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

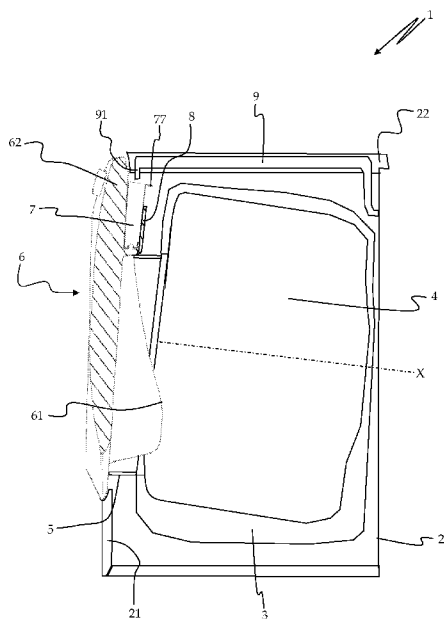


Fig. 1

(57) **Abstract:** 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 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) and a frame (62; 62') supporting said porthole glass (61). The invention is characterized in that said frame (62; 62') comprises a housing (8; 8') adapted to receive a washing agent dispenser (7), said dispenser (7) being extractable from said housing (8; 8').

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**FRONT-LOADING LAUNDRY WASHING MACHINE FOR HOUSEHOLD USE,
IN PARTICULAR A WASHING OR WASHING/DRYING MACHINE**

DESCRIPTION

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.

5 The present invention also relates to a washing agent dispenser for said laundry washing machine.

The invention is applicable to the field of front-loading laundry washing machines for household use, in particular 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.

10 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 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.

15 Patent GB2029862 discloses a door for front-loading laundry washing machines for household use that comprises a porthole glass within which a washing agent dispenser is provided.

In patent GB2260770, on the other hand, the porthole glass is equipped with a housing wherein an extractable dispenser is inserted, which is shaped like a small basket open on
20 top.

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
25 front of the washing machine.

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 leakage of said 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.

5 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.

Moreover, the washing machines described in the above-mentioned documents (see also, for example, patent EP1951947) compel the user to stay in a rather uncomfortable position
10 to pour the washing agents into the respective dispenser, since the latter is in a relatively low and/or ergonomically unfavourable position; in such washing machines, it is also quite difficult and uncomfortable to pour the exact dose of washing agent into the dispenser.

Washing machines are also known wherein the washing agent dispenser is permanently associated with the washing machine; however, these washing machines have drawbacks as
15 well, in that pouring the washing agents into the dispenser often turns out to be a difficult, time-consuming and uncomfortable task. Furthermore, said washing agent loading operation can only be carried out by keeping the door of the washing machine in the open position; this inevitably implies that much room is needed to be able to load the washing agents, which room is often lacking in modern homes.

20 In this frame, it is one 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 designed as to eliminate or significantly reduce water percolation from the door.

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

It is yet another object of the present invention to provide a front-loading laundry washing
30 machine for household use, in particular a washing or washing/drying machine, which allows the user to pour the washing agents comfortably into a suitable dispenser.

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 facilitates the task of pouring the washing agents into the dispenser regardless of whether the door of the washing machine is closed or open, thus not taking up much room when loading said washing agents into the appropriate dispenser, unlike the washing machines
5 known in the art, wherein the washing agents can only be poured into the dispenser with the door open.

Yet another object of the present invention is to provide a washing machine, in particular a laundry washing machine, which comprises a dispenser of washing agents and/or additives which can be cleaned extremely easily by the user of the machine.

10 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 as an integral part of the present description.

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

- Fig. 1 is a schematic sectional view of a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, according to the present invention;
- 20 - Figs. 2a and 2b are sectional views of a detail of the laundry washing machine of Fig. 1, respectively in a first and a second operating conditions;
- Fig. 3 is a perspective view of an element of the front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, according to the present invention;
- 25 - Figs. 4a and 4b show a sectional view and a partial view, respectively, of a variant of a door of the laundry washing machine according to the present invention.

Referring now to the annexed drawings, Fig. 1 shows, designated as a whole by reference numeral 1, a front-loading laundry washing machine for household use, in particular a washing or washing/drying machine, according to the present invention.

30 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 of a known type, in particular a perforated one, is

rotated about a horizontal or substantially horizontal axis X.

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.

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.

The load opening 5 is closed by a door 6 comprising a porthole glass 61 made of transparent material and a frame 62 supporting said porthole glass 61 (advantageously made of plastic material, such as, for example, ABS or SAN or polycarbonate), said porthole glass 61 preferably protruding in the direction of the axis X of the drum 4 with respect to the frame 62 in order to facilitate the upward movement of the laundry during the rotation steps of the drum 4. As to the door 6, reference should be made, for an explanatory but non-limiting example thereof, to the description of patent application WO2007/000645.

When the door 6 is closed, the porthole glass 61 is inserted into the load opening 5 and enters at least partially into the wash tub 3 and possibly also 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 frame 62 comprises a housing 8 adapted to receive a washing agent dispenser 7, said dispenser 7 being extractable from said housing 8.

Said housing 8 is preferably obtained in the frame 62 of the door 6, above said porthole glass 61.

Although in the present description reference will be made to particular examples of the invention in which the housing 8 is located in the door 6, in particular on the surface of said door 6 facing the wash tub 3, the invention should not be considered to be subject to any limitations in this respect. In fact, the housing may also be obtained inside the cabinet 2, e.g. in a recess accessible from the top wall or from the front wall of the washing machine 1; in this latter case, the housing may be either visible or hidden behind the door, when this is in the closed position.

Furthermore, although in the present description reference will be made to particular examples of the invention in which the washing machine 1 comprises a single extractable dispenser 7, it is however possible to conceive an embodiment of the invention wherein the washing machine 1 comprises a plurality of extractable dispensers, in particular from two to

four extractable dispensers, each one dedicated to a particular washing agent or additive to be loaded into the washing machine 1. It is also possible to combine the presence of the extractable dispenser 7 with the presence of other fixed dispensers inside the washing machine 1.

- 5 The particular design and position of the washing agent dispenser 7 according to the present invention allow to provide a washing machine 1 that allows the user to adequately see the inner portion of the drum 4 and of the laundry loaded therein, since the porthole glass 61 does not house the washing agent dispenser 7.

In addition, the special arrangement of the dispenser 7 according to the present invention
10 allows the washing agents to be easily and comfortably poured into said dispenser 7; it should be noted, in fact, that this can also be done with the door 6 of the washing machine 1 closed, thus avoiding taking up much room when loading said washing agents. As a matter of fact, the washing agents can be poured into the dispenser 7 indifferently with the door 6 open or closed, because it is sufficient to extract the dispenser 7 from the housing 8
15 and then fill it with washing agents.

The door 6 must be opened to extract and re-position the dispenser 7 after having filled it with washing agent or additive.

As shown in Fig. 1, the washing machine 1 also comprises a hydraulic system 9, preferably arranged in an upper part 22 of the cabinet 2, which is adapted to carry water from a
20 solenoid valve (connected to the household water main) to a nozzle 91 adapted to precipitate the water into the dispenser 7.

Figs. 2a and 2b show sectional views of the dispenser 7 and housing 8 in a first and a second operating conditions, respectively.

As can be seen in said Figs. 2a and 2b, the dispenser 7 and the housing 8 comprise junction
25 means 71, 81 adapted to allow the dispenser 7 to be coupled to the housing 8 as well as to allow the washing agents contained in the dispenser 7 to pass through and reach the wash tub 3; the washing agents may be delivered into the tub 3 either directly or through a pipe (not shown in the drawings) starting from the housing 8 and ending into the tub 3, said pipe preferably comprising a first portion integral with the door 6 and a second portion integral
30 with the cabinet 2, said first and second pipe portions being connected by means of a fitting located in correspondence of one of the hinges that link the door 6 to the cabinet 2.

In a preferred embodiment, said junction means comprise a male element 81 associated with said housing 8 and a valve 71 associated with said dispenser 7; in particular, said male element 81 is associated with a lower portion 8A of said housing 8, and said valve 71 is associated with a bottom portion 7A of said dispenser 7.

- 5 Said male element 81 comprises at least one aperture 82 (e.g. a pair of symmetrical apertures) that communicates with a duct 83 extending along the body of the male element 81. Preferably, said male element 81 has a substantially truncated-cone shape.

The valve 71 of the dispenser 7 comprises:

- a seat 72 adapted to receive said male element 81, said seat 72 being delimited by at least one wall 73 and a cover 74, said at least one wall 73 including at least one passage 10 73A in the proximity of said bottom portion 7A of the dispenser 7;
- a shutter 75, slidable relative to the cover 74 in a direction defined by the contact between a first surface (e.g. a cylindrical inner surface) integral with the cover 74 and a second surface (e.g. a cylindrical outer surface) integral with the shutter 75;
- 15 - an elastic element 76, e.g. a spring, positioned between said cover 74 and said shutter 75 and constrained to a groove integral with the shutter 75.

As can be seen in Fig. 2a, when the dispenser 7 is at least partially extracted from the housing 8, the elastic element 76 allows the shutter 75 to remain in contact with the bottom portion 7A of said dispenser 7, thus shutting said at least one passage 73A obtained on said 20 at least one wall 73.

Fig. 2b schematically shows the condition of the junction means according to the present invention when the dispenser 7 is inside the housing 8. In this situation, the male element 81 is inserted in the seat 72 and contacts the shutter 75, in particular a base 75A of the shutter 75, thus causing it to move towards the cover 74 by overcoming the resistance of 25 the elastic element 76. Preferably, the dispenser 7 and/or the housing 8 comprise means (not shown) for firmly holding the dispenser 7 within the housing 8, in the operating condition shown in Fig. 2b. Said movement of the shutter 75 opens the passage 73A and allows the washing agents, possibly mixed with water coming from the nozzle 91, to enter the duct 83 of the male element 81 through:

- 30 - said at least one passage 73A of said at least one wall 73, and
- said at least one aperture 82 of the male element 81.

In fact, said at least one passage 73A is positioned on the wall 73 so as to match at least partially said at least one aperture 82 in the condition shown in Fig. 2b.

In Fig. 2b, the path followed by the washing agents when passing from the dispenser 7 to the duct 83 is shown by means of dashed arrows.

5 Preferably, said cover 74 is substantially U-shaped and faces the bottom portion 7A of the dispenser 7; the particular shape of the cover 74 allows it both to contain said elastic element 76 and to create a sort of guide for the movement of the shutter 75, when the dispenser 7 is inside the housing 8 and the male element 81 is inserted in the seat 72.

10 The shape coupling between the shutter 75 and the cover 74 is such that it prevents or counters any leaks of washing agents seeping into the volume comprised between the shutter 75 and the cover 74, i.e. the action volume of the elastic element 76. Aiming at further improving the sealing against such leaks, the shutter 75 or the cover 74 may be fitted with a gasket (not shown in the drawings), e.g. a ring-type gasket.

15 From the above description, it clearly emerges that the particular provision of the junction means 71, 81 allows to obtain an effective coupling between the dispenser 7 and the housing 8, so as to facilitate the introduction of the washing agents into the wash tub 3 and into the drum 4.

20 In a preferred embodiment, the door 6 of the washing machine 1 according to the present invention comprises connection means (not shown in the drawings) for hydraulically connecting the washing agent dispenser 7 to the wash tub 3, said connection means being hydraulically connected to an intake hole (also not shown in the drawings) provided on the wash tub 3, e.g. through a duct preferably made of elastic material, e.g. rubber. Said connection means ensure a continuous connection between the dispenser 7 and the wash tub 3, both when the door 6 is closed and when the door 6 is open.

25 As can be seen in Figs. 2a and 2b, said male element 81 comprises an extension 84 that allows establishing the connection between the housing 8 and said connection means.

30 It must be underlined that the valve 71 shown by way of example in Figs. 2a and 2b must be intended as a non-limiting explanatory example of a valve adapted to retain the washing agent present in the dispenser 7 when the dispenser 7 is extracted from the housing, and to release the washing agent present in the dispenser 7 when the latter is inserted in the housing 8. In fact, it is for example conceivable to provide the dispenser 7

with a movable bottom driven by pressure against suitable strikers arranged in the housing. It is also possible, by means of design modifications accessible to a man skilled in the art of dispenser devices for washing machines, all of which will still fall within the scope of the present invention, to associate the male element 81 with the dispenser 7 and the valve 71 with the housing 8.

Fig. 3 shows a perspective view of the dispenser 7 according to the present invention.

In this drawing one can see that said dispenser 7 comprises at least one handle 77 which allows a user to grip and move said dispenser 7 in a simple and effective manner. Preferably, said handle 77 is positioned near an upper edge 7B of the dispenser 7.

Furthermore, said dispenser 7 comprises measuring means 78, in particular a graduated scale, which allow the user to pour in an adequate quantity of washing agents. In such a case it is advantageous that the dispenser 7 is made of transparent material.

The dispenser 7 may also comprise multiple graduated scales, e.g. in order to consider different types of washing agents and/or additives or different units of measure. The handle 77 may incorporate a magnifying lens to facilitate the reading of the measuring means 78.

Preferably, said dispenser 7 has a substantially semicylindrical shape and comprises a first side surface 7C which is substantially flat and a second side surface 7D which is curved; the particular shape of the dispenser 7 allows to provide a container that can be easily filled with washing agents while at the same time being associated with the door 6 of the washing machine 1, without taking up too much room inside the wash tub 3.

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.

In particular, such advantages consist in the fact that the particular positioning of the washing agent dispenser 7 allows to provide a washing machine 1 that allows the user to adequately see the inner portion of the drum 4 and of the laundry loaded therein, since the porthole glass 61 does not house the washing agent dispenser 7.

In addition, the special design of the dispenser 7 according to the present invention allows the washing agents to be easily and comfortably poured into said dispenser 7; in fact, in order to load washing agents into the machine 1 according to the present invention, it is sufficient to extract the dispenser 7 from the housing 8, fill it with washing agents, and then

put it again into the housing 8.

Furthermore, the shape of the dispenser 7 as shown in Fig. 3 offers the advantage that it is particularly suited to loading washing agents and/or additives of any type. If the washing agent is a powder, the user can extract the dispenser 7 from the machine 1 and use it to take
5 a measured quantity of washing powder directly from the bin. If the washing agent is a liquid, the user can pour the liquid washing agent into the dispenser 7 from the bottle without extracting the dispenser 7 from the machine 1, or may extract the dispenser 7 from the machine 1 and then fill it by holding the dispenser 7 with one hand and the washing agent bottle with the other hand.

10 Operations carried out with the door 6 open, such as, for example, introducing the dispenser 7 into the housing 8 or loading liquid washing agents when the dispenser 7 is inside the housing 8, are particularly easy in the example shown in Fig. 1, since the upper profile of the door 6 is shaped in such a manner as to not interfere with such operations.

The special design of the junction means 71, 81 then ensures an effective coupling between
15 the dispenser 7 and the housing 8, thus facilitating the introduction of the washing agents into the wash tub 3.

A further advantage of the laundry washing machine 1 according to the present invention is that the arrangement of the washing agent dispenser 7 inside the housing 8 reduces the percolation or dripping of water from the door 6 when the latter is opened. Also, the height
20 at which the housing 8 is located makes the interaction between the user of the washing machine 1 and the dispenser 7 particularly comfortable and ergonomical.

Another advantage is that the connection means for hydraulically connecting the washing agent dispenser 7 to the wash tub 3 allow to eliminate any risk of washing agent leakage, e.g. compared with the washing machine described in patent EP1951947. In fact, the
25 provision of said connection means allows all the washing agent placed in the dispenser 7 to enter directly into the tub 3 even after opening the door 6. This prevents water, possibly with a washing agent dissolved therein, from percolating onto the floor in front of the washing machine, as opposed to what happens, especially at the end of a wash cycle, in prior-art washing machines such as, for example, the washing machine described in patent
30 EP1951947.

It should also be pointed out that the dispenser 7 is very easy to clean, thanks both to

easiness of extraction and the small dimensions of the dispenser 7.

The front-loading laundry washing machine for household use 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.

Among the many possible variants, it is worth mentioning the one represented in Figs. 4a and 4b, which show a sectional view and a partial view, respectively, of the door 6 according to the present invention.

10 In this variant, said door 6 comprises a frame 62' in which a recess-like housing 8' is obtained, which is adapted to receive the washing agent dispenser 7, said dispenser 7 being extractable from said recess-like housing 8' by subjecting the dispenser 7 to at least one turning movement (see arrow A in Fig. 4a and the dashed outline of the dispenser 7) and to at least one lifting movement (see arrow B in Fig. 4a).

15 It is clear that the sequence of said turning and lifting movements to extract the dispenser 7 from the recess-like housing 8' may vary, in particular depending on the depth of said recess-like housing 8' in said frame 62'. In particular, when the depth of the recess-like housing 8' substantially corresponds to the height of the dispenser 7 (as shown in Fig. 4a), the extraction of the dispenser 7 will occur through a first turning movement A and a second lifting movement B.

20 Instead, if the depth of the recess-like housing 8' is greater than the height of the dispenser 7, then the extraction of the dispenser 7 will occur through a first lifting movement B, a second turning movement A, and possibly a third lifting movement B.

25 To insert the dispenser 7 into the housing 8', the above-mentioned movements are executed in the reverse order.

It can also be observed in Fig. 4b that the frame 62' may comprise at least one notch 63' in communication with the recess-like housing 8', which allows the dispenser 7 to be grasped more easily when it is inside said recess-like housing 8', the dispenser 7 being anyway easy to grip due to the presence of the handle 77.

30 Furthermore, in the variant represented in Figs. 4a and 4b the washing machine 1 comprises a hydraulic system 9 (not shown in Figs. 4a and 4b because it substantially corresponds to

the one shown in Fig. 1), which is preferably positioned in said upper part 22 of the cabinet 2 and which is adapted to carry water from the household water main to a nozzle (also not shown in Figs. 4a and 4b) placed in the door 6 of the washing machine 1, above the housing 8', and adapted to precipitate the water into the dispenser 7.

5 Advantageously, the washing machine 1 according to the variant shown in Figs. 4a and 4b comprises a system (not shown in the drawings) for automatically moving the dispenser 7 with respect to the housing 8', so that the above-described turning movement A is executed automatically when opening or closing the door 6, said moving system being preferably mechanical and comprising a fixed or mobile striker on the wall of the cabinet 2 in front of
10 the dispenser 7.

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
15 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 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) and a frame (62; 62') supporting said porthole glass (61),
5 characterized in that
said frame (62) comprises a housing (8; 8') adapted to receive a washing agent dispenser (7), said dispenser (7) being extractable from said housing (8; 8').
2. A laundry washing machine (1) according to claim 1, characterized in that said
10 housing (8; 8') is obtained in the frame (62; 62') of the door (6), above said porthole glass (61).
3. A laundry washing machine (1) according to one or more of the preceding claims, characterized in that the dispenser (7) and the housing (8; 8') comprise junction means (71, 81) adapted to allow the dispenser (7) to be coupled to the housing (8; 8') while at the same
15 time also allowing the washing agents contained in the dispenser (7) to pass through and be supplied into the wash tub (3) and into the drum (4).
4. A laundry washing machine (1) according to claim 3, characterized in that said junction means comprise a male element (81) associated with said housing (8; 8') and a valve (71) associated with said dispenser (7).
- 20 5. A laundry washing machine (1) according to claim 4, characterized in that said male element (81) comprises at least one aperture (82) that communicates with a duct (83) extending along the body of the male element (81).
6. A laundry washing machine (1) according to one or more of claims 3 to 5, characterized in that said male element (81) has a substantially truncated-cone shape.
- 25 7. A laundry washing machine (1) according to one or more of claims 4 to 6, characterized in that said valve (71) of the dispenser (7) comprises:
- a seat (72) adapted to receive said male element (81), said seat (72) being delimited by at least one wall (73) and a cover (74), said at least one wall (73) including at least one passage (73A) in the proximity of said bottom portion (7A) of the dispenser (7);
 - 30 - a shutter (75);

- an elastic element (76) positioned between said cover (74) and said shutter (75).

8. A laundry washing machine (1) according to claim 7, characterized in that said cover (74) is substantially U-shaped and faces the bottom portion (7A) of the dispenser (7).

9. A laundry washing machine (1) according to one or more of the preceding claims,
5 characterized in that said door (6) comprises connection means providing a hydraulic connection between the washing agent dispenser (7) and the wash tub (3), said connection means being hydraulically connected to an intake hole provided on the wash tub (3).

10. A laundry washing machine (1) according to one or more of the preceding claims,
10 characterized in that a recess-like housing (8') is obtained in said frame (62') for receiving the washing agent dispenser (7), said dispenser (7) being extractable from said recess-like housing (8') by subjecting said dispenser (7) to at least one turning movement (A) and at least one lifting movement (B) .

11. A laundry washing machine (1) according to the preceding claim, characterized by
15 comprising a system for automatically moving the dispenser (7) with respect to the housing (8').

12. A washing agent dispenser (7) for a laundry washing machine (1) according to one or more of the preceding claims 1 to 11.

13. A dispenser (7) according to claim 12, characterized by comprising a handle (77)
20 which allows a user to grip and move said dispenser (7) in a simple and effective way, in particular said handle (77) being positioned near an upper edge (7B) of the dispenser (7).

14. A dispenser (7) according to claim 12, characterized by being made of transparent material and by comprising measuring means (78), in particular a graduated scale, which allow the user to pour in an adequate quantity of washing agents.

15. A dispenser (7) according to one or more of the preceding claims 12 to 14,
25 characterized by having a substantially semicylindrical shape and by comprising a first side surface (7C) which is substantially flat and a second side surface (7D) which is curved.

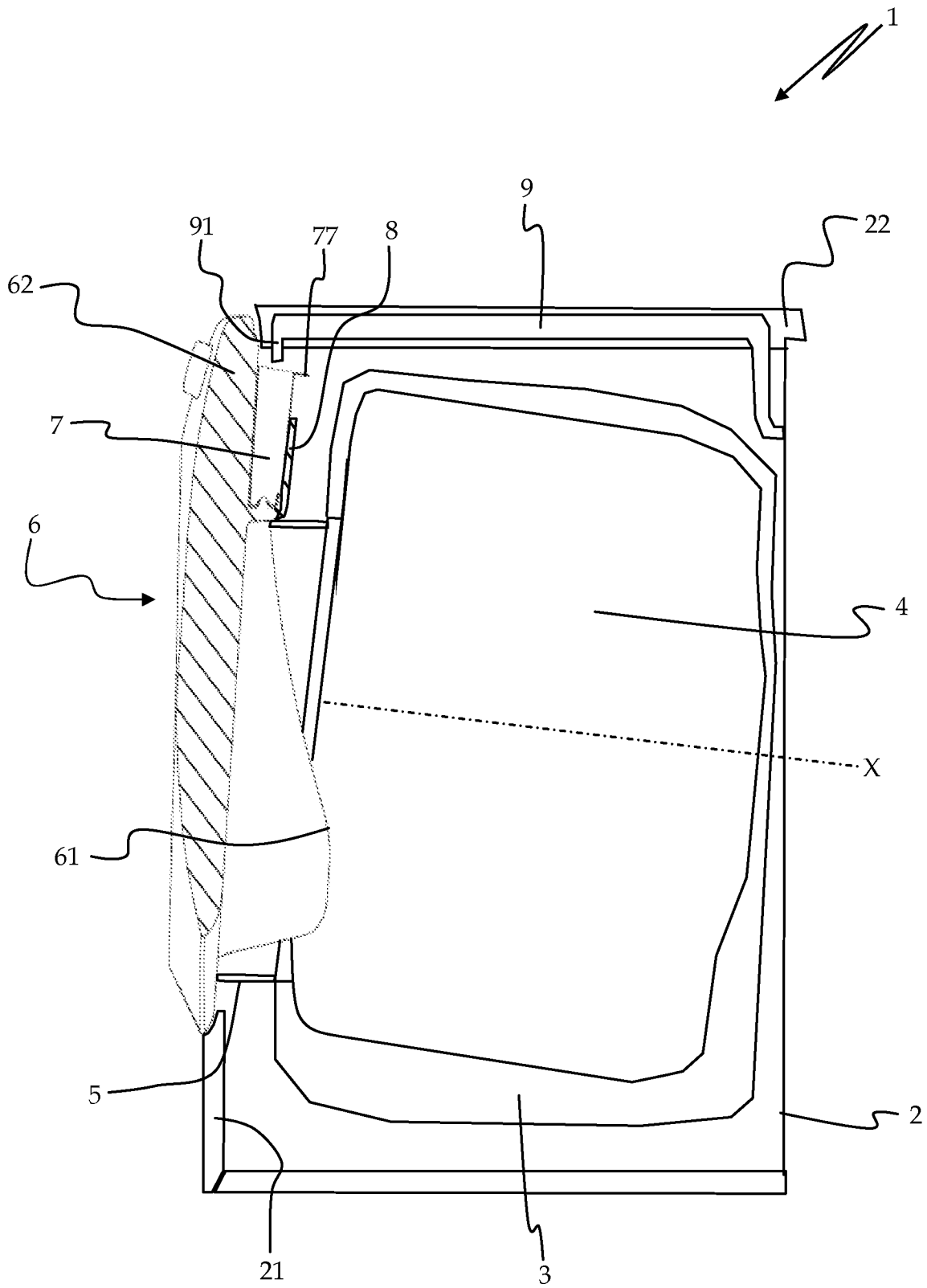


Fig. 1

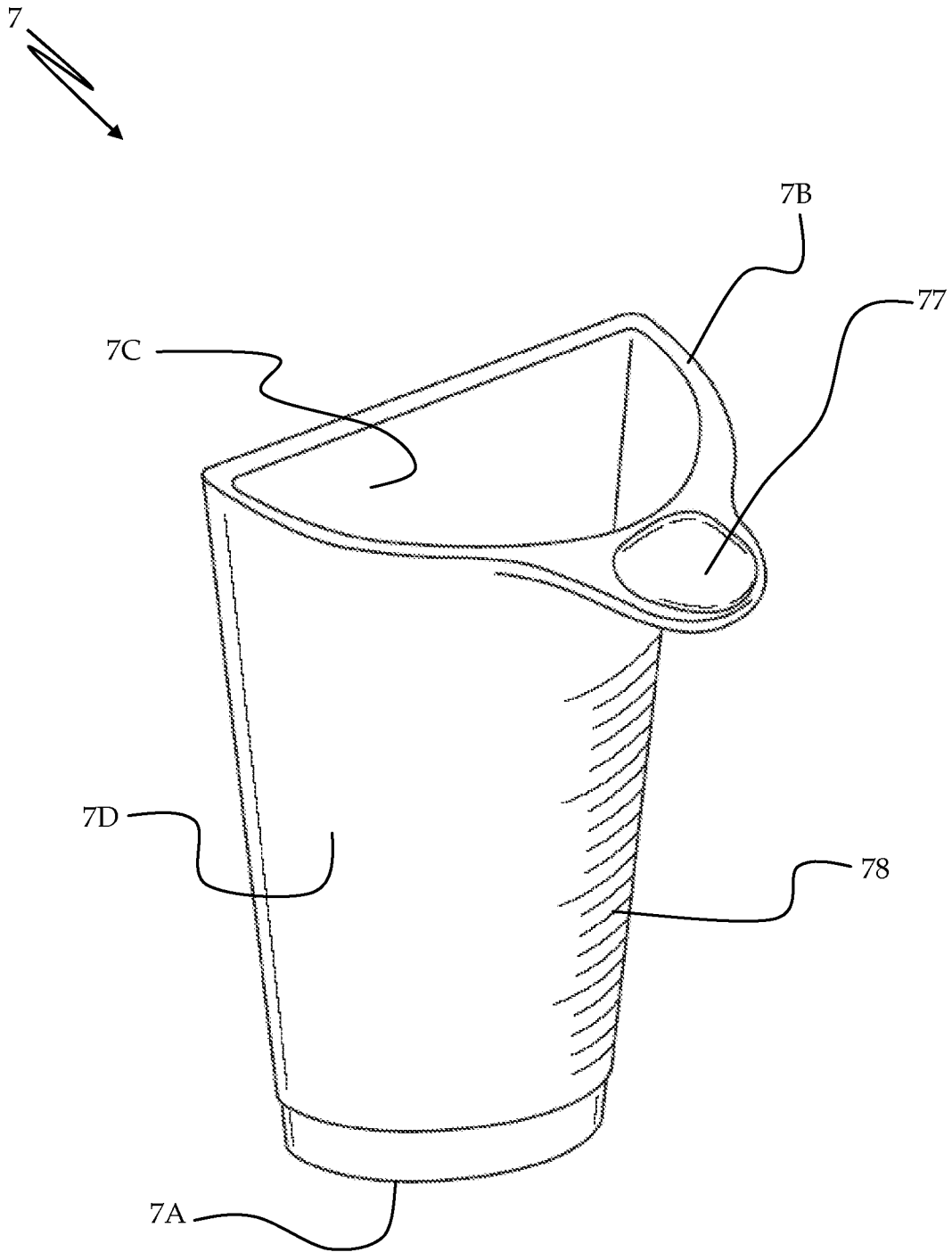


Fig. 3

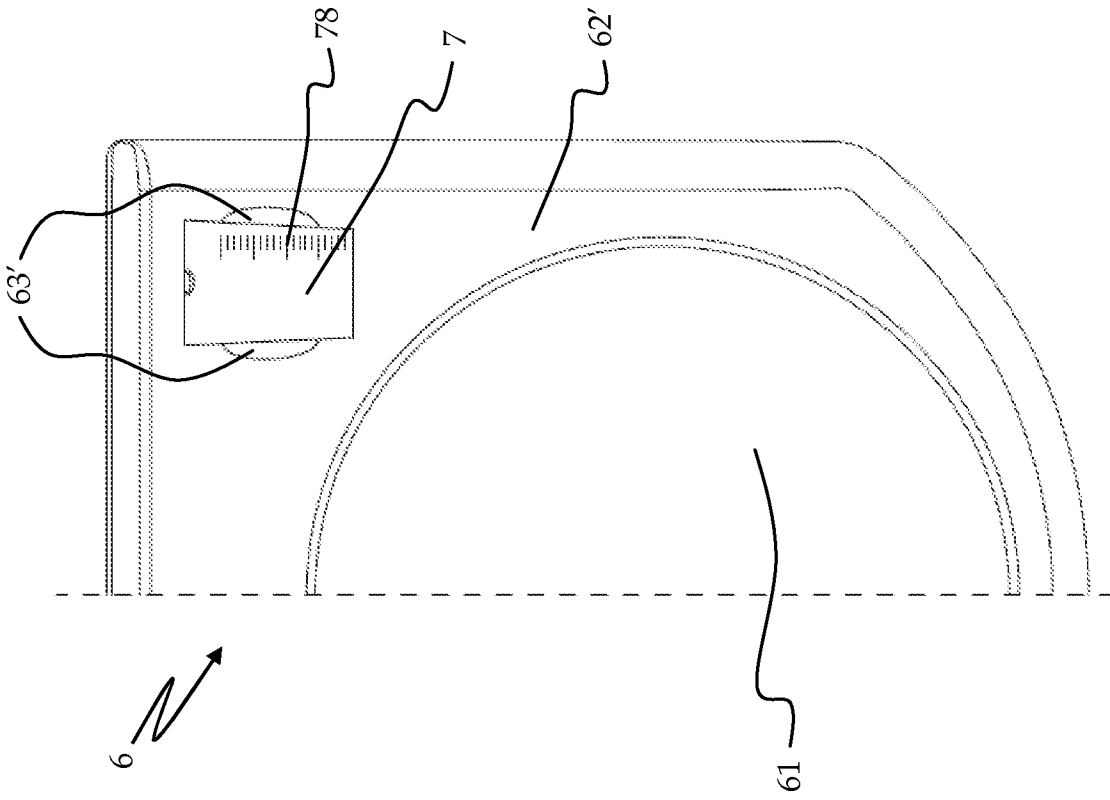


Fig. 4b

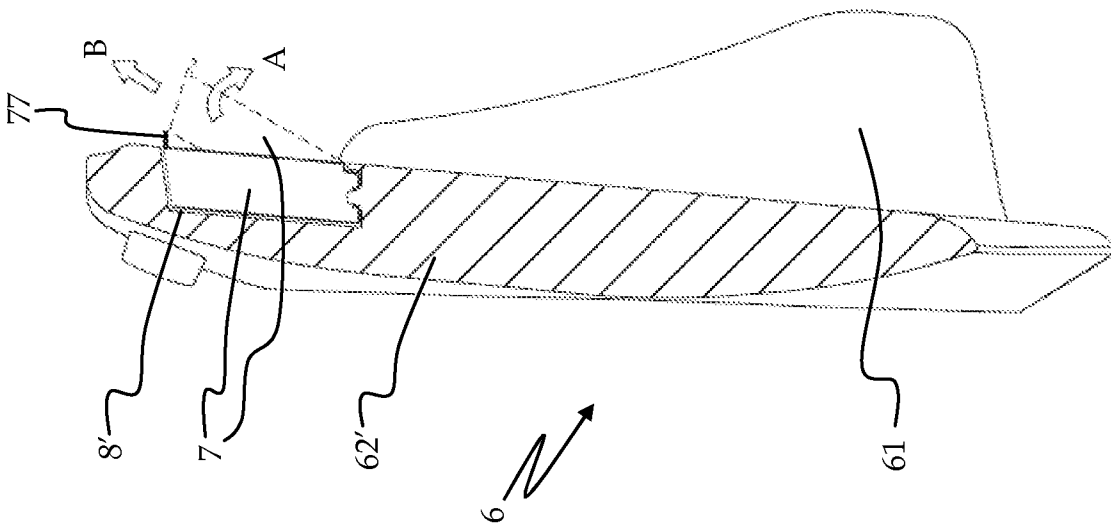


Fig. 4a

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2011/054762

A. CLASSIFICATION OF SUBJECT MATTER INV. D06F39/02 D06F37/28 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) D06F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	WO 2010/125538 A1 (INDESIT CO SPA [IT]; AMATI LUCIO [IT]; CAMILLONI GIUSEPPE [IT]; COLCIA) 4 November 2010 (2010-11-04) page 3, line 23 - page 4, line 10 page 6, line 14 - page 7, line 30; claim 23; figures 1-3	1,2,9
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
Date of the actual completion of the international search	Date of mailing of the international search report	
9 February 2012	17/02/2012	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Fachin, Fabiano	

INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	WO 2007/122484 A2 (INDESIT CO SPA [IT]; MARIOTTI COSTANTINO [IT]; BOMBARDIERI GIOVANNI [I]) 1 November 2007 (2007-11-01) page 5, line 1 - page 7, line 1; figures 2,4,5 -----	1

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