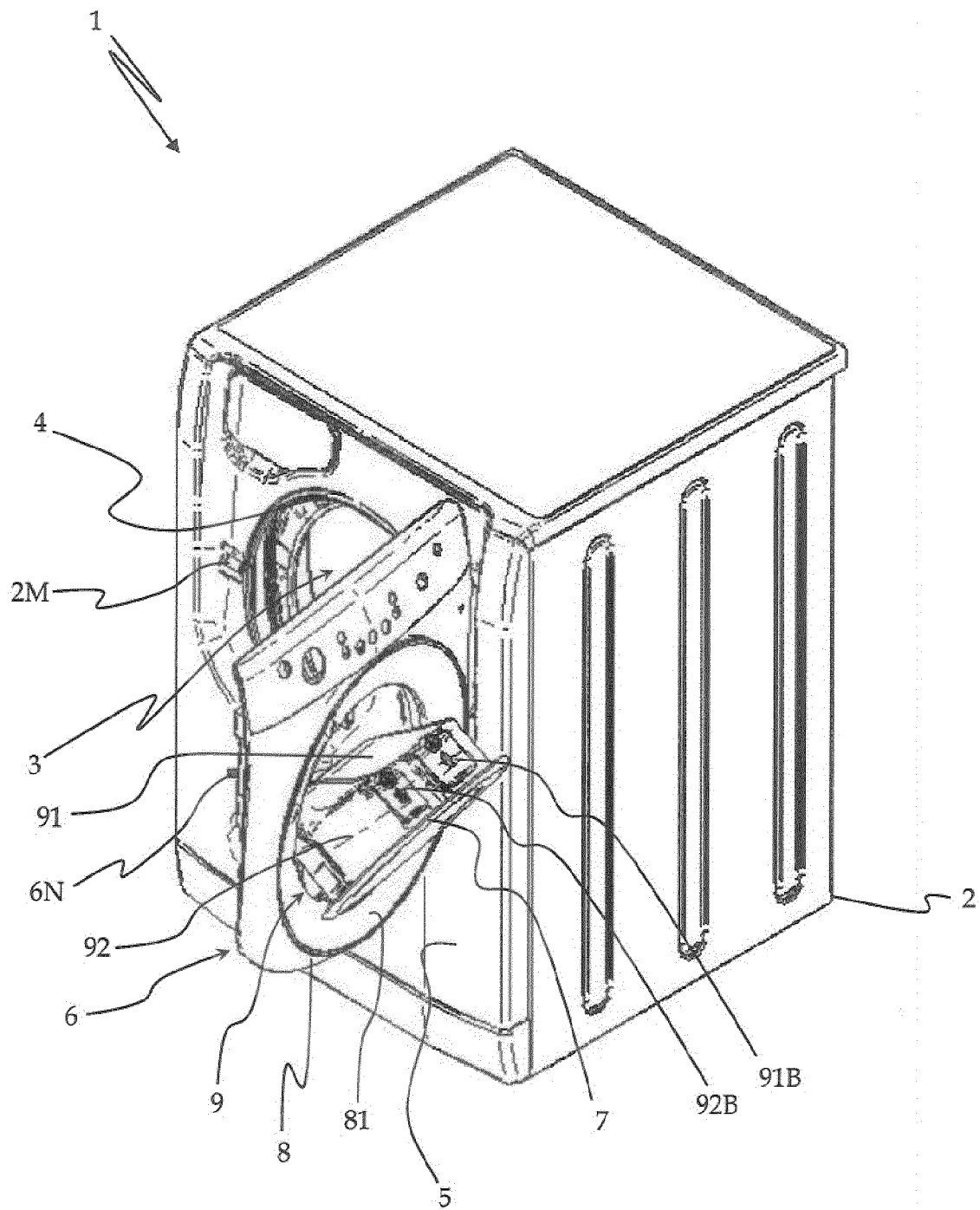


Fig. 2

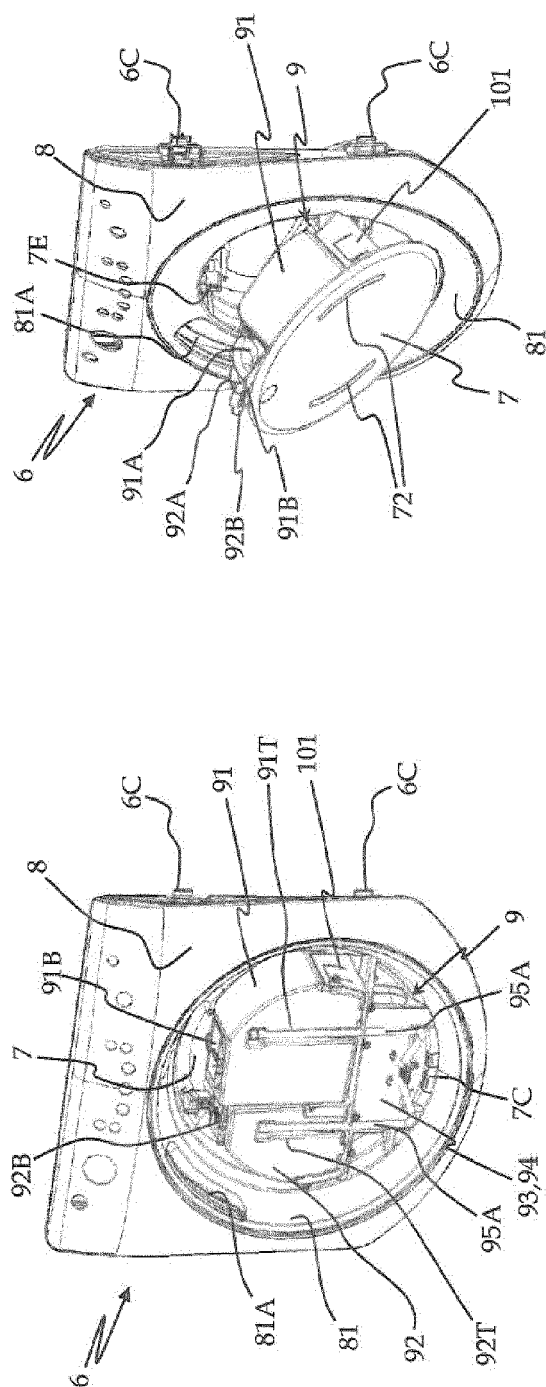


Fig. 3a

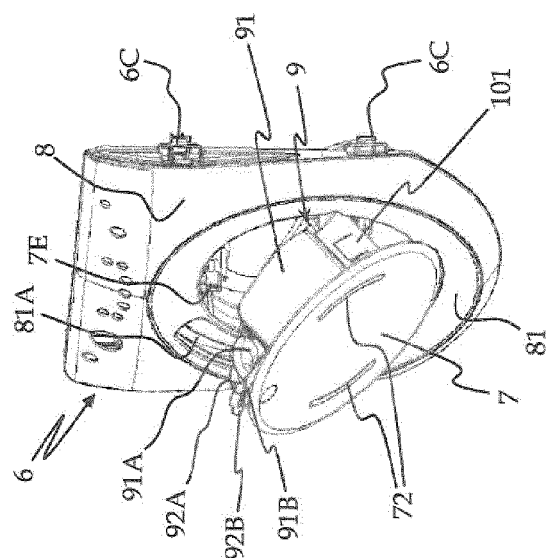


Fig. 3b

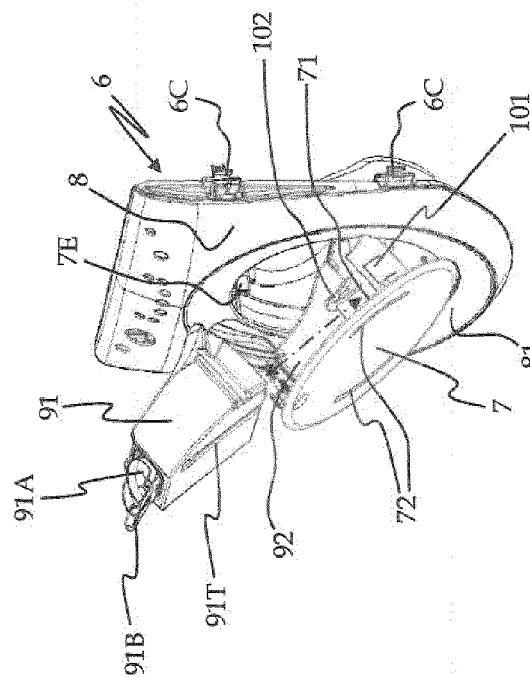


Fig. 3c

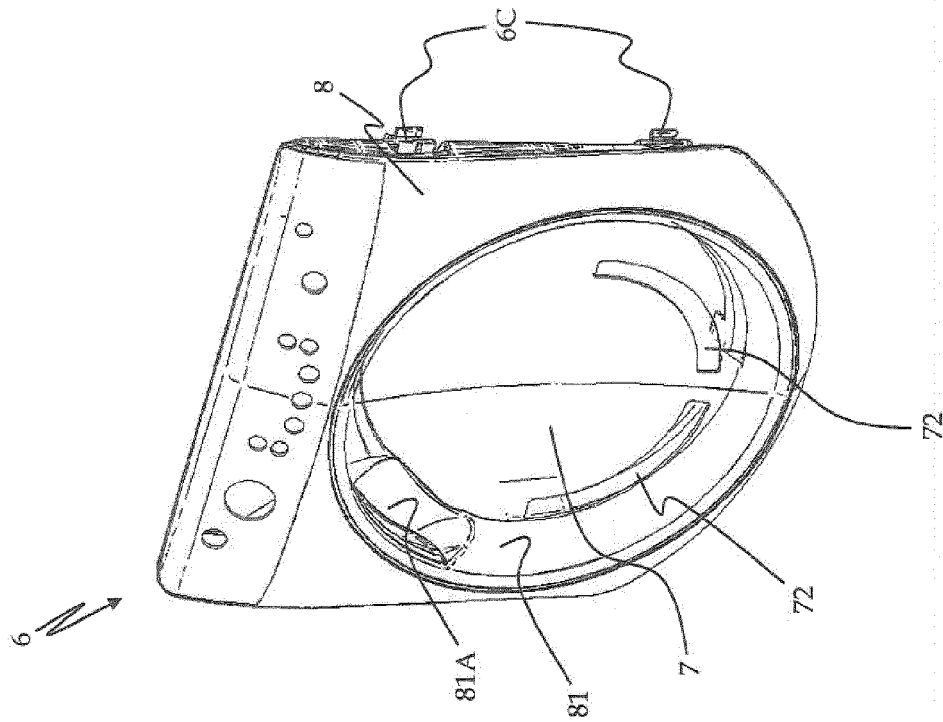


Fig. 4b

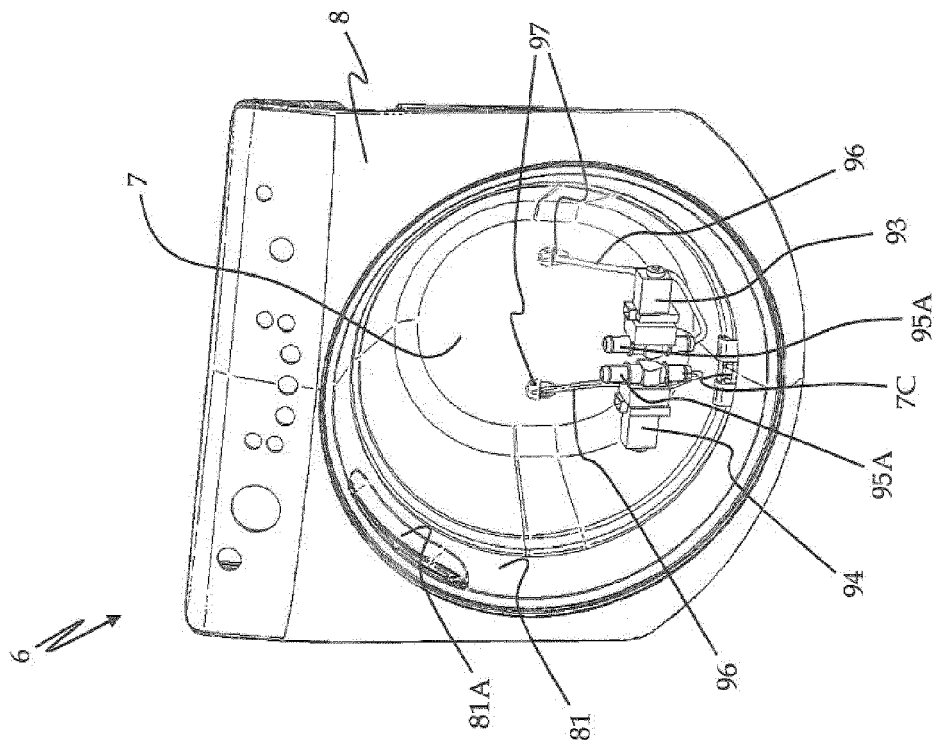


Fig. 4a

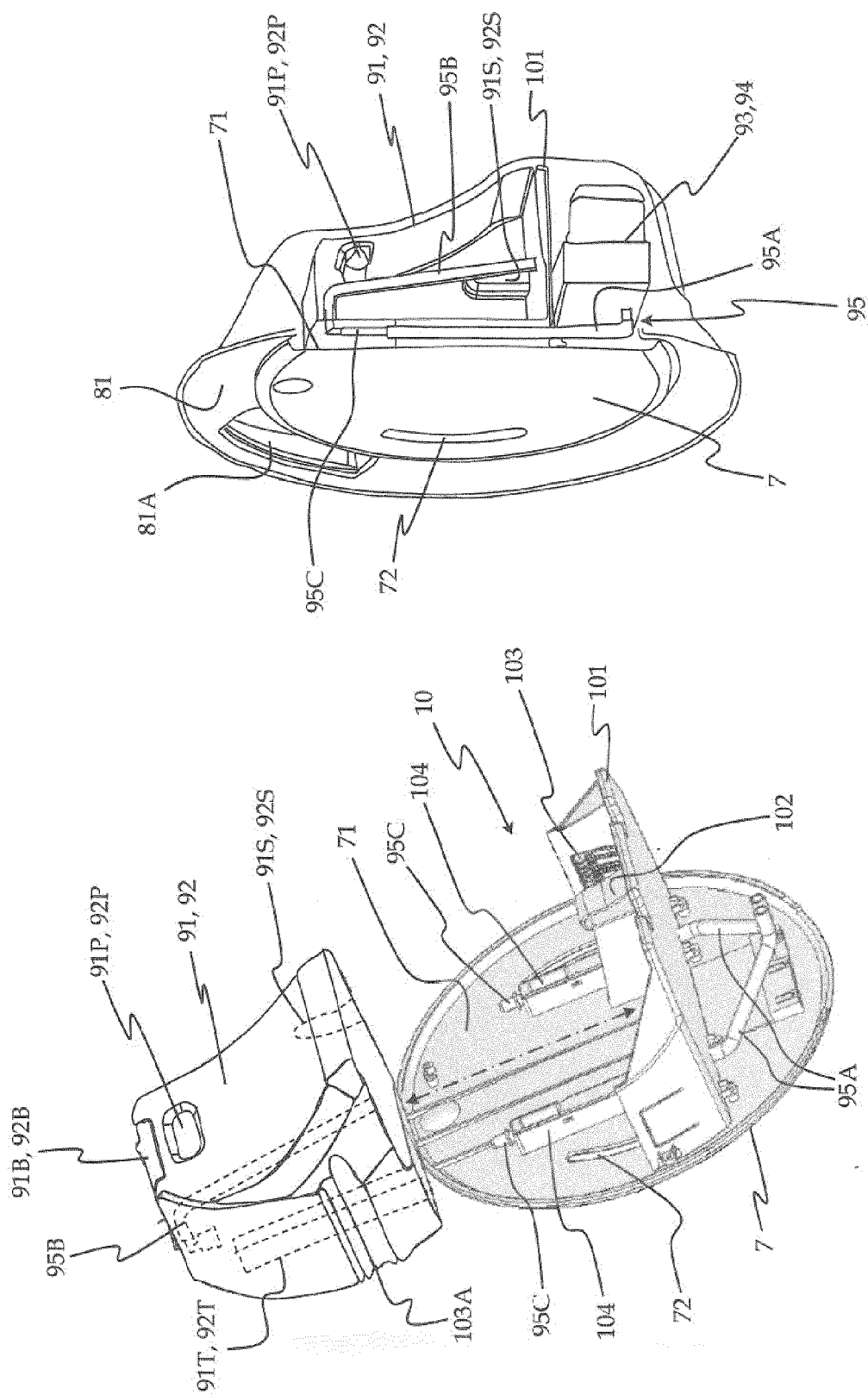


Fig. 5b

Fig. 5a



EUROPEAN SEARCH REPORT

Application Number
EP 13 19 6806

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2008/068559 A1 (INDESIT CO SPA [IT]; PETECCHIA FABRIZIO [IT]; CAMILLONI GIUSEPPE [IT];) 12 June 2008 (2008-06-12) * the whole document *	1-18	INV. D06F39/02 D06F39/14
A	EP 0 379 950 A1 (MIELE & CIE [DE]) 1 August 1990 (1990-08-01) * the whole document *	1-18	
A	EP 0 655 523 A1 (MERLONI ELETTRODOMESTICI SPA [IT]) 31 May 1995 (1995-05-31) * the whole document *	1-18	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 March 2014	Examiner Stroppa, Giovanni
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			

2
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 19 6806

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.

17-03-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008068559 A1	12-06-2008	AT 463604 T EP 2092104 A1 WO 2008068559 A1	15-04-2010 26-08-2009 12-06-2008
EP 0379950 A1	01-08-1990	DE 3901686 A1 EP 0379950 A1 ES 2034773 T3	26-07-1990 01-08-1990 01-04-1993
EP 0655523 A1	31-05-1995	AT 171487 T DE 69413500 D1 DE 69413500 T2 EP 0655523 A1 ES 2122131 T3 IT T0930909 A1 KR 100404981 B1 US 5548978 A	15-10-1998 29-10-1998 11-02-1999 31-05-1995 16-12-1998 30-05-1995 28-01-2004 27-08-1996

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 2214524 A [0009]
- EP 0379950 A [0011]
- EP 1884584 A [0013]
- US 3595036 A [0015]