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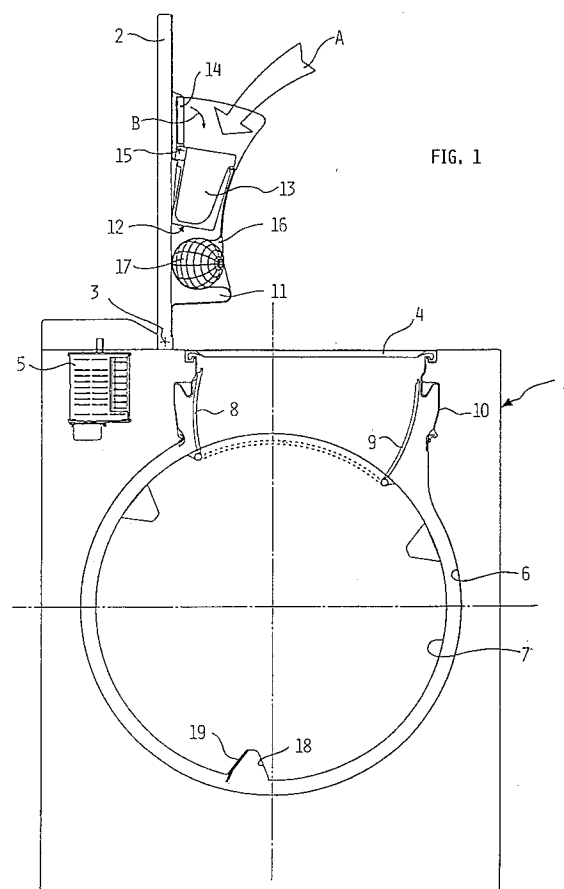
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(54) **Top loading washing machine, with washing agents dispenser in the door.**

(57) A top loading laundry washing machine is described, comprising a door (2) being movable between a substantially vertical position, for loading the machine (figs 1 and 3), and a substantially horizontal position, for operation (figs 2 and 4), the lower part of the door (2) being provided with a washing agents dispensing device. Said dispensing device (12) comprises a compartment (13) for receiving a washing agent (detergent or additive) in powder and/or liquid form, that has an opening for the loading of said washing agent and at least one opening for the automatically commanded discharge of said washing agent, said loading aperture and said discharge aperture in particular coinciding, and occlusion means of said discharge aperture, in particular a mobile flap (14), the opening of which, by way of an appropriate actuating organ, is commanded by the programming device (5) of the machine, at an appropriate moment of the operation cycle of the latter, so as to cause the delivery of a determined dose of said washing agent; in following the opening of said occlusion means (14), said washing agent contained in said compartment (13) can fall or flow due to gravity within the washing chamber (6) of the machine.



The present invention relates to a top loading laundry washing machine comprising a door being movable between a substantially vertical position for loading, and a substantially horizontal position, for operation, the lower part of the door being provided with a washing agents dispensing device.

As is known, in the washing machines of the cited type the loading and unloading of laundry to be washed is realized through an aperture obtained in the superior wall of the cabinet of the machine, which faces a corresponding aperture present in the superior part of the washing chamber; the basket of the machine, assembled so as to revolve within the chamber, also presents an opening, that can be closed with appropriate means; said opening in the loading/unloading phases of the laundry is made to be found at the top position, by way of known means.

The abovementioned aperture obtained in the superior wall of the cabinet of the machine is apt at being closed by a door, generally hinged along the rear side of the latter, and being movable between a substantially vertical position for loading, and a substantially horizontal position, of operation and closure.

In the described type of machine it is known to provide on the lower part of the door a dispensing device, able to provide different kinds of washing agents, such as detergents and additives in powder and/or liquid form; such known devices are provided for carrying out the delivery of detergents, generally in powder, and/or of additives, generally liquid softeners, in different established times, under the control of the programmer, or timer, of the laundry washing machine.

The realisation of such top loading washing machines, and the realisation of dispensers used within the same, is generally shown to be complicated, expensive, and at times unreliable.

For example, from the document EP-A-83.532 a dispenser of the type described is known, comprising two distinct containers for the washing agents, obtained on the lower surface of the door. Such containers, of a cylindrical form, provide loading thresholds which define the maximum dose of the agents that can be contained within. The machine further comprises two nozzles apt at creating, with water coming from the water mains, tangential jets respect the cylindrical wall of the two containers, so as to generate a circular movement of water within the containers themselves and to create as a consequence a vortex that lifts and moves the washing agent over the said threshold level, thus causing it to fall in the washing chamber of the machine.

Such solution, however, is shown to be complicated, above all due to the difficulty of controlling and conveying the various jets of water necessary for obtaining the removal of the washing agents.

A dispensing device of the same kind is known from the document EP-A-213.385, whereby appropri-

ate conduits are provided in the door for feeding water coming from the water mains to distinct compartments of the washing agents, and a nozzle for the inlet of water to such conduits, movable under the control of the machine. Such solution also, even though better than the other, has the risk of blockage and it is however shown to be complicated and expensive for obtaining a satisfying removal of the various washing agents.

From document FR-A-2.455.113 the taking advantage of the rotation of the basket of a laundry washing machine is known for creating a vortex of water that removes the washing agents from the compartments obtained in a double door. In such solution, water enters the containers of the agents through appropriate apertures obtained in a first door, covered in use by a second door, to then flow in the washing chamber with the relative washing agent through a siphon.

Such solution also presents drawbacks, generally due to the difficulty of directing the flow of water produced by the rotation of the basket in the cited opening of the door; such system, apart from complicating the realisation of the door, also has blockage risks and cannot then guarantee the complete removal of the washing agents.

The aim of the present invention is that of overcoming the aforementioned drawbacks, in relation to top loading washing machines equipped with a dispenser of washing agents arranged on the lower part of the door, and in particular to indicate such a machine that is functional, of a simple and economical realisation, and reliable in all conditions of use.

In view of such aims, the present invention has as its subject a top loading laundry washing machine, comprising a door being movable between a substantially vertical position, for loading the machine and a substantially horizontal position, for operation, the lower part of said door being provided with a washing agents dispensing device, characterised in that said dispensing device comprises at least one compartment for receiving a washing agent (detergent or additive) in powder and/or liquid form, that has an opening for the loading of said washing agent and at least one opening for the automatically commanded discharge of said washing agent, said loading aperture and said discharge aperture in particular coinciding, and occlusion means of said discharge aperture, in particular a mobile flap, the opening of which, by way of an appropriate actuating organ, is commanded by the programming device of the machine, at an appropriate moment of the operation cycle of the latter, so as to cause the delivery of a determined dose of said washing agent, by the fact that, in following the opening of said occlusion means, said washing agent contained in said compartment can fall or flow due to gravity within the washing chamber of the machine.

Further aims and advantages of the present in-

vention will result in being clear from the detailed description and annexed drawings, supplied purely as an explanatory and non-limiting example, wherein:

- figure 1 represents a partial and schematic section of the laundry washing machine subject of the present invention, with the loading door open;
- figure 2 represents a partial and schematic section of the laundry washing machine of figure 1, with the loading door closed;
- figure 3 represents a partial and schematic section of the laundry washing machine subject of the invention, with the loading door open, in a possible variational embodiment;
- figure 4 represents a partial and schematic section of the laundry washing machine of figure 3, with the loading door closed.

With the expression washing agent, when not expressly specified, it is meant from herein on any substance added to the washing water, such as a detergent, softener, whitener, etc.

In the cited figures, 1 indicates as a whole the cabinet of a top loading laundry washing machine; 2 indicates the door of the machine, hinged in a point 3 and destined to close a top loading aperture 4 of the cabinet 1; 5 partially indicates the programming device, or timer, of the machine; 6 indicates the washing chamber of the laundry washing machine, while 7 indicates its basket, that rotates around a horizontal axis; the basket 7 is equipped with an aperture that, during the functioning of the machine is closed by way of appropriate mobile flaps 8 and 9, which are in themselves known. Between the mouth of the washing chamber and the loading aperture 4 a bellow type seal 10 is present, for instance made of rubber.

With 11 a plastic box-like element is indicated, applied to the lower surface of the door 2.

Advantageously the geometry of the superior part of the laundry washing machine has been chosen so as to allow its use for the simple gathering of dirty laundry; in particular the size of the element 11 and the flaps 8 and 9 (such flaps are of different lengths), the disposition of the loading aperture 4 and that of the seal 10, are chosen so as to allow the closure of the door 2 even when the opening/closure flaps 8 and 9 of the basket 7 are raised (as can be seen from the dotted lines of figure 4); such measure therefore allows, when the machine is off, to introduce to the basket, over time, the laundry to be washed, without having to always leave the door 2 open, or without the necessity of having to open the door 2 and the flaps 8 and 9 every time.

The frontal part of the element 11 has a recess apt at housing a washing agent dispenser 12, comprising at least one single-dose compartment for the washing agent (detergent or rinsing additive), equipped with a small flap, which is made to open at an opportune moment of the washing phase.

The dispenser 12 is, in the illustrated case, fastened in the recess of element 11 by way of snap fittings, in a position slightly inclined respect the door 2.

For simplifying the present description it is assumed that the body of the dispenser 12 comprises a single compartment, for containing an appropriate single dose of detergent of a powder form. Several of its constructive elements from herein on cited are not illustrated, inasmuch as they are known.

The cited single-dose compartment, indicated with 13, advantageously has a wall of an inclined profile so as to make easier, in addition to the inclination of the body 12 of the dispenser, the release due to gravity of the detergents; such compartment 13 is equipped with a small entry flap 14, hinged in point 15, equipped with a suitable seal. A spring interacts between the body of the dispenser 12 and the relative small flap 14, apt at bringing the small flap to an open position when a suitable release device, for instance an electromagnetic one, frees a small hooking tooth, directly obtained on the small flap 14. Naturally electric cables are also provided, that connect in a known manner the timer 5 to the actuation device or devices present in the dispenser 12 for releasing the small flap at an appropriate moment.

The element 11, within the space not used by the dispenser 12, advantageously has a seat 16, apt at housing a spherical washing agent container 17, of the type that can be directly inserted in the basket of the laundry washing machine between the laundry to be washed; when such spherical container 17 is not being used during the washing phase, it can therefore be replaced by the user in the seat 16.

Finally, 18 indicates one of the laundry dragging elements defined in the basket 7, that has a wall 19, the function of which shall be clarified later in the present description.

In figure 1, the laundry washing machine is ready for the loading of laundry to be washed.

As can be seen, the door 2 is vertically open. In such position, the dispenser 12 is facing upwards, with the small flap 14 open, so as that the compartment 13 for containing the detergent, also facing upwards, can be easily filled by the user, in the sense indicated with the arrow A.

Upon termination of the introduction of laundry and the loading of detergent, the user of the laundry washing machine closes the flaps 8 and 9 of the basket, the small flap 14 of the dispenser 12 (in the sense indicated with the arrow B) and the door 2 of the machine. At this point the start of the washing cycle can be given.

At an appropriate moment of the washing cycle, the timer 5 commands the electromagnetic release device of the small flap 14 of the compartment 13; its hook is freed and the flap 14, under the action of the spring, automatically opens so as to allow for the release of the detergent; such situation can be seen in

figure 2.

As is seen, in following the opening of the flap 14, the detergent flows due to gravity in the washing chamber, as indicated with the arrow C; as previously mentioned, the release of the detergent is favoured by the inclination of the dispenser 12 and by the profile of the internal wall of the compartment 13; even the slight vibrations of the machine favour the release of the detergent.

During rotation of the basket, that takes place in the sense indicated by arrow D, the wall 19 provides for collecting water from the washing chamber, so as to launch upward splashes, in the direction of the dispenser 12. A part of such splashes will therefore enter the compartment 13, as indicated by arrow E, to then drop back into the washing chamber; in this way, therefore, even the minimal quantity of detergent remaining inside the compartment 13 of powder detergent will be removed by the splashes; the fact that the splashes are in the air actually favours the removal of the detergent, due to the braking effect they have when striking the compartment 13.

Naturally, in a realisational phase, the form, number and dimensions of the walls 19, and the rotational speed of the basket, shall be decided for creating a vortex and splashes of water substantially directed towards the compartment 13 containing the washing agent, but without an excessive need of precision.

Naturally the dispenser 12 could also be provided with a compartment for containing a second washing agent, for example a liquid softener, that could be substantially identical to that indicated with 13, with a relative flap 14.

In such a case, upon termination of the actual washing phase, in a successive moment, the timer 5 sends impulses to the release device of the flap of the compartment containing the softener. As before the flap opens and the softener can flow due to gravity in the chamber; also in this case the total removal of the softener is assured by the splashes caused by the wall 19, similar to that described above with reference to powder detergent.

Finally, once the programmed operation cycle has finished, the user can open the door of the machine for unloading the washed laundry, and the machine will once again be in the condition illustrated in figure 1.

Figure 3 illustrates a possible variant of the top loading washing machine according to the invention.

In the case of such variant, as opposed to equipping the basket 7 with walls 19 for generating splashes that strike the compartment or compartments 13 of the dispenser 12, an appropriate nozzle 20 is provided, for instance arranged in the upper part of the seal 10, in a position being remote respect the dispenser 12, but being directed in its position.

Such nozzle 20 could for example be that provided in the laundry washing machine for charging the

washing chamber water coming from the water mains, and that, according to the proposed variant, it can also be advantageously utilised for striking the dispenser 12 with jets of water.

As is seen in figure 4, according to the proposed variant, after the opening of the small flap 14 the jet 21 exiting the nozzle 20, provides for the total removal of washing agent, fallen or flowed due to gravity in the washing chamber 6, as previously described.

Naturally, the jet 21 may be created in various ways; for instance such jet 21 could be obtained by withdrawing the water from the chamber, utilising for this purpose an appropriate drainage pump; with such aims use can for example be made of the artifices for the recirculation of the washing liquid, used for the cleaning of the containers of the dispensers of the known type (note for example US patent US-A-3.896.641).

It is however clear that the results obtained with the variants illustrated and/or described are the same as those described with reference to figures 1 and 2.

From the given description the characteristics of the top loading laundry washing machine subject of the present invention are clear, as are clear its advantages.

According to the inventive idea, the washing agent (detergent or additive be it powder or liquid) flows due to gravity in the washing chamber, therefore without the necessity of having to provide for complicated and expensive feeding runs or liquid drains for the dispensing device. The eventual jet of water that strikes the dispenser of the machine according to the invention is used to guarantee the total removal of the washing agent, therefore the generation of such jet can be realised using simple means, unlike those used in top loading washing machines with an integral dispenser in the door of the known type (in which, moreover, the total removal of the washing agent is not always guaranteed).

The risk of blockages of the dispensing device of the machine according to the invention is practically eliminated (due to the fact that conduits and siphons, or openings of reduced dimensions are omitted) and its assembly in the realisational phase of the machine is simple and fast.

It is also to be mentioned that the dispensing device 12 can be equipped with more actuators, each apt at commanding a delivery operation (it can therefore provide actioning devices being separated for the feeding in the chamber of detergents and additives), or equipped with a single actuator for operating in all the delivery cycles, be it for the detergents or for the additives.

In the same way, the dispenser 12, united to a single-dose compartment for containing the powder detergent, could be provided with a small metering chamber of the liquid additive, associated to a reserve tank, that can be periodically reloaded by the

user with known means; in such case the dispenser of the liquid substance would take advantage of the opening and closing movements of the door of the laundry washing machine, horizontal when closed and vertical when open, for loading the liquid additive from the reserve tank to the metering chamber; also in this case the machine's programmer provides for commanding the discharge, at an appropriate moment, of the liquid additive from the metering chamber to the washing chamber of the washing machine (and the removal of the additive is eventually completed by the jets produced in the above mention manner).

It is clear that numerous variants are possible to the dispensing device subject of the present invention, without for this departing from the scope of novelty inherent in the innovative idea.

A possible variant is that of providing means that allow the user to remove at least part of the dispenser 12 for cleaning purposes. With such aim a snap fit fastening means in the recess of the element 11 could be provided, with an appropriate release button.

In another possible variant, for the liquid washing agent, in the body of the dispenser 12, or even in the space defined by the element 11, a liquid reserve tank (for example a softener) and a small chamber could be obtained, that is found inside of said tank, for the metering of such liquid agent to be delivered. As previously mentioned, during the closure of the door of the washing machine, i.e. during the movement of the door from a position being substantially vertical to a horizontal one; an established quantity of liquid agent contained in the tank is withheld in the metering chamber, from which, at an appropriate moment of the washing cycle, is made to fall in the washing chamber.

It is however clear that other variants are possible without departing from the inventive idea, as is also clear that in the practical realisation of the invention the various elements described can be substituted by technically equivalent elements.

Claims

1. Top loading laundry washing machine, comprising a door (2) being movable between a substantially vertical position, for loading the machine (figs 1 and 3), and a substantially horizontal position, for operation (figs 2 and 4), the lower part of the door (2) being provided with a washing agents dispensing device, characterised in that said dispensing device (12) comprises at least one compartment (13) for receiving a washing agent (detergent or additive) in powder and/or liquid form, that has an opening for the loading of said washing agent and at least one opening for the automatically commanded discharge of said washing agent, said loading aperture and said discharge aperture in particular coinciding, and occlusion means of said discharge aperture, in particular a mobile flap (14), the opening of which, by way of an appropriate actuating organ, is commanded by the programming device (5) of the machine, at an appropriate moment of the operation cycle of the latter, so as to cause the delivery of a determined dose of said washing agent, and in that in following the opening of said occlusion means (14), said washing agent contained in said compartment (13) can fall or flow due to gravity within the washing chamber (6) of the machine.
2. Top loading laundry washing machine, according to claim 1, characterised in that the removal of eventual washing agents remaining in said compartment, i.e. an eventual part of said determined dose of washing agent that has not fallen or flowed due to gravity from said compartment to the washing chamber (6) of the machine, is guaranteed by way of a jet or splash of liquid (E;21), coming from a remote area (18-19;20) respect to said dispenser (12) and said door (2), said jet or splash of liquid (E;21) being directed substantially in correspondence to said compartment (13).
3. Top loading laundry washing machine, according to claim 1 or 2, characterised in that said dispenser (12) comprises at least one compartment (13) equipped with a mobile flap (14) subject to the action of an elastic element, said flap (14) having a closure element apt at cooperating with a hooking/release device, in particular of the electromagnetic type, present in said dispenser (12).
4. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that said door (2) has on its underside a box-like portion (11), in particular being of a plastic material, within which said dispenser (12) is housed, in particular in an inclined position.
5. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that with the door (2) open, i.e. vertically raised, said opening for the charging of the washing agent is facing upwards.
6. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that at an appropriate moment of the washing cycle, said programming device (5) provides for commanding the release of said flap (14) which, under the action of elastic means opens in a way that allows the falling due to gravity of the washing agent in said washing chamber (6).

7. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that said jet or splash (E;21) is obtained by way of washing liquid present in said washing chamber (6) and is in particular produced by the rotation of the basket (7) of the machine. 5
8. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that said basket (7) provides appendices (19) apt at collecting and throwing upwards, in the direction of the dispenser (12), splashes of liquid (E) gathered from said chamber (6). 10
9. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that said jet or splash of liquid (21) comes from a nozzle (18) arranged in a remote position respect to said dispenser (12), in particular arranged in a seal (10) being present between the mouth of said washing chamber (6) and the loading aperture (4) of the machine. 15 20
10. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that the liquid exiting said nozzle (20) is water coming from the water mains. 25
11. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that the water exiting the nozzle (20) is withdrawn from said washing chamber (6), in particular from a drainage pump of the machine. 30
12. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that fastening means are provided, for example of the snap fit type, that allow the user to remove at least a part of said dispenser (12), for cleaning purposes. 35 40
13. Top loading laundry washing machine, according to claim 1, characterised in that in said box-like element (11) and/or in the body of said dispenser (12) a reserve tank for a liquid washing agent (for instance a softener) and a small chamber for the metering of a single dose of said liquid agent to be distributed are obtained, said chamber being apt at withholding, during the movement of the door (2) from the substantially vertical position to that being horizontal, said determined quantity of said liquid agent contained in said tank, and that, in following the opening of said occlusion means (14), said single dose of liquid washing agent flows due to gravity in said washing chamber. 45 50 55
14. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that in said box-like element (11) a seat (16) is obtained apt at housing, when not in use, a washing agent container (17) of the type that can be directly inserted in the basket of the laundry washing machine between the laundry to be washed. 15.
15. Top loading laundry washing machine, according to at least one of the previous claims, characterised in that the geometry of its superior part, in particular the dimension of said element (11) and the flaps (8,9) of said basket (7), the arrangement of the loading aperture (4) of the machine and the relative water tight seal (10), is chosen so as to allow the closure of said door (2) even when the opening/closure flaps (8,9) of said basket (7) are raised (fig. 4).

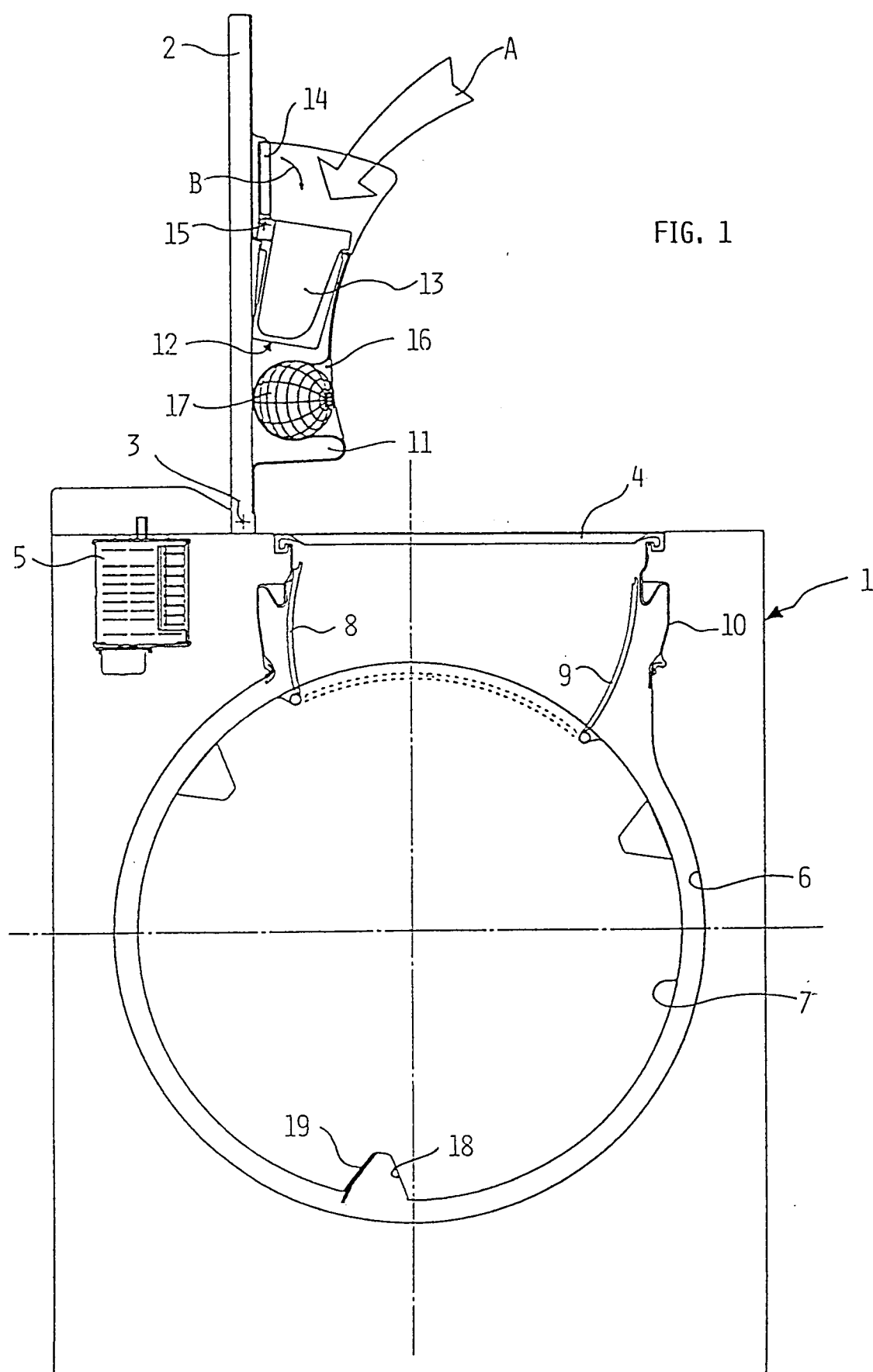
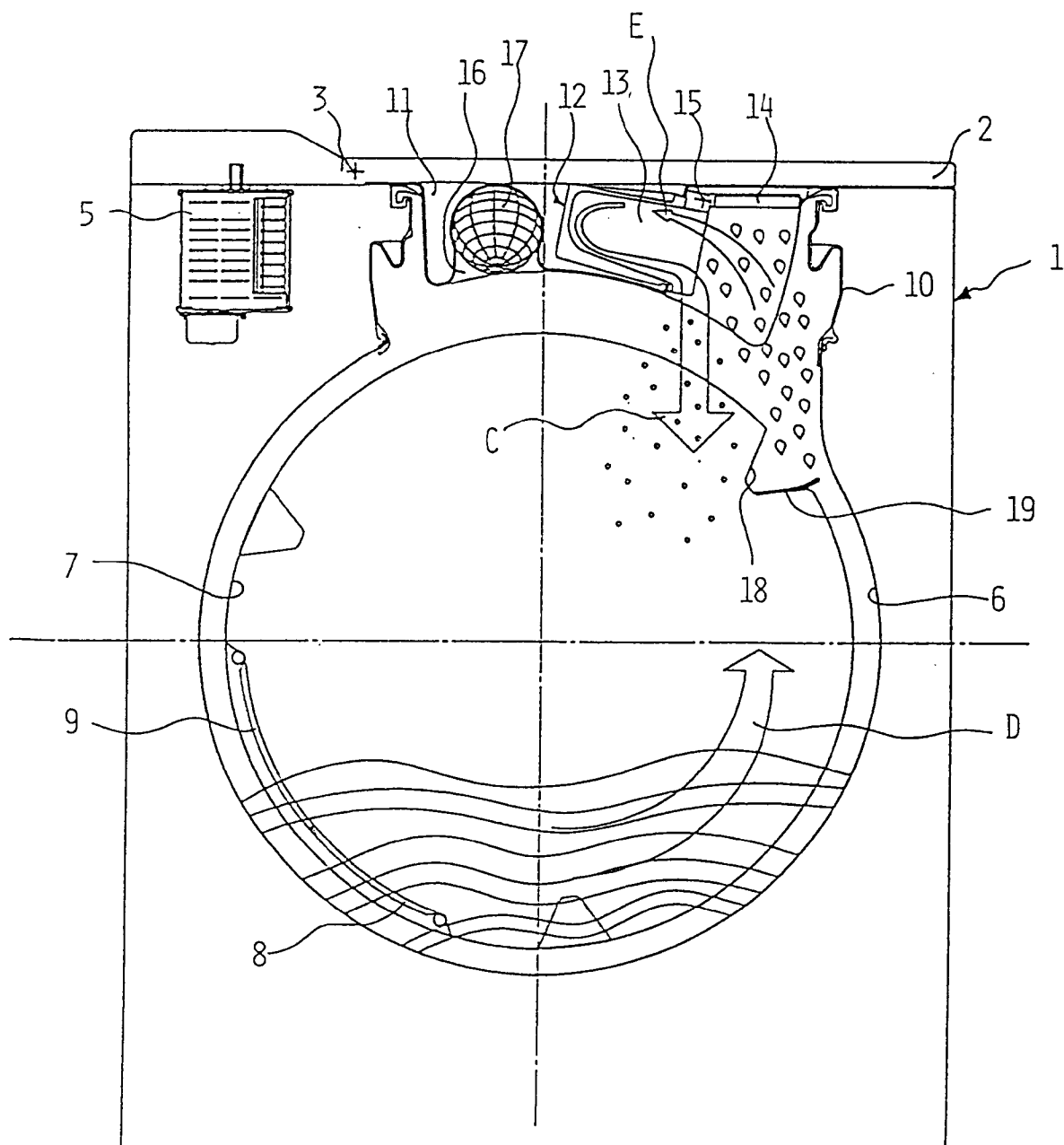


FIG. 2



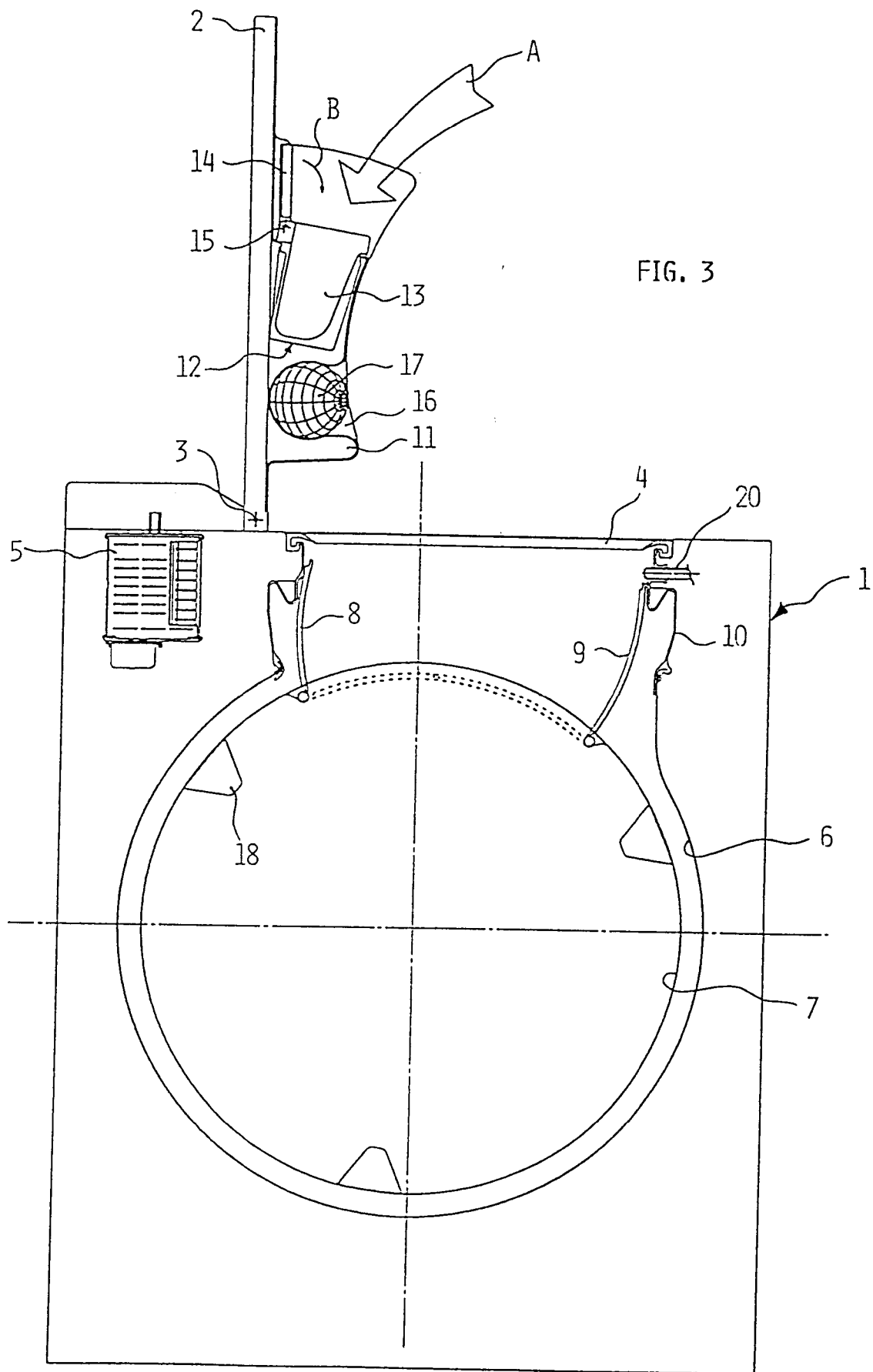
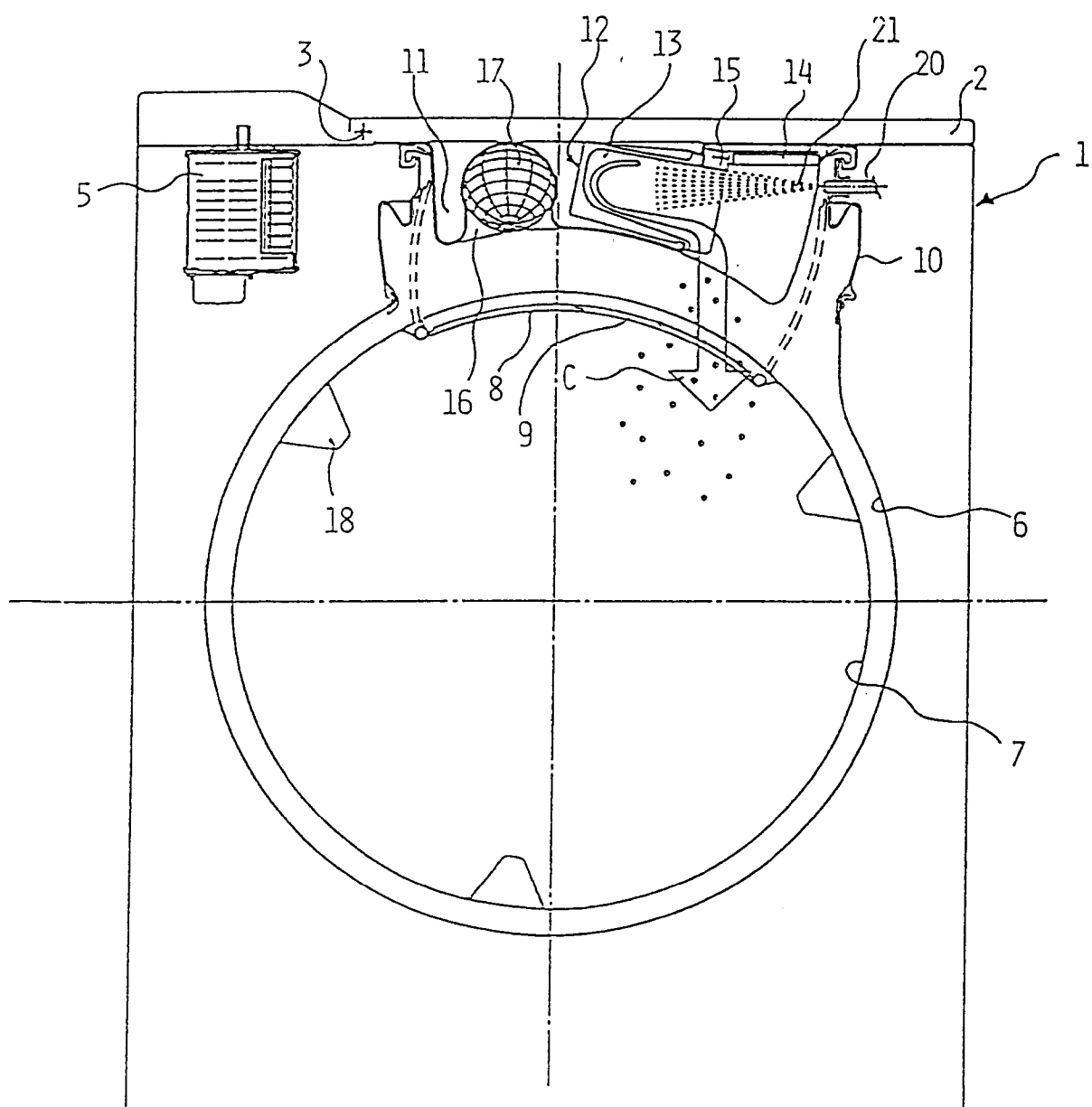


FIG. 4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 10 8421

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.5)
X Y	DE-A-28 04 036 (LICENTIA) * page 5, line 20 - page 6, line 20; figure *	1,3,5,6 2,7,9-12	D06F39/02
Y	FR-A-1 519 399 (GENERAL MOTORS) * page 2, left column, line 39 - line 48; figures 4,5 *	2,9,10	
Y,D	FR-A-2 455 113 (THOMSON-BRANDT) * page 5, line 32 - column 6, line 14; figure 2 *	7	
Y	US-A-4 043 158 (BOCHAN) * column 3, line 57 - line 68; figures 1,2 *	11	
Y	DE-B-10 96 319 (BOSCH) * column 3, line 7 - line 12; figure 1 *	12	
X	EP-A-0 128 073 (ESSWEIN) * page 5, line 13 - page 6, line 15; figures *	1,5,6,13	
A	FR-A-2 590 917 (ZANUSSI) * the whole document *	1,2,5,9, 10,13	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
A,D	EP-A-0 083 532 (ESSWEIN) * the whole document *	1,2,5,9, 13	D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 5 October 1994	Examiner Rebiere, J-L
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