



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.12.2005 Bulletin 2005/51

(51) Int Cl.7: **D06F 39/02, D06F 37/28**

(21) Application number: **04425356.5**

(22) Date of filing: **18.05.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR
 Designated Extension States:
AL HR LT LV MK

(74) Representative: **Perani, Aurelio et al**
Perani Mezzanotte & Partners
Piazza San Babila 5
20122 Milano (IT)

Remarks:

Amended claims in accordance with Rule 86 (2) EPC.

(71) Applicant: **CANDY S.p.A.**
I-20052 Monza (Milano) (IT)

(72) Inventor: **Fumagalli, Silvano**
20052 Monza (IT)

(54) **Door for front-loading washing machine**

(57) The door (7) for closing the opening (2) for access to the washing tank (4) of front-loading, domestic washing machines or washing/drying machines (1) is of the type which comprises a dome-shaped wall (8) with its convex side facing towards the access opening (2), and which is movable between an open position and a closure position in which it forms a watertight seal with respect to the front wall of the machine by means of the interposition of a gasket (6), the door (7) being provided with recesses (11, 13) for holding washing agents to be released for dilution in the tank (4) in accordance with specific stages of the operative cycle of the machine.

The door includes at least one pocket (11) which extends predominantly vertically and is integral with the domed-shaped wall (8) in the region of the concavity (8a) thereof, the pocket having an input opening (14) for the washing agents, disposed at the upper end of the pocket and accessible from the outer side of the door (7), and an outlet opening (12) for diluted agents, disposed at the lower end of the pocket and opening inside the tank (4) of the machine through the dome-shaped wall (8).

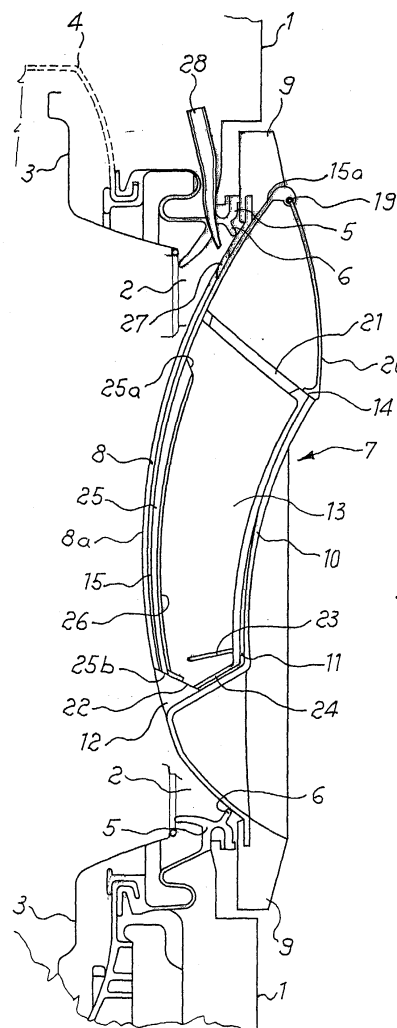


Fig.1

Description

[0001] The present invention relates to a door for closing the opening for access to the washing tank of front-loading, domestic washing machines or washing/drying machines, of the type which comprises a dome-shaped wall with its convex side facing towards the access opening, and which is movable between an open position and a closure position in which it forms a watertight seal with respect to the front wall of the machine by means of the interposition of a gasket, the door being provided with recesses for holding washing agents to be released for dilution in the tank in accordance with specific stages of the operative cycle of the machine.

[0002] Doors of the above-mentioned type and for the purposes indicated are known in the art.

[0003] An example is described in GB-A-2 029 862. The porthole-shaped door which is described in this document comprises a domed portion which extends appreciably axially towards the interior of the machine and is separated from the exterior by a substantially flat wall. Between the flat wall and the domed portion there is a hollow space with one or more compartments which are intended to hold one or more washing agents. These are introduced vertically through an opening formed radially in the dome and, during the operating cycle of the machine, are diluted by the washing liquid which enters the space inside the dome both through the input opening and through an outlet opening formed by a labyrinthine path which is provided in a position opposite that in which the input opening is disposed.

[0004] With the door structure described in the above-mentioned document, it is clear that the washing agents can be loaded only after the door has been opened.

[0005] Another example of the prior art is described in GB-A-2 260 770.

[0006] The porthole-shaped door in this case also has a dome-shaped portion extending appreciably axially towards the interior of the tank. Here again, the washing agents have to be introduced into the various compartments in the domed portion with the door open.

[0007] As can be seen, according to the prior art, when the detergent-holder cassettes or, in general, the washing-agent-holder cassettes of washing machines are provided in the tank-closure doors, they have the disadvantage of requiring the door to be in the open position in order to be filled. In view of the fact that the base of each compartment for receiving a respective washing agent is provided with an opening, even though the opening is protected by a labyrinthine path, it is not possible to exclude the possibility that, during its introduction into the respective compartment, some of the washing agent will come out at the bottom, soiling the floor surrounding the washing machine.

[0008] Furthermore, the requirement for a domed configuration of the door which extends appreciably axially towards the interior of the machine because the compartments are arranged side by side along the hor-

izontal axis of the tank is certainly a disadvantage.

[0009] The object of the present invention is to devise a door for closing and opening the opening for access to the tank of a washing machine and/or washing/drying machine which contains the compartments for the loading of the washing agents without having the disadvantages encountered in the prior art.

[0010] This object is achieved by the door according to the invention which is characterized in accordance with appended Claim 1.

[0011] The invention will now be described in greater detail with reference to a practical embodiment thereof which is given purely by way of non-limiting example and which is illustrated in the appended drawings, in which:

Figure 1 shows a vertical section through the door in the position in which it is closed onto the front wall of a washing machine, and with the compartments for the washing agents closed,

Figure 2 shows a section similar to that of Figure 1 with the washing-agent compartments open for filling, and

Figure 3 is a front view of the door of the preceding drawings, taken from the exterior of the washing machine.

[0012] With reference to the above-mentioned drawings, the front wall of a front-loading washing machine is indicated 1. The machine may also be of the washing/drying type. The wall has an opening 2 which affords access to the rotary drum 3 which in turn is housed in conventional manner inside the washing tank 4.

[0013] Around the opening 2 through which the laundry is passed, there is a profiled section 5 provided with an annular rim 6 which performs the functions of a watertight seal between the door 7 and the access opening 2.

[0014] The door 7 is movable between a closure position and an open position, for example, by pivoting about a vertical hinge axis which is not shown because it is conventional. Alternatively, the door 7 may also be of the type in which the movement in order to move from the closure position to the open position and *vice versa* takes place by means of an articulated parallelogram-like system of levers, which is also known and conventional.

[0015] The door 7 is constituted by a dome-shaped wall 8 the convex surface 8a of which faces towards the interior of the machine, that is, towards the washing tank 4. The wall 8, which may be made of transparent plastics material in conventional manner, is supported by an annular frame 9.

[0016] A second wall 10, also with a convex shape, is connected to the wall 8 and spaced therefrom by a distance in the axial direction, forming an intermediate pocket 11.

[0017] In the connecting region between the wall 8 and the wall 10, the pocket 11 has an outlet opening 12 which is open towards the interior of the drum 3.

[0018] A container 13 is placed in the pocket 11 and can be removed through the upper opening 14 of the pocket 11. The container 13 is formed by opposed walls 15 and 16 which fit the shape of the walls 8 and 10 of the pocket 11, as well as by opposed side walls 17 and 18 (Figure 3). The wall 15 has, at its end 15a, a hinge 19 on which a lid 20 is articulated; when raised, the lid 20 affords access to the opening 21 of the removable container 13, which is formed in the upper end thereof. When the container 13 is inserted in the pocket 11, the opening 21 is positioned in the region of the access opening 14 of the pocket 11.

[0019] The lower portion of the removable container 13 is provided with an outlet opening 22 which is positioned in the region of the opening 12 of the pocket 11. The opening 22 is partially obstructed by a transverse wall 23 which, together with an opposed base wall 24, defines a substantially labyrinthine connection between the interior of the container 13 and the drum 3 in the tank 4.

[0020] The removable container 13 may be subdivided into several compartments arranged side by side with respective access openings 21a and 21b, as shown in Figure 3.

[0021] These compartments are intended to hold, in conventional manner, various washing agents, particularly in the form of powders or spheres.

[0022] If the removable container 13 has to include at least one compartment for a washing agent in liquid form, the opening 22 in the base of that compartment must be arranged to be closed to prevent the liquid being discharged directly into the tank during the filling of the compartment.

[0023] In order to use a washing agent in liquid form, the compartment for this purpose therefore has an auxiliary duct 25 formed between the wall 15 of the container 13 and a wall 26 parallel and adjacent thereto. The duct 25 has a mouth 25a disposed inside the compartment at a predetermined height above the base, as well as a lower outlet 25b which opens into the opening 12 of the pocket 11.

[0024] The duct 25 thus behaves as a siphon.

[0025] With reference to Figures 1 and 2, it is pointed out that the wall 8 of the door has at least one through-hole 27 which, on the side facing towards the tank 4, is in alignment with a nozzle 28 forming part of the water supply system of the washing machine, which is not shown in detail because it is conventional; on the other side, the through-hole 27 is in a position above the opening 21 of the removable container 13.

[0026] The through-hole 27 is formed in the convex wall 8 of the door in a position which, when the door 7 is closed, is disposed inside of the watertight gasket 6.

[0027] Although they are not shown, when the removable container 13 has several compartments side by

side, further nozzles such as that indicated 28 are arranged in alignment with the openings 21a and 21b.

[0028] It will be appreciated from the foregoing description with reference to the drawings that the various washing agents, both in powder and in liquid form, can be loaded into the respective compartments of the removable container 13 whilst it is inserted in the pocket 11 of the door, whilst the door is in the closed position.

[0029] For this purpose, it suffices to lift the lid 20.

[0030] Any reduction in the curvature of the dome of the door promotes savings in the detergent load which may even be equal to half of the detergent load of the prior art.

[0031] For cleaning, if necessary, the container 13 can in any case be removed from the pocket 11 without the need to dismantle parts.

[0032] Naturally, the dimensions may vary without thereby departing from the scope of protection of the invention as described above and in the appended claims.

Claims

1. A door (7) for closing the opening (2) for access to the washing tank (4) of front-loading, domestic washing machines or washing/drying machines (1), of the type which comprises a dome-shaped wall (8) with its convex side facing towards the access opening (2), and which is movable between an open position and a closed position in which it forms a watertight seal with respect to the front wall of the machine by means of the interposition of a gasket (6), the door (7) being provided with recesses (11, 13) for holding washing agents to be released for dilution in the tank (4) in accordance with specific stages of the operative cycle of the machine, **characterized in that** the door includes at least one pocket (11) which extends predominantly vertically and is integral with the domed-shaped wall (8) in the region of the concavity (81) thereof, the pocket having an input opening (14) for the washing agents, disposed at the upper end of the pocket and accessible from the outer side of the door (7), and an outlet opening (12) for the diluted agents, disposed at the lower end of the pocket and opening inside the tank (4) of the machine through the dome-shaped wall (8).
2. A door according to Claim 1, **characterized in that** the pocket (11) includes, in its interior, at least one container (13) which can be extracted through the upper opening (14), the container being provided with a first opening (21) disposed in the region of the upper opening (14) of the pocket (11) and a second opening (22, 25b) disposed in the region of the outlet opening (12) of the pocket into the tank (4).
3. A door according to any one of Claims 1 and 2,

characterized in that the removable container (13) comprises a lid (20) which can be lifted, for opening and closing the first opening (21).

4. A door according to any one of Claims 1 to 3, **characterized in that** the second opening (22) of the removable container (13) has transverse walls (23, 24) which partially obstruct the opening (22), forming a labyrinthine path. 5
5. A door according to any one of Claims 1 to 3, **characterized in that** the second opening (25b) is connected to a duct (25) extending inside the removable container (13) and opening therein, the duct (25) performing the function of a siphon. 10 15
6. A door according to any one of Claims 1 to 5, **characterized in that** the container (13) which is removable from the pocket (11) comprises a plurality of separate compartments arranged side by side for holding respective different washing agents. 20
7. A door according to any one of Claims 1 to 6, **characterized in that** the dome-shaped wall (8) is provided with at least one through-hole (27) which, on one side, is in alignment with a water-supply nozzle (28) forming part of the water-supply system of the washing machine and, on the other side, opens in the region of the first opening (21) of the removable container (13), the through-hole (27) being formed inside of the watertight gasket (6) for sealing the door (7) with respect to the front wall (1) of the machine. 25 30 35

Amended claims in accordance with Rule 86(2) EPC.

1. A door (7) suitable for closing the opening (2) for access to the washing tank (4) of front-loading, domestic washing machines or washing/drying machines (1), of the type which comprises a dome-shaped wall (8) with its convex side facing towards the access opening (2), and which is movable between an open position and a closed position in which it forms a watertight seal with respect to the front wall of the machine by means of the interposition of a gasket (6), the door (7) being provided with recesses (11, 13) for holding washing agents to be released for dilution in the tank (4) in accordance with specific stages of the operative cycle of the machine, said recesses including at least one pocket (11) which extends predominantly vertically and is integral with the domed-shaped wall (8) in the region of the concavity (8b) thereof, the pocket having an input opening (14) for the washing agents, disposed at the upper end of the pocket and an outlet opening (12) for the diluted agents, disposed at the 40 45 50 55

lower end of the pocket and opening inside the tank (4) of the machine through the dome-shaped wall (8), **characterized by** the fact that said input opening (14) is open towards the outer side of the door whilst the door is in the closed position.

2. A door according to Claim 1, **characterized in that** the pocket (11) includes, in its interior, at least one container (13) which can be extracted through the upper opening (14), the container being provided with a first opening (21) disposed in the region of the upper opening (14) of the pocket (11) and a second opening (22, 25b) disposed in the region of the outlet opening (12) of the pocket into the tank (4).

3. A door according to Claim 2, **characterized in that** the removable container (13) comprises

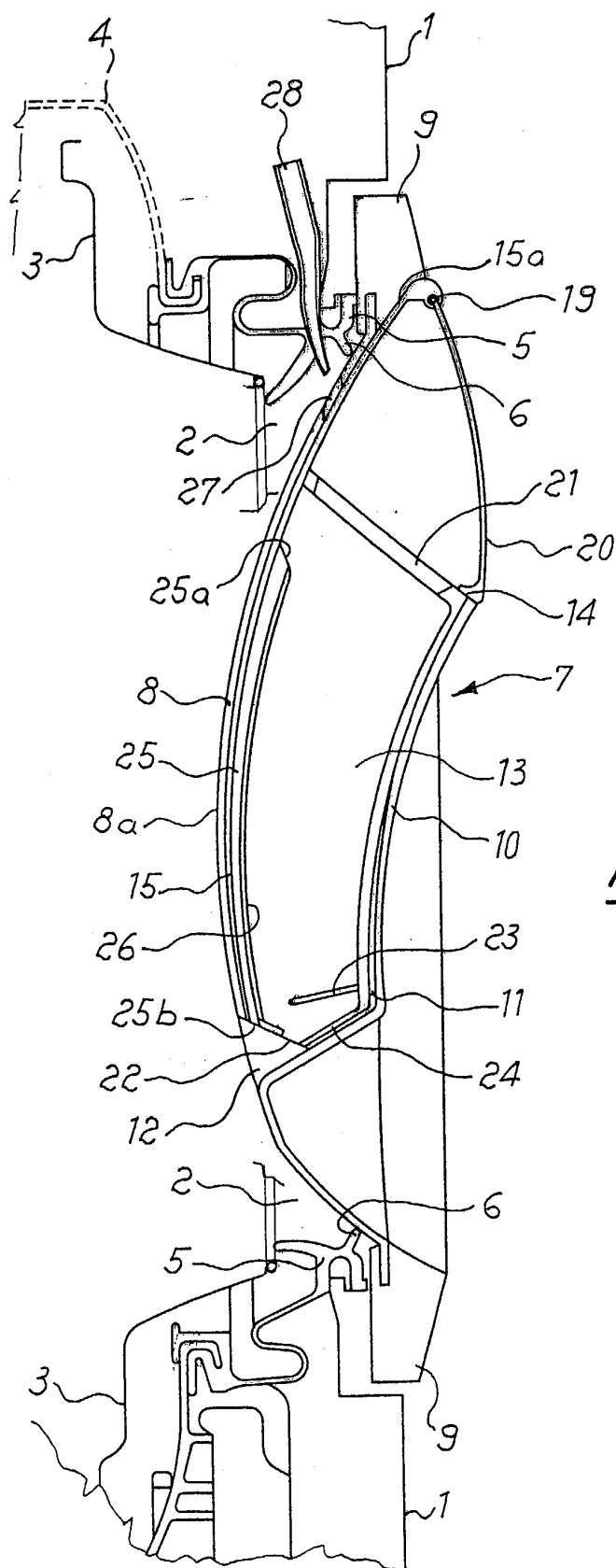
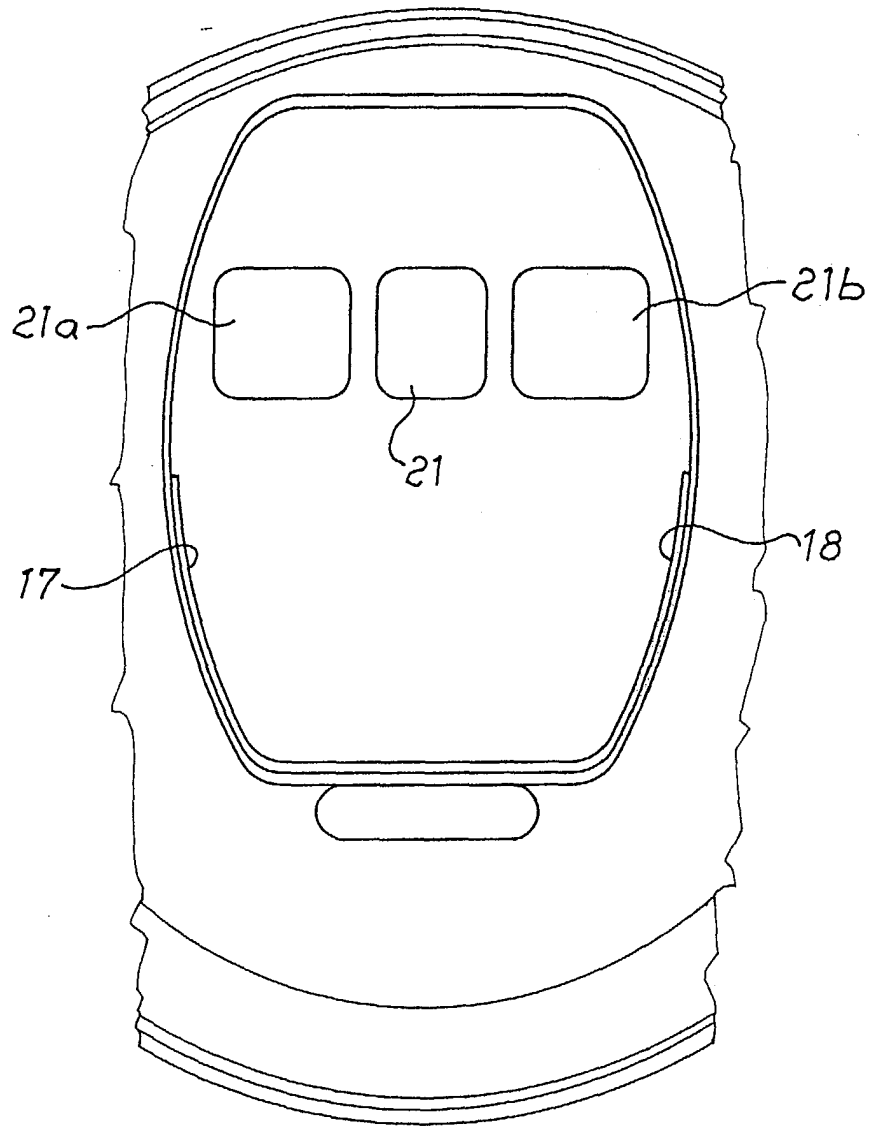


Fig. 1

Fig. 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5356

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	DE 14 60 888 A (CONSTRUCTA WERKE GMBH) 29 May 1969 (1969-05-29) * the whole document *	1-7	D06F39/02 D06F37/28
A,D	GB 2 029 862 A (BALAY SA) 26 March 1980 (1980-03-26) * the whole document *	1-7	
A,D	GB 2 260 770 A (ZANUSSI ELETTRODOMESTICI) 28 April 1993 (1993-04-28) * abstract * * page 4, line 20 - page 5, line 14; figure *	1-7	
A	GB 1 110 375 A (GEN MOTORS FRANCE) 18 April 1968 (1968-04-18) * the whole document *	1-7	
L	WO 2004/055253 A (INCAELEC S L) 1 July 2004 (2004-07-01) * abstract; figures *		
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D06F A47L
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 October 2004	Examiner Falkentoft, C
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			

4
EPO FORM 1503 03 82 (P04C01)

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

EP 04 42 5356

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.

29-10-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 1460888	A	29-05-1969	DE 1460888 A1	29-05-1969
GB 2029862	A	26-03-1980	ES 238080 Y	01-05-1979
			BE 874357 A1	18-06-1979
			FR 2435552 A1	04-04-1980
GB 2260770	A	28-04-1993	IT 1256272 B	29-11-1995
			DE 9214331 U1	10-12-1992
			ES 2065830 A2	16-02-1995
			FR 2682695 A1	23-04-1993
GB 1110375	A	18-04-1968	NONE	
WO 2004055253	A	01-07-2004	WO 2004055253 A1	01-07-2004