(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 013 400 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**28.03.2012 Bulletin 2012/13**

(21) Application number: **07734356.4**

(22) Date of filing: **20.04.2007**

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

(86) International application number:
**PCT/IB2007/001037**

(87) International publication number:
**WO 2007/122484 (01.11.2007 Gazette 2007/44)**

(54) **METHOD FOR DISPENSING WASHING AGENTS IN A LAUNDRY WASHING MACHINE, AND LAUNDRY WASHING MACHINE USING IT**

VERFAHREN ZUR DOSIERUNG VON WASCHMITTELN IN EINER WASCHMASCHINE UND DAVON GEBRAUCH MACHENDE WASCHMASCHINE

PROCÉDÉ DE DISTRIBUTION DE DÉTERGENTS DANS UN LAVE-LINGE ET LAVE-LINGE METTANT EN OEUVRE CE PROCÉDÉ

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

(30) Priority: **21.04.2006 IT TO20060297**

(43) Date of publication of application:
**14.01.2009 Bulletin 2009/03**

(73) Proprietor: **Indesit Company S.p.A.**
**60044 Fabriano (AN) (IT)**

(72) Inventors:
- **MARIOTTI, Costantino**
  **I-06028 Sigillo (PG) (IT)**
- **BOMBARDIERI, Giovanni**
  **I-24021 Albino (BG) (IT)**
- **VOTA, Roberto**
  **I-13051 Andorno Micca (BI) (IT)**
- **COLUCCI, Nicola**
  **I-60044 Fabriano (AN) (IT)**

(74) Representative: **Dini, Roberto**
**Metroconsult S.r.l.**
**Via Sestriere 100**
**10060 None (TO) (IT)**

(56) References cited:
**EP-A- 1 703 012**
**EP-A2- 1 382 734**
**DE-A1- 1 610 190**
**DE-A1- 4 306 216**
**GB-A- 1 110 375**
**GB-A- 2 029 862**
**GB-A- 2 260 770**



EP 2 013 400 B1

Printed by Jouve, 75001 PARIS (FR)

## Description

**[0001]** The present invention relates to a method for dispensing washing agents in a front-loading laundry washing machine, according to the preamble of claim 1, and to a laundry washing machine adapted to implement said method.

**[0002]** In front-loading washing machines, the laundry is typically placed in a drum rotating about a substantially horizontal axis inside a tub.

**[0003]** In laundry washing machines, the laundry treatment usually comprises a "wash" cycle, possibly preceded by a "pre-wash" cycle, and a plurality of "rinse" cycles which may be followed by a "spin" cycle for drying the laundry.

**[0004]** In both wash and rinse cycles, it is necessary to supply the tub with water and/or watery solution comprising washing agents such as detergents, softeners, etc. Such watery solution is dispensed through a dispenser.

**[0005]** In laundry washing machines available on the market, in particular washing machines and washing/drying machines for domestic use, the washing agent dispenser is usually located outside the tub, below the washing machine top, and consists of a drawer including several compartments in which different washing agents can be poured.

**[0006]** In these solutions, therefore, the dispenser takes up room inside the washing machine, which could otherwise be used for other purposes, thus allowing to optimize the layout of the various machine components and, if required, to increase the tub size without making the machine any bigger.

**[0007]** Also, since the dispenser is external to the tub, it is necessary to provide a duct for delivering the watery solution, made up of water and washing agent diluted therein, from the dispenser to the tub. Said duct comprises a hopper and a bellows that ensures a tight connection against the vibrations and movements of the tub. In addition to representing a production cost, all of these items are also sometimes subject to obstruction caused by poorly dissolved powder detergent that is not carried all the way to the tub.

**[0008]** The French application for utility certificate FR 2701965 discloses a laundry washing machine provided with a dispenser in the top of the washing machine and wherein water is lifted from the tub to the dispenser by turning the drum at a speed comprised between 100 and 900 rpm, preferably between 500 and 700 rpm.

**[0009]** In order to overcome the above-mentioned drawbacks, several patents, such as GB 1,110,375, GB 2,260,770 and GB 2,029,862, have proposed to insert the dispenser in the wash tub by applying it to the load door.

**[0010]** As far as the Applicant knows, none of the proposed solutions has ever found any widespread industrial application, probably because dispensers located in the load door have just a single compartment which can be used for powder detergents only.

**[0011]** Another problem common to all known laundry washing machines (with the dispenser in the load door or in the cabinet) concerns the technical means which can be used for dispensing two different washing agents at different times, e.g. detergent during the wash cycle and softener during the rinse cycle.

**[0012]** In known solutions, this function generally utilizes a hydraulic system wherein two distinct ducts, controlled by two solenoid valves, carry two water flows to a canalization element which supplies water into two distinct compartments of the dispenser.

**[0013]** Though effective, such a system represents a cost item which, if possible, should be reduced.

**[0014]** Moreover, solenoid valves are subject to wear and/or failure, and may prevent the machine from operating properly.

**[0015]** The present invention therefore aims at providing a method for dispensing washing agents in the tub of a front-loading laundry washing machine, which allows to overcome the drawbacks of the prior art and to reduce the production costs of said machine.

**[0016]** It is another object of the present invention to provide a laundry washing machine suitable for implementing said method, in particular adapted to dispense liquid washing agents through a dispenser located in the load door of said machine.

**[0017]** These objects arc achieved through a laundry washing machine and a method for dispensing a washing agents having the features set out in the appended claims, which are intended as an integral part of the present description.

**[0018]** These and further objects of the present invention will become apparent from the following description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig. 1 shows a laundry washing machine according to the prior art.

Fig. 2 shows a prior art laundry washing machine.

Fig. 3 shows a second embodiment of a laundry washing machine according to the present invention.

Fig. 4 shows, from three different perspectives, a detail of a door for a laundry washing machine according to the invention.

Figs. 5 and 6 show two perspective views of the inside of a dispenser comprised in a door for a laundry washing machine according to the invention.

Figs. 7 and 8 show two systems for coupling a dispenser to a door of a laundry washing machine according to the invention.

**[0019]** In the following detailed description, identical or equivalent means will be referred to by using similar reference numbers, wherein the first digit will change to designate the figure or embodiment example taken into account. Referring now to Fig. 1, it shows a front-loading laundry washing machine 1 according to the prior art.

**[0020]** The laundry washing machine 1 has a cabinet 2 on the front side of which there is a load/unload opening 3; through said opening, the laundry items to be treated are loaded into a holed drum 4.

**[0021]** Drum 4 is located inside a tub 5 and is turned by a motor, not shown for clarity. To treat the laundry items, the user pours washing agents, in particular detergent and softener, in a dispenser 6 having a plurality of compartments (7a, 7b, 7c); the latter hold the different washing agents that will be dispensed during the different laundry treatment cycles, e.g. the detergent is released during the wash cycle, whereas the softener is released during a rinse cycle, in particular during the last rinse cycle.

**[0022]** Dispenser 6 typically has a drawer-like shape, in the case of Fig. 1 being a circular sector, which is then closed again in a compartment 8 supplied with water taken from the household water main.

**[0023]** The load opening is closed again by the user through a door 9 having a glass door bowl 10 having typically a substantially shape of a cut cone.

**[0024]** A gasket 11 provides tightness, thus preventing water leaks during the laundry treatment.

**[0025]** Once the user has closed dispenser 6 and selected a laundry treatment program through a control panel, not shown for simplicity, the washing machine starts the laundry treatment.

**[0026]** Such a treatment normally comprises at least one wash cycle and one rinse cycle. Two solenoid valves 12a and 12b regulate the supply of the water required by the treatment. Through ducts 13a and 13b water is supplied directly into tub 5, while through ducts 14a and 14b water is delivered selectively to the different compartments 7a, 7b, 7c of the dispenser; during the wash cycle, solenoid valves 12a and 12b are thus actuated in such a way as to supply water into the detergent compartment.

**[0027]** The water carries away the detergent being present in compartment 7a of dispenser 6 and drops into tub 5 through a supply hopper 15 and a bellows 16. When the wash is completed, the dirty water is drained and rinse cycles start wherein fresh water is supplied into tub 5 for rinsing the laundry; at the end, the rinse water is drained, too.

**[0028]** Typically, the last rinse cycle also includes a step for dispensing softener into the tub; for this reason, the solenoid valves are so actuated as to let water flow through dispenser compartment 7b, containing softener.

**[0029]** The solenoid valves may however operate according to different combinations to select the various dispenser compartments to be flushed with water.

**[0030]** Laundry washing machine 1 also comprises a blower assembly 17 which allows to dry the laundry by blowing hot air into tub 5; washing machines of this type are called "washing/drying machines".

**[0031]** Fig. 2 shows a laundry washing machine 201 according to the prior art. Although machine 201 is a washing/drying machine, it should be understood that the invention can be applied to "washing" machines as well, i.e. laundry washing machines lacking a hot-air drying system.

**[0032]** The front-loading laundry washing machine of Fig. 2 has a door 209 comprising a washing agent dispenser 206.

**[0033]** Advantageously, the dispenser comprises at least a first compartment adapted to contain a preferably liquid washing agent.

**[0034]** The advantages of such a solution are apparent. Firstly, a number of components (dispenser, supply hopper, etc.) are eliminated from the cabinet of the washing machine, said components representing cost items and being subject to wear. Secondly, considering the widespread use of liquid detergents and softeners, the presence of a compartment for liquid washing agents (e.g. detergents or softeners) is very useful.

**[0035]** According to a preferred embodiment, the dispenser comprises at least a second compartment adapted to receive an additional washing agent to be dispensed separately from a first washing agent being present in the first compartment, in particular said second compartment being adapted to contain wash detergent, and said first compartment being adapted to contain softener to be dispensed during the rinse cycle.

**[0036]** If the detergent or wash agent used is a powder, then the respective compartment is constructed in a known manner by using a base made of a porous material or, more preferably, made of a plastic material and open at the bottom, as well as fitted with suitable inclined barriers capable of holding the powder detergent until the compartment is flushed with running water, which carries it away into the tub. An example of similar compartments for powder detergents is known from the British patent GB2029862.

**[0037]** To obtain a compartment which can hold a liquid detergent and dispense it into the tub at the right time, the bottom of the dispenser can be neither porous nor open, so that it is necessary to provide the dispenser with means for releasing the liquid washing agent.

**[0038]** In a preferred low-cost embodiment, said means are merely mechanical and consist essentially of one or more siphons.

**[0039]** This embodiment offers the advantage that the release means do not require to be activated by additional actuators, but allow the washing agent to be dispensed when the liquid (in particular the solution of water and washing agent) contained in the compartment reaches a certain level, called "siphoning" level.

**[0040]** Advantageously, the means for releasing the liquid washing agent may be controlled by a control unit of the washing machine. In particular, said release means may comprise an electromechanical valve driven by the control unit. Door 209 is normally constrained to cabinet 2 of the washing machine by means of hinges, while the control unit (not shown) is located inside cabinet 2.

**[0041]** In a first embodiment, the control unit is connected electrically to the valve by means of a cable routed through or near the hinges; the control unit sends control

signals to the valve over said cable.

**[0042]** In another embodiment, the valve is driven by control signals sent to said valve by said control unit over a radio path, thus avoiding the use of wired connections between the control unit and the valve.

**[0043]** Also advantageously, the control unit may alternatively be located in the door of the washing machine and be connected to the valve (through a wired or wireless connection) to control its operation.

**[0044]** If the valve is controlled through a wireless connection, when the washing agent must be dispensed the control unit sends a radiofrequency signal which activates a transponder of the valve; in response to the control signal of the control unit, the transponder actuates the valve, thus dispensing the liquid washing agent. Since normally it is not possible to transmit the power required for driving the valve via radiofrequency, only the control signal is sent via radiofrequency, the valve receiving the necessary power through a battery or a power wire. Referring to Fig. 2, dispenser 206 has a shape of a cut cone, so that it can substitute for the typical inner surface of a door of a front-loading washing machine. Those skilled in the art will easily understand that many different shapes may be used, such as a shape of a cut cone or other shapes described in the Italian patent application No. TO2003A000803 to the present Applicant.

**[0045]** In the example of Fig. 2, dispenser 206 is inserted in load/unload door 209 and comprises 3 compartments (207a, 207b, 207c) having respective inlets (261, 262 and 263) through which liquid and powder washing agents can be poured in. Laundry washing machine 201 comprises a hydraulic system adapted to carry water from the household main to dispenser 206; such a hydraulic system comprises two solenoid valves 212a and 212b which, in a known manner, supply water to the compartments of dispenser 206 through a water canalization element 218 arranged in a watertight manner within gasket 211. To this end, two ducts 214a and 214b wind inside the washing machine and connect to canalization element 218 at inlets 219; by controlling solenoid valves 212a and 212b, water flows in the different ducts 220 being present inside canalization element 218, thus coming out of different ports 221 matching openings 261, 262 and 263.

**[0046]** In a first preferred embodiment which allows to reduce production costs even further and to eliminate items subject to wear, the laundry washing machine according to the invention has only one solenoid valve. Said embodiment is shown in Fig. 3.

**[0047]** Laundry washing machine 301 according to this embodiment is provided with a dispenser 306 having two compartments 307a and 307c for detergents (for liquid and powder detergents, respectively), and one compartment 307b for a washing agent to be dispensed during a treatment cycle other than the wash cycle. Compartment 307b may be adapted without distinction to contain liquid or powder washing agents. In the preferred embodiment, said compartment is adapted to contain a liquid washing agent, in particular softener, to be dispensed during the last rinse cycle.

**[0048]** By controlling solenoid valve 312a, water is delivered through duct 314 and canalization element 318 into inlets 361 and 362 of compartments 307a and 307c, thus dispensing the washing agent, in particular detergent, contained in said compartments and required for the wash cycle.

**[0049]** The use of only one solenoid valve allows to reduce the number of components of the machine (thereby reducing the cost of the latter), as well as to make canalization element 318 simpler by providing it with only one inlet 319 and a lower number of outlet ports 321.

**[0050]** However, if no additional measures are taken, using only one solenoid valve will involve that the washing agents cannot be dispensed at different times, which function was provided in the embodiment of Fig. 2 through the combined use of two solenoid valves and canalization element 218.

**[0051]** In order to solve the above-mentioned problem, compartment 307b comprises at least one inlet located on one side of said compartment and adapted to supply water by direct lifting from the tub. Preferably, said compartment 307b comprises at least two inlets, having preferably an upper inlet 363 (to make it easy to pour in the washing agent) and a side inlet 364 (for water supply), respectively located in the upper area and on the side of said first compartment 307b (as shown in Fig. 3).

**[0052]** The side inlet of said compartment 307b is adapted to supply water into said compartment through direct lifting of water from the tub of said machine.

**[0053]** According to the embodiment described above, therefore, the water required for carrying the washing agent into the tub from compartment 307b, i.e. softener in this example, is not injected into the dispenser through a duct controlled by a solenoid valve, but is taken directly from the tub.

**[0054]** This solution offers the great advantage that washing agents can be dispensed at different times as with the solution using two solenoid valves, while eliminating one solenoid valve and simplifying the traditional hydraulic system that supplies the dispenser.

**[0055]** The machine described herein allows to implement a method for dispensing washing agents in a front-loading laundry washing machine, wherein a washing agent is contained in a compartment of a dispenser comprised in the load door of said laundry washing machine, characterized in that the water required for carrying said washing agent into a tub of said laundry washing machine is supplied into said compartment through direct lifting of water being present in said tub.

**[0056]** For supplying water into the dispenser compartment containing liquid washing agent, in this case compartment 307b, the method according to the invention provides for lifting water from the tub by turning the drum within said tub at a "supply" speed being higher than the "rolling" speed.

**[0057]** The term rolling speed refers to the speed pref-

erably used during the wash, at which the laundry items in the drum do not have enough centrifugal force to complete a turn of the drum in adherence to the walls thereof, so that they roll. The rolling speed (which depends on the drum size) is typically in the range of 25-60 rpm.

**[0058]** By turning the drum at a sufficiently high supply speed, water is lifted from the tub and flows into side inlet 364, thus priming the siphon and carrying the detergent, contained in compartment 307b, all the way to tub 305. Laboratory tests have shown that an effective supply of water to said compartment for liquid washing agent is obtained at a predetermined revolution speed of drum 304 when the inside portion of the glass door bowl of a machine comprising a drum having a diameter of about 48 cm is replaced with a dispenser having a side inlet (364) of about 6 $cm^2$ located on the dispenser side at a height of about 20 cm from the bottom of drum 304. Said revolution speed is the "supply" speed and is comprised between 70 and 200 rpm, being preferably 90 rpm.

**[0059]** To achieve a good water supply from the tub, side inlet 364 of machine 301 is therefore sized appropriately in accordance with the machine. In particular, the side inlet is located at such a height that water is supplied from tub 305 only at a "supply" speed being higher that the rolling speed, in particular at a "supply" speed between 70 and 200 rpm.

**[0060]** This brings the advantage that during the wash cycle (when drum 304 is turning at the rolling speed) water cannot enter compartment 307b.

**[0061]** Fig. 4 shows a detail of a door of a front-loading washing machine according to three different perspectives: a side view, a front view, and a view from a suitable angle which highlights side inlet 364 on the side of the dispenser compartment, which is supplied with water lifted from the tub.

**[0062]** In the embodiment of Fig. 4, washing agent dispenser 406 has three compartments 407a, 407b and 407c adapted to contain three different washing agents, one of which (407b) is to be dispensed during a treatment cycle other than that during which the washing agents contained in the other compartments are dispensed.

**[0063]** On the dispenser side facing the inside of the washing machine, there are three level indicators 418 which allow to check the level of washing agent in the dispenser compartments. As an alternative, the surface of the dispenser may comprise a single transparent area allowing to inspect all three compartments; said transparent area may at most coincide with the whole dispenser surface protruding from the door.

**[0064]** Fig. 4 also shows the three upper inlets (461,462,463) of the three compartments and side inlet 464 of compartment 407b.

**[0065]** Additionally, an aperture 465 is present on the dispenser base, through which the solution of water and washing agent flows out of the respective compartment.

**[0066]** Fig. 5 also shows a detail of the inside of the dispenser of Fig. 4 according to an embodiment wherein it comprises a portion secured to the door, in particular pre-moulded with the glass door bowl, and a removable cover.

**[0067]** Referring to Fig. 5, central compartment 407a is adapted to contain a powder washing agent, in particular powder detergent; to this end, the base of compartment 407a has micro-holes being small enough to trap a powder washing agent.

**[0068]** On the contrary, compartments 407c and 407b are adapted to contain a liquid washing agent.

**[0069]** In the embodiment example of Figs. 5 and 6, the means for releasing the liquid washing agent consist of a siphon essentially made up of two elements:

- a drain pipe 530 rising from the compartment base and allowing the liquid washing agent to flow from the compartment to the tub of the washing machine, and
- a "plug" 531 having a shape matching said drain pipe

**[0070]** The siphon "plug", once in position on the drain pipe, leaves an interspace 532 open, in which liquid 533 comprised in the container, indicated by hatching in Fig. 6, is free to rise. As soon as the solution (water and washing agent) in the container rises above a certain level at which said interspace is filled up, the siphon drains the compartment content into the underlying tub. The washing agent is thus dispensed into the tub.

**[0071]** In the embodiment example of Figs. 5 and 6, the dispenser comprises two main elements; a body 540 comprising three washing agent compartments, and a removable cover 541. When coupled to the main body, the cover defines upper inlets 561, 562 and 563.

**[0072]** In the embodiment example of Figs. 5 and 6, dispenser body 540 comprises two compartments 507b and 507c adapted to contain liquid washing agents; said compartments comprise identical release means, i.e. the above-described siphons.

**[0073]** On the side facing compartment 507b, cover 541 has a side inlet 564, not shown, for receiving water from the tub; said side inlet is located higher than the siphon actuation level.

**[0074]** It is however clear that, without departing from the teaching of the present patent resulting from the present description and from the appended claims, the dispenser may also, for example, be provided as one piece completely removable from the door of the washing machine. According to this solution, the door comprises means for securing said dispenser to said door.

**[0075]** As shown in Fig. 7, the securing means may be pins 720 associated with door 709, matching respective slots 721 on dispenser 706.

**[0076]** Fig. 8 shows another embodiment example of a dispenser 806 and a door 809 of a front-loading laundry washing machine, wherein the securing means consist of slots 820 housing respective pins 821 being present on the back of the dispenser.

**[0077]** It is also clear from the above description that the present invention is suited to implementing a method

for treating laundry items loaded in a drum of a front-loading laundry washing machine, said method comprising at least one wash cycle and one rinse cycle; the method according to the invention is characterized in that said rinse cycle comprises a step wherein said drum is turned at such a revolution speed that the water in the tub is lifted into a compartment of a dispenser comprised in the load door of said laundry washing machine.

**[0078]** According to a possible variant, the dispenser may be provided with an essentially closed and impermeable compartment (preferably made of plastic material) to contain a liquid washing agent. In this variant, the compartment has only one aperture operating as both inlet and drain. According to this variant, the wash liquid is first poured in through the aperture, and then (after the laundry treatment cycle has been started) water is supplied by lifting water from the tub. As water is supplied, the liquid in the compartment overflows, and the solution of water and washing agent flows out through the only aperture provided in the dispenser compartment.

## Claims

1. Method for dispensing washing agents in a front-loading laundry washing machine (301), wherein a washing agent is contained in a compartment (307b) of a dispenser (306), and wherein water required for carrying said washing agent out of the compartment and into a tub (305) of said laundry washing machine (301) is supplied into the dispenser compartment (307b) by lifting water being present in the tub (305), said lifting of water being obtained by turning a drum (304) within said tub (304) at a supply speed being higher than a rolling speed at which laundry items roll in the drum
**characterized in that** said dispenser (306) is associated with the load door of said laundry washing machine (301) and **in that** said compartment is provided with an inlet (364) located on one side of said compartment (307b), such that by turning the drum (304) at said supply speed water is lifted from the tub and flows into said side inlet (364).

2. Method according to claim 1, **characterized in that** said supply speed is 90 rpm.

3. Method according to claims 1 or 2, **characterized in that** said washing agent is dispensed through a siphon actuated by filling said compartment (307b) with water.

4. Method for treating laundry items loaded in a drum (304) of a front-loading laundry washing machine, said method comprising at least one wash cycle and one rinse cycle, wherein said rinse cycle comprises a step wherein said drum (304) is turned at such a revolution speed that the water in the tub (305) is lifted into a compartment of a dispenser, said dispenser (306) being associated with the load door of said laundry washing machine (301), **characterized in that** said method for treating laundry items comprises a method for dispensing washing agents according to any of claims 1 to 3.

5. Front-loading laundry washing machine (301) comprising:

   • a drum (304) placed inside a wash tub (305),
   • a load opening for laundry which provides access to said drum (304),
   • a door adapted to close said load opening,
   • a washing agent dispenser (306) constrained to said door and comprising at least one compartment (307b) for containing washing agents, said compartment (307b) comprising at least an upper inlet (363) and a side inlet (364) located respectively in the upper area and on one side of said compartment (307b), **characterized in that** said side inlet (364) of said container (306) is adapted to allow water to flow into said first compartment (307b) as water is lifted from the tub of said machine.

6. Laundry washing machine according to claim 5, **characterized in that** said side inlet (364) is located at such a height that water can be supplied from the tub (364) only when the drum (304) is turned at a supply speed being higher than a rolling speed at which laundry items roll in the drum (304).

7. Laundry washing machine according to claim 5, **characterized in that** said supply speed is 90 rpm.

8. Laundry washing machine according to any of claims 5 to 7, **characterized in that** said compartment (307b) comprises means for releasing a liquid contained in said compartment.

9. Laundry washing machine according to claim 8, **characterized in that** said release means comprise a siphon (530) and that said side inlet (564) is located higher than the actuation level of said siphon (530).

10. Laundry washing machine according to claim 8, **characterized in that** said release means comprise an electromechanical valve.

11. Laundry washing machine according to claim 10, wherein said door is constrained to a cabinet of said laundry washing machine by means of hinges, and wherein said valve is actuated by control signals sent to said valve by a control unit through at least one cable routed through or near said hinges.

12. Laundry washing machine according to any of claims

5 to 11, **characterized in that** said dispenser comprises an element to be secured to said door and a removable cover.

**13.** Laundry washing machine according to any of claims 5 to 12, **characterized in that** said dispenser (306) can be removed and said door comprises means for securing said dispenser to said door.

**14.** Laundry washing machine according to any of claims 5 to 13, **characterized by** comprising a hydraulic system adapted to carry water from the household water main to said dispenser, said hydraulic system comprising in turn only one solenoid valve (312a).

**Patentansprüche**

**1.** Verfahren zum Spenden von Waschmitteln in einer Frontlade-Wäschewaschmaschine (301), wobei ein Waschmittel in einer Kammer (307b) eines Spenders (306) enthalten ist, und wobei Wasser, das zum Befördern des Waschmittels aus der Kammer heraus und in eine Wanne (305) der Wäschewaschmaschine (301) hinein erforderlich ist, dadurch in die Spenderkammer (307b) eingespeist wird, dass Wasser, das in der Wanne (305) vorhanden ist, angehoben wird, wobei das Anheben des Wassers dadurch erhalten wird, dass eine Trommel (304) im Innern der Wanne (305) mit einer Einspeisegeschwindigkeit gedreht wird, die höher ist als eine Drehgeschwindigkeit, mit der sich Wäschestücke in der Trommel drehen,
**dadurch gekennzeichnet, dass** der Spender (306) mit der Ladetür der Wäschewaschmaschine (301) verbunden ist, und dass die Kammer mit einem Einlass (364) versehen ist, der an einer Seite der Kammer (307b) gelegen ist, so dass durch Drehen der Trommel (304) mit der Einspeisegeschwindigkeit Wasser von der Wanne angehoben wird und in den Seiteneinlass (364) fließt.

**2.** Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Einspeisegeschwindigkeit 90 Umdrehungen/Minute beträgt.

**3.** Verfahren nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** das Waschmittel durch einen Siphon gespendet wird, der dadurch betätigt wird, dass die Kammer (307b) mit Wasser gefüllt wird.

**4.** Verfahren zum Behandeln von Wäschestücken, die in eine Trommel (304) einer Frontlade-Wäschewaschmaschine geladen werden, wobei das Verfahren zumindest einen Waschzyklus und einen Spülzyklus umfasst, wobei der Spülzyklus einen Schritt umfasst, bei dem die Trommel (304) mit solch einer Drehgeschwindigkeit gedreht wird, dass das Wasser in der Wanne (305) in eine Kammer eines Spenders angehoben wird, wobei der Spender (306) mit der Ladetür der Wäschewaschmaschine (301) verbunden ist, **dadurch gekennzeichnet, dass** das Verfahren zum Behandeln von Wäschestükken ein Verfahren zum Spenden von Waschmitteln nach einem der Ansprüche 1 bis 3 umfasst.

**5.** Frontlade-Wäschewaschmaschine (301), umfassend:

- eine Trommel (304), die im Inneren einer Waschwanne (305) angeordnet ist,
- eine Ladeöffnung für Wäsche, die einen Zugang zu der Trommel (304) bereitstellt,
- eine Tür, die angepasst ist, die Ladeöffnung zu schließen,
- einen Waschmittelspender (306), der an der Tür festgelegt ist, und der zumindest eine Kammer (307b) zum Enthalten von Waschmitteln aufweist,

wobei die Kammer (307b) zumindest einen oberen Einlass (363) und einen Seiteneinlass (364) umfasst, die jeweils in dem oberen Bereich und an einer Seite der Kammer (307b) gelegen sind,
**dadurch gekennzeichnet, dass** der Seiteneinlass (364) des Containers (306) angepasst ist, es zu ermöglichen, dass Wasser in die erste Kammer (307b) hinein fließt, wenn Wasser von der Wanne der Maschine angehoben wird.

**6.** Wäschewaschmaschine nach Anspruch 5, **dadurch gekennzeichnet, dass** der Seiteneinlass (364) an solch einer Höhe gelegen ist, dass Wasser von der Wanne (364) nur dann eingespeist werden kann, wenn die Trommel (304) mit einer Einspeisegeschwindigkeit gedreht wird, die höher ist als eine Drehgeschwindigkeit, mit der sich Wäschestücke in der Trommel (304) drehen.

**7.** Wäschewaschmaschine nach Anspruch 5, **dadurch gekennzeichnet, dass** die Einspeisegeschwindigkeit 90 Umdrehungen/Minute beträgt.

**8.** Wäschewaschmaschine nach einem der Ansprüche 5 bis 7, **dadurch gekennzeichnet, dass** die Kammer (307b) Mittel zum Abgeben einer in der Kammer enthaltenen Flüssigkeit umfasst.

**9.** Wäschewaschmaschine nach Anspruch 8, **dadurch gekennzeichnet, dass** die Abgabemittel einen Siphon (530) umfassen, und dass der Seiteneinlass (564) höher gelegen ist als das Betätigungsniveau des Siphons (530).

**10.** Wäschewaschmaschine nach Anspruch 8, **dadurch**

**gekennzeichnet, dass** die Abgabemittel ein elektromechanisches Ventil umfassen.

**11.** Wäschewaschmaschine nach Anspruch 10, wobei die Tür an einem Gehäuse der Wäschewaschmaschine mithilfe von Gelenken festgelegt ist, und wobei das Ventil durch Steuersignale betätigt wird, die zu dem Ventil von einer Steuereinheit durch zumindest ein Kabel, das durch die Gelenke oder nahe an den Gelenken verlegt ist, gesendet werden.

**12.** Wäschewaschmaschine nach einem der Ansprüche 5 bis 11, **dadurch gekennzeichnet, dass** der Spender ein Element zum Fixieren an der Tür und eine abnehmbare Abdeckung umfasst.

**13.** Wäschewaschmaschine nach einem der Ansprüche 5 bis 12, **dadurch gekennzeichnet, dass** der Spender (306) entfernt werden kann, und dass die Tür Mittel zum Fixieren des Spenders an der Tür umfasst.

**14.** Wäschewaschmaschine nach einem der Ansprüche 5 bis 13, **dadurch gekennzeichnet, dass** die Maschine ein hydraulisches System umfasst, das angepasst ist, Wasser von der Haushaltswasserleitung zu dem Spender zu befördern, wobei das hydraulische System wiederum nur ein Solenoidventil (312a) umfasst.

**Revendications**

**1.** Procédé de distribution d'agents de lavage dans une machine à laver le linge à chargement frontal (301), dans lequel un agent de lavage est contenu dans un compartiment (307b) d'un distributeur (306) et dans lequel l'eau nécessaire à l'entraînement dudit agent de lavage hors du compartiment et dans une cuve (305) de ladite machine à laver le linge (301) est introduite dans le compartiment (307b) du distributeur par relevage de l'eau présente dans la cuve (305), ledit relevage d'eau étant obtenu en faisant tourner un tambour (304), à l'intérieur de ladite cuve (304), à une vitesse d'introduction supérieure à une vitesse de brassage à laquelle des pièces de linge sont brassées dans le tambour
**caractérisé en ce que** ledit distributeur (306) est associé à la porte de chargement de ladite machine à laver le linge (301) et **en ce que** ledit compartiment est pourvu d'une entrée (364) située sur un côté dudit compartiment (307b), de telle sorte qu'en faisant tourner le tambour (304) à ladite vitesse d'introduction, l'eau est relevée dans la cuve et s'écoule dans ladite entrée (364).

**2.** Procédé selon la revendication 1, **caractérisé en ce que** ladite vitesse d'introduction est de 90 tr/mn.

**3.** Procédé selon la revendication 1 ou 2, **caractérisé en ce que** ledit agent de lavage est distribué par l'intermédiaire d'un siphon amorcé par le remplissage dudit compartiment (307b) avec de l'eau.

**4.** Procédé de traitement de pièces de linge chargées dans un tambour (304) d'une machine à laver le linge à chargement frontal, ledit procédé comprenant au moins un cycle de lavage et un cycle de rinçage, dans lequel ledit cycle de rinçage comprend une étape au cours de laquelle ledit tambour (304) tourne à une vitesse telle que l'eau présente dans la cuve (305) est relevée et introduite dans un compartiment d'un distributeur, ledit distributeur (306) étant associé à la porte de chargement de ladite machine à laver le linge (301), **caractérisé en ce que** ledit procédé de traitement de pièces de linge comprend un procédé de distribution d'agents de lavage selon l'une quelconque des revendications 1 à 3.

**5.** Machine à laver le linge à chargement frontal (301) comprenant :

- un tambour (304) placé à l'intérieur d'une cuve de lavage (305),
- une ouverture de chargement pour le linge, qui permet d'accéder audit tambour (304),
- une porte conçue pour fermer ladite ouverture de chargement,
- un récipient d'agent de lavage (306) relié à ladite porte et comprenant au moins un compartiment (307b) pour contenir des agents de lavage,

ledit compartiment (307b) comprenant au moins une entrée supérieure (363) et une entrée latérale (364) respectivement situées dans la partie supérieure et sur un côté dudit compartiment (307b), **caractérisée en ce que** ladite entrée latérale (364) dudit récipient (306) est conçue pour permettre à l'eau de s'écouler dans ledit premier compartiment (307b) lorsque l'eau est relevée dans la cuve de ladite machine.

**6.** Machine à laver le linge selon la revendication 5, **caractérisée en ce que** ladite entrée latérale (364) est située à une hauteur telle que l'eau peut être introduite depuis la cuve (364) uniquement lorsque le tambour (304) tourne à une vitesse d'introduction supérieure à une vitesse de brassage à laquelle des pièces de linge sont brassées dans le tambour (304).

**7.** Machine à laver le linge selon la revendication 5, **caractérisée en ce que** ladite vitesse d'introduction est de 90 tr/mn.

**8.** Machine à laver le linge selon l'une quelconque des revendications 5 à 7, **caractérisée en ce que** ledit compartiment (307b) comprend des moyens pour

libérer un liquide contenu dans ledit compartiment.

**9.** Machine à laver le linge selon la revendication 8, **caractérisée en ce que** lesdits moyens de libération comprennent un siphon (530) et **en ce que** ladite entrée latérale (564) est située plus haut que le niveau d'amorçage dudit siphon (530).

**10.** Machine à laver le linge selon la revendication 8, **caractérisée en ce que** lesdits moyens de libération comprennent un clapet électromécanique.

**11.** Machine à laver le linge selon la revendication 10, dans laquelle ladite porte est reliée à un caisson de ladite machine à laver le linge au moyen de charnières, et dans laquelle ledit clapet est actionné par des signaux de commande envoyés audit clapet par une unité de commande, par l'intermédiaire d'au moins un câble passé à travers ou près desdites charnières.

**12.** Machine à laver le linge selon l'une quelconque des revendications 5 à 11, **caractérisée en ce que** ledit distributeur comprend un élément à fixer à ladite porte et un cache amovible.

**13.** Machine à laver le linge selon l'une quelconque des revendications 5 à 12, **caractérisée en ce que** ledit distributeur (306) peut être retiré et ladite porte comprend des moyens pour fixer ledit distributeur à ladite porte.

**14.** Machine à laver le linge selon l'une quelconque des revendications 5 à 13, **caractérisée en ce qu'**elle comprend un circuit hydraulique conçu pour acheminer l'eau du réseau d'eau domestique audit distributeur, ledit circuit hydraulique comprenant à son tour une seule électrovanne (312a).

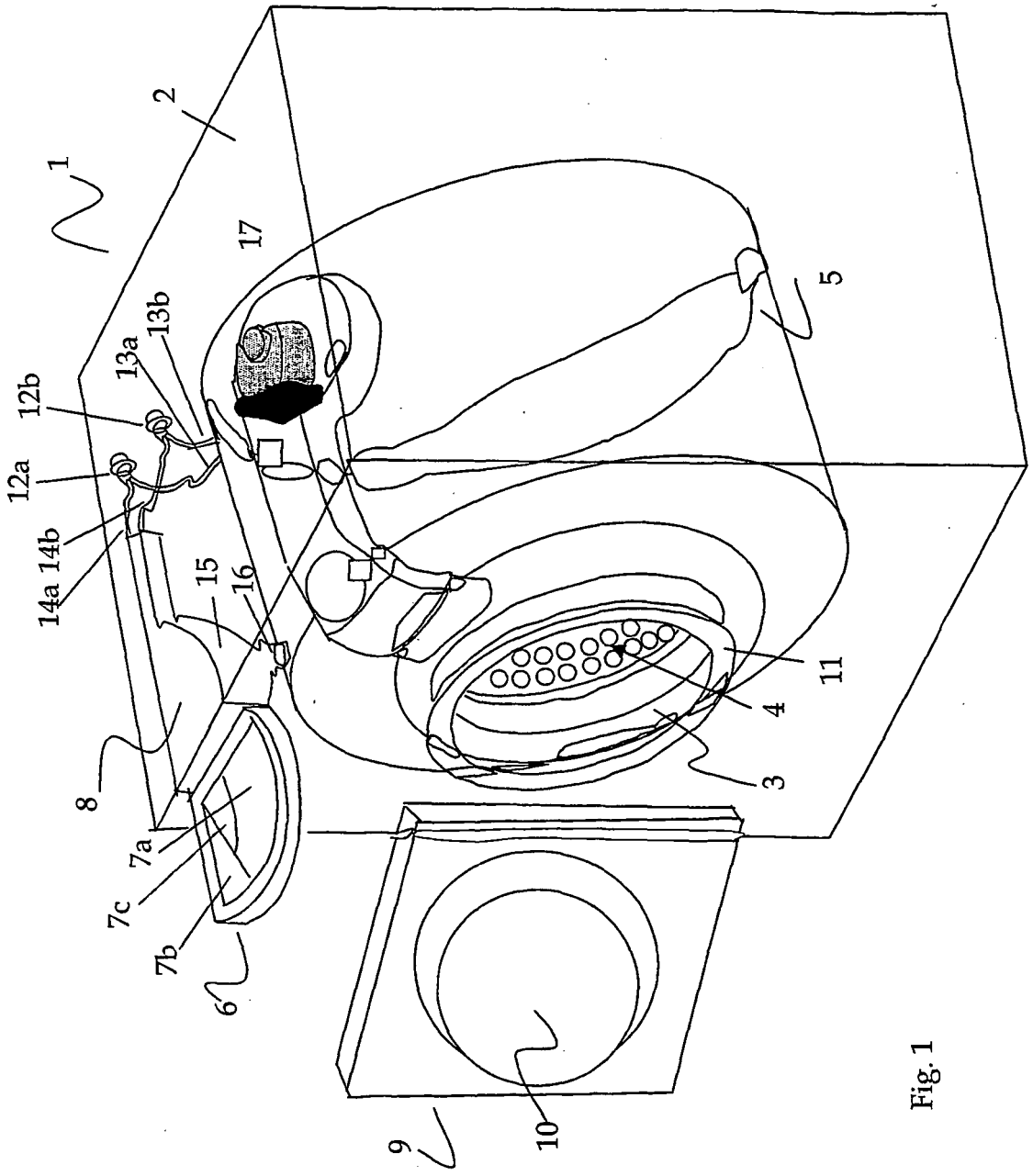


Fig. 1

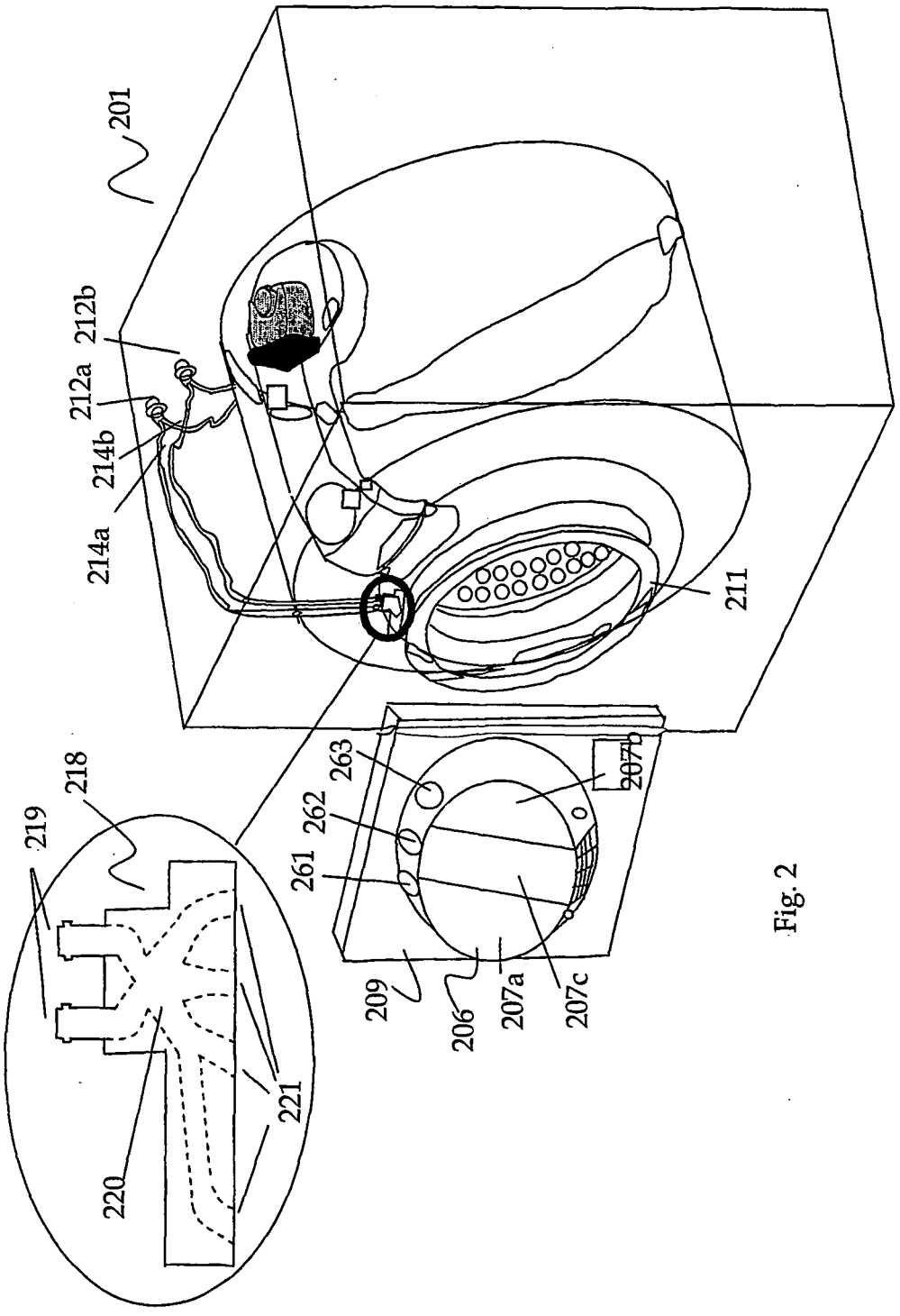
201
212b
212a
214b
214a
211
218
219
263
262
261
207b
209
206
207a
207c
220
221

Fig. 2

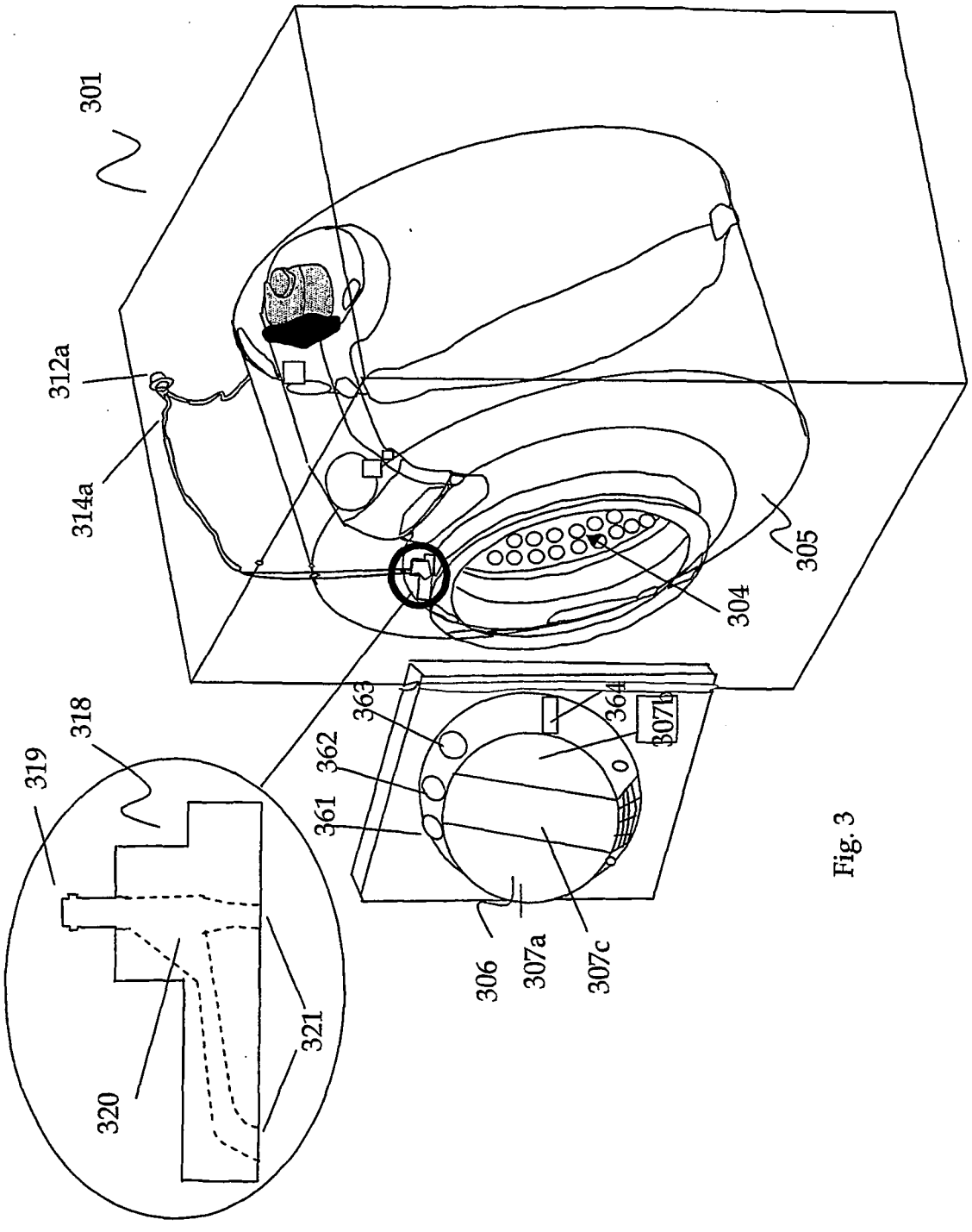
301
312a
314a
305
304
363
364
307b
362
361
306
307a
307c
318
319
320
321

Fig. 3

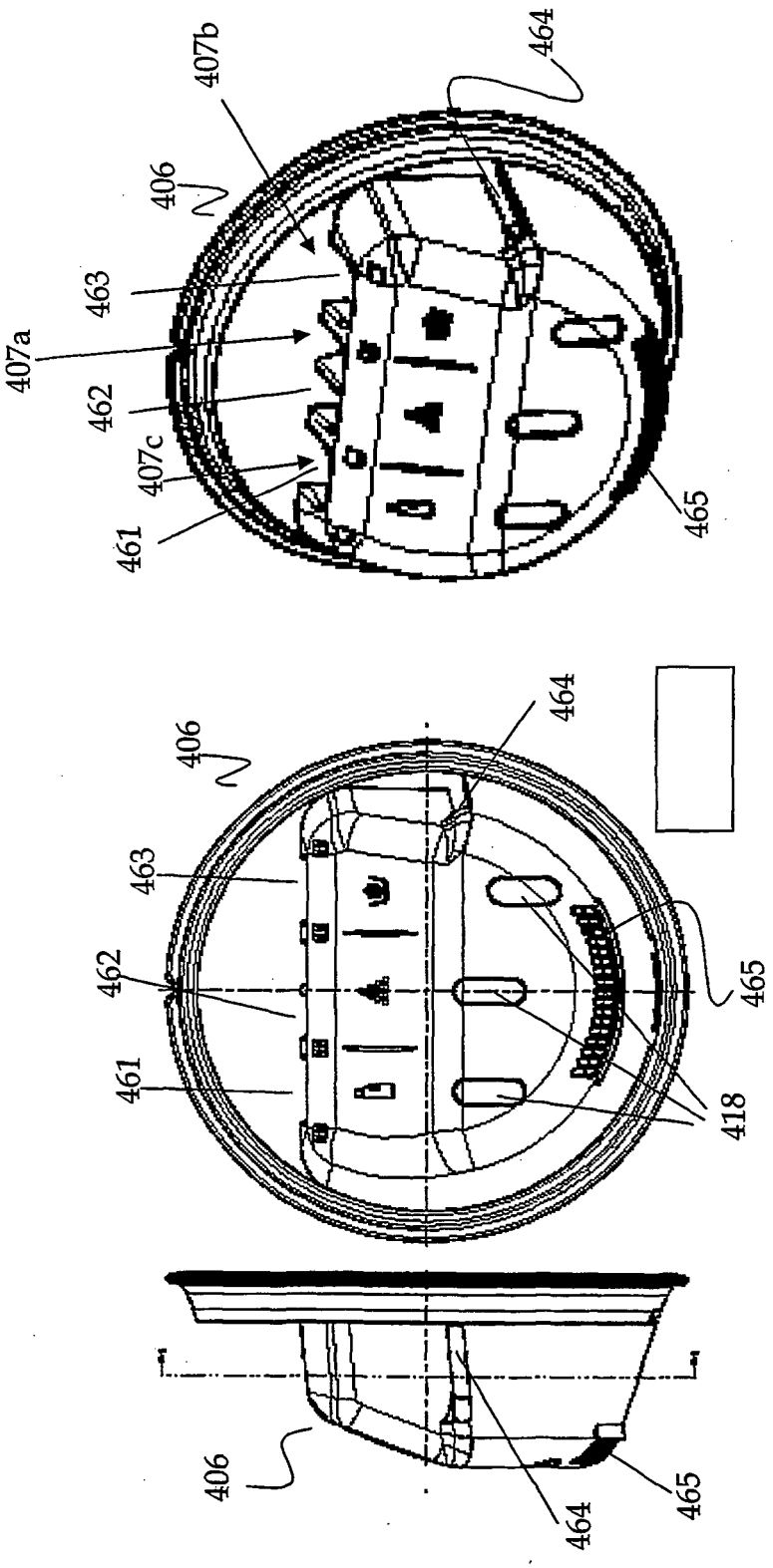
407b
464
406
463
407a
462
407c
461
465
406
464
463
462
461
465
418
406
464
465

Fig. 4

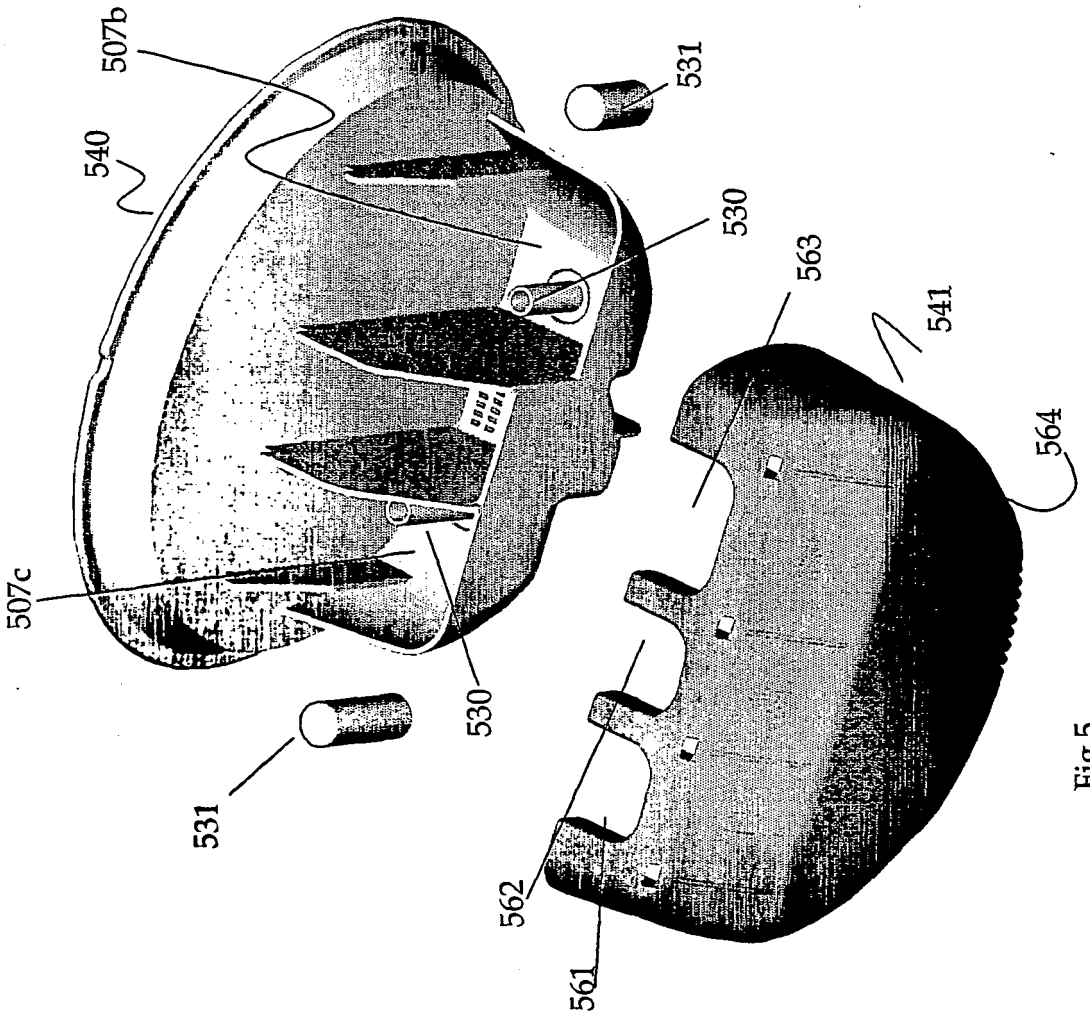
507b
540
531
530
563
541
564
507c
530
531
562
561

Fig.5

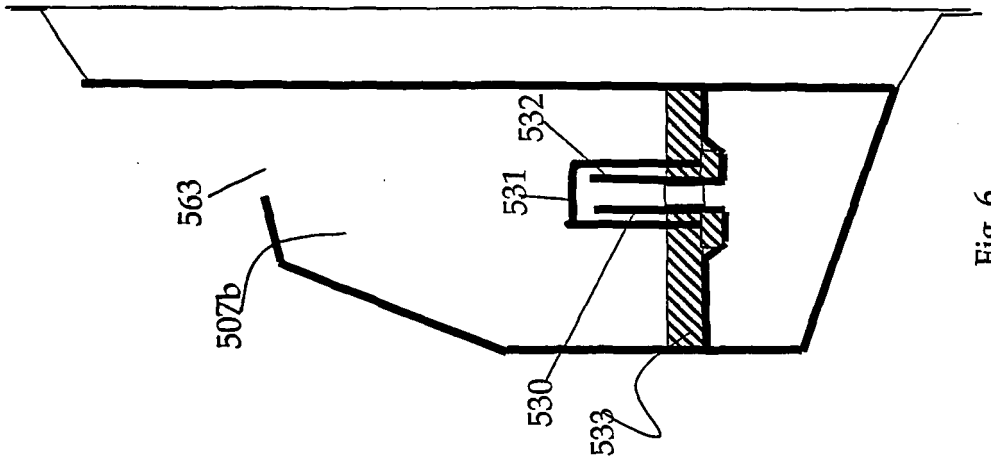
532
531
563
507b
530
533

Fig. 6

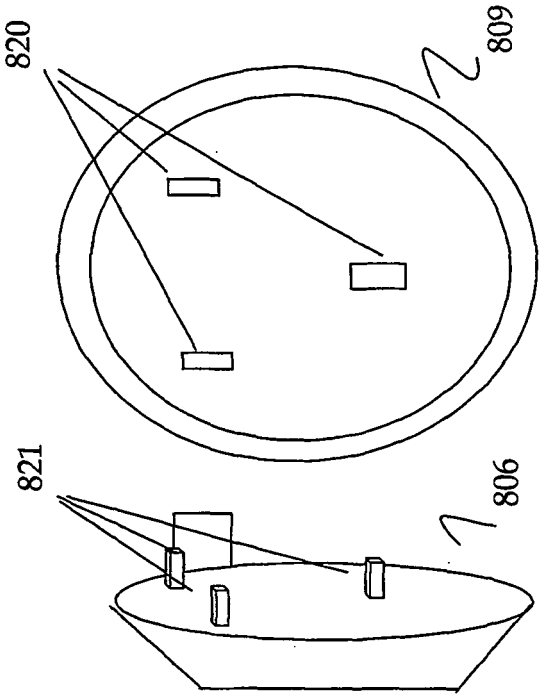


Fig. 8

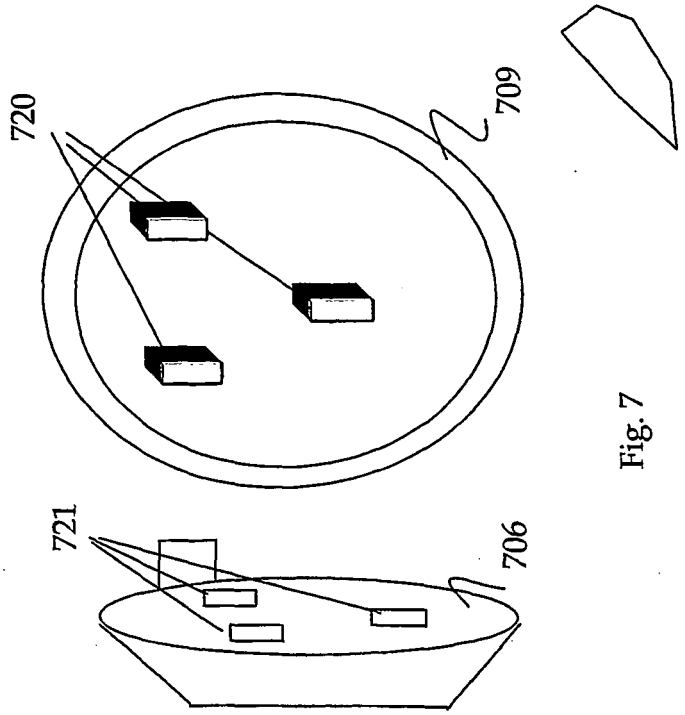


Fig. 7

## 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


- FR 2701965 **[0008]**
- GB 1110375 A **[0009]**
- GB 2260770 A **[0009]**
- GB 2029862 A **[0009] [0036]**
- IT TO20030803 A **[0044]**