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(54) Laundry washing machine with improved washing agent distribution.

(57) A laundry washing machine is described, of the type comprising a container of the washing agents (1) divided into compartments (2,3,4), and precisely a first compartment (2), for the pre-wash detergents, a second compartment (3), for the detergents of the actual wash and a third compartment (4) for the softener ; the main characteristic of the invention consists in the fact that a removable tank (5) is provided for containing a liquid bleach, apt at being inserted in said first compartment (2), so as that said first compartment (2) can be alternately used for containing the detergents for the pre-wash or, by way of the tank (5), for containing the liquid bleach.

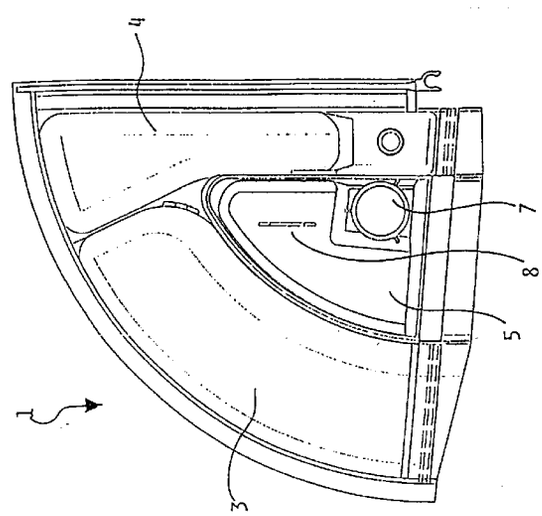
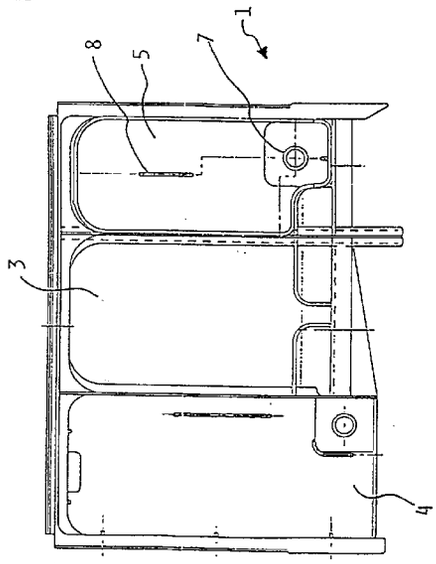


FIG. 3



EP 0 685 587 A1

The present invention relates to a laundry washing machine, of the type comprising a container of the washing agents divided into compartments and precisely a compartment for the pre-wash detergents, a compartment for the detergents of the actual wash and a compartment for the softener.

Practically all modern laundry washing machines are equipped with a dispensing device of the washing agents. Such dispensing device is usually composed of a container divided into a series of compartments, each of which destined to be loaded with a dose of detergents and/or additives to be used during the different phases of the washing program; in the working position of the dispenser, each of such compartments is placed in communication with appropriate water entry and drainage ducts, in such a way that a quantity of water can pass through conveying the washing agents to the tub. As a result of the type of laundry to be washed, the user therefore selects a washing program and provides for adding to the various compartments of the dispenser the appropriate quantity of the said washing agents; at an appropriate moment, upon a command of the control system (of the electromechanical or electronic type) of the machine,-the water to be introduced to the washing tub of the machine is made to pass through each of the various compartments, so as to convey to the tub the relative washing agent; i.e. based on the selected program, and according to the phase of the wash reached, the control system provides for withdrawing at appropriate times the different washing agents from the relative compartments.

It is also known that the use of bleach is becoming more and more common, due to its considerable advantages in relation to the efficiency of the wash, above all concerning hygiene: with this aim bleach is periodically used for instance for the washing of bed linen.

In some machines of the known type the detergents drawer is provided for the use of liquid detergents; such drawers, that therefore allow for the use of bleach usually have four compartments, and are therefore of considerable encumbrance and of complicated realisation, due to the necessity of having to allow for the use of both powder agents and liquid agents. Such machines are not usually equipped with an appropriate cycle for the bleach, therefore the user has to select one of the normal cycles provided by the machine, preferably a cycle of brief duration: the use of bleach does however require particular attention (as will result from the following), therefore the compromise of using an existing program of the machine does not allow for completely exploiting the characteristics of the bleach.

Other problems arise in the case in which bleach is used, in the known ways, during a washing program: in fact it has been observed that the introduction of bleach during one of the rinses following the wash has the consequence of cancelling the optical effect of the detergents, i.e. the effect produced by some of the components present in the detergents (e.g. whitener) that have the function of giving brightness to the laundry, independently from the level of washing reached.

In some other laundry washing machines of the known type the drawer of the washing agents only has three compartments, precisely a compartment for powder detergents for the pre-wash, a compartment for powder detergents for the actual wash and a compartment for a liquid softener. It is therefore clear that with such machines the bleaching of laundry is not possible, if not using other solutions as a compromise. In particular the user has to load the laundry to be bleached in the machine, select a brief washing program and, while the machine charges the water in the tub, pour the bleach in the detergents compartment for the wash, with the dispenser open. The machine consequently carries out such brief cycle and, after the final spinning phase, the user can then add any other laundry to be washed, insert the preferred powder detergent, in the dispenser or by way of the so called "ball", and select if possible a cycle without a pre-wash phase and being of a low temperature. This sequence of operations is also that suggested by the bleach producers themselves.

It is clear that such solution used as a comprise is not the best possible, first of all because the user is forced to carry out abnormal operations, such as introducing bleach during the charging of water to the machine and with the dispenser open, with the problem of eventual splashes of bleach, which could strike the users clothes. Another problem with such bleaching operations is that the rinse provided by the brief pre-wash cycle does not allow for eliminating completely the bleach residues remaining in the laundry: such residues of bleach as previously mentioned have the effect of cancelling part of the effects of the detergents (i.e. destroying the whiteners) used in the successive wash, thereby determining an overall unsatisfactory result.

The present invention is therefore based on the recognition of some important facts:

- a first important fact is that it would be desirable to allow the use of bleach even with machines equipped with a drawer having only three compartments, but without forcing the user to carry out abnormal operations;
- a second important fact is that it would be desirable to arrange for a specific bleaching program, that assures a correct treatment of the laundry;
- a third important fact is that, as a general rule, the use of a pre-wash in modern laundry washing machines is becoming progressively less important in the habits of the users and that, in particular, the pre-wash of laundry is not indis-

pensable together with bleaching; it is however clear that such pre-wash phase should be provided with laundry washing machines, so as to always satisfy the eventual washing requirements of the user;

- a fourth important fact is that the use of liquid detergents are now predominately used together with the so called "ball", i.e. detergent containers that are directly introduced to the basket of the machine, among the laundry to be washed.

The aim of the present invention is therefore that of indicating a laundry washing machine with a detergents drawer having only three compartments that, without any substantial cost increases, is arranged for the use of bleach and in which an appropriate program is provided for the execution of an efficient bleaching of the laundry, without the known drawbacks. These and others aims, that will result in being clear from the following description, are reached according to the present invention by way of a laundry washing machine incorporating the characteristics of the enclosed claims.

Further characteristics and advantages of the present invention will result in being clear from the following description and annexed drawings, supplied purely as an explanatory and non-limiting example, wherein:

- figure 1 schematically illustrates a sectioned plan view of a container making up part of the washing agents dispenser of the machine according to the present invention, and a relative accessory, in a first possible embodiment;
- figure 2 schematically illustrates a sectioned plan view of a container making up part of the washing agents dispenser of the machine according to the present invention, and a relative accessory, in a second possible embodiment;
- figure 3 schematically illustrates a plan view of the containers of figures 1 and 2, equipped with the relative accessories;
- figures 4, 5 and 6 schematically illustrate, respectively, the progress of a washing cycle of the type known, the progress of a washing cycle according to the invention and the progress of a washing cycle according to a possible variant of the invention.

In the following figures some of the elements mentioned are not represented, as they are in themselves known.

Figure 1 represents a container making up part of the washing agents dispenser of the machine according to the present invention; such container, globally indicated with reference number 1, is realised as a parallelepiped drawer and in use results in being slidably inserted, in a known way, in an appropriate cavity situated in the command console of the laundry washing machine. As in the known art, in the upper part of such cavity means are provided for the supply of the water that has to pass through the container 1, and a lower duct that places the drawer in communication with the inside of the washing tub of the machine. As is seen, the drawer container 1 is divided in three compartments, more precisely:

- a first compartment, indicated with 2, for containing a powder detergent for the pre-wash;
- a second compartment, indicated with 3, for containing a powder detergent for the actual wash;
- a third compartment, indicated with 4, for containing a liquid softener.

According to the invention, the compartment for the pre-wash 2 is realised in such a way that a small tank can be inserted within for containing a dose of bleach, to be utilised as an alternative to the powder detergent for the pre-wash. Such small tank, which is removable, indicated with 5, has a lower downflow aperture 6, equipped with a suitable siphon 7, so as that the bleach does not exit the small tank until the programming device or timer of the machine does not command the conveyance of water in the compartment 2 necessary for the fulfilment of the bleaching phase. The small tank 5 has a vertical blade centrally arranged, indicated with 8, having the purpose of facilitating the dosage of the bleach: in practice, references are present on such blade 8 (such as notches or different colours, indicating the different levels of the bleach dosage, according to the requirements of the bleaching operation).

Figure 2 illustrates a container making up part of the washing agents dispensing device of the machine according to the present invention, in a second possible embodiment; in such figure 2 the same reference numbers of figure 1 have been maintained, for indicating technically equivalent elements.

In the case of figure 2, the container 1 is not of the drawer type, instead it is of the angular movable type, having a circular sector shaped plan, according to the technique described in the European patent application EP-A-0327.043, in the name of the same Applicant.

According to the present invention, even in the case of figure 2, the compartment 2 is destined for alternative use of powder detergents for the pre-wash or of bleach, by way of inserting in such compartment 2 the appropriate removable small tank 5.

In figure 3 the base of the containers 1 of figures 1 and 2 are illustrated, in the compartment 2 of which the small tank for the bleach is inserted. The laundry washing machine according to the invention is also equipped with an appropriate program for using bleach, as an alternative to detergents for the pre-wash: advantageously such specific program for bleaching is obtained by way of several phases provided in a main washing program controlled by the timer of the machine, appropriately modified respect

the known art.

Figure 4 illustrates in a schematic manner the course of the phases making up an intense washing program of the known type. The prewash phase is indicated with P, the actual washing phase with L, with A, B, C and D four rinses are indicated; upon termination of-the final rinse D a high speed spinning phase E is provided; such spinning phase may eventually be followed by a drying phase, in the case of machines which provide for such a function. The functions carried out during the mentioned phases are in themselves known, therefore they will not be described in detail; it is convenient to mention as to how, according to the known art, during each rinse the movement of the laundry in the cold water charged to the washing tub is in the order of 4-6 minutes.

Figure 5 illustrates in a schematic manner the course of the phases making up an intense washing program of the machine according to the present invention, a program within which a specific cycle for the use of bleach, eventually charged in the compartment 2, has been advantageously obtained.

Compared to the program of figure 4, the program of figure 5 has the great difference of comprising at least one rinse (BB) of a duration being substantially longer compared to that provided by the known art; in particular during the course of the second rinse (BB) provided according to the invention a movement of the laundry in the water takes place in the order of 10-20 minutes, for instance 15 minutes.

Such modifications of the intense cycle allow for, according to the invention, obtaining from the phases BB, C, D, E of the intense washing program the cycle dedicated to bleaching.

Such dedicated cycle is characterised therefore in the absence of heating the water present in the washing tub of the machine and comprises a first actual bleaching phase, obtained in the phase BB, of a duration being comprised of 10-20 minutes, followed by at least two rinsing phases C and D, each of which being of the usual duration, comprised for example of 4-6 minutes of movement of the laundry in the clean water; and finally providing a spinning phase E of a high rotational speed of the basket, for instance in the order of 600 rpm.

Another substantial difference compared to the known cycle of figure 4 is that in the case of figure 5 the distribution of the rinses results in being altered, in such a way that, at least in the occasion of the rinse BB, the water to be introduced to the washing tub is made to pass through the compartment 2 of the drawer of figure 1 or 2, which contains, alternately, the detergents for the pre-wash or the bleach, in the appropriate small tank.

The functioning of the machine according to the invention is the following. In the case of a normal intense washing cycle, the user loads the laundry to be washed in the machine and the detergents in the container 2: in particular the detergents for the eventual pre-wash will be inserted in the compartment 2, the detergents for the wash in the compartment 3 and the liquid softener in the compartment 4. The user, by way of the dial of the programmer device or timer, selects the beginning of the intense program and starts the machine.

In the occasion of the first charging of water, during the pre-wash, the water will pass through the compartment 2, conveying to the tub the detergents eventually present for effecting the pre-wash phase P. The cycle then continues in the known way for the other phases provided, with the substantial difference, compared to the known art, of a greater rinsing time of the laundry during the phase BB, which does not however cause any particular problems.

In the case in which the user wishes to bleach the laundry, the functioning of the machine according to the invention is the following.

The user inserts the small tank 5 in the compartment 2 of the container 1, introduces the desired dose of bleach, loads the laundry to be bleached in the machine and selects by way of the dial of the timer the bleaching cycle. For such purpose it is to be noted that the display of the timer provides an appropriate indication of the point in which the dial is to be positioned, in correspondence of which the machine is arranged for initiating the second rinse BB.

The user then starts the machine and then the first charging of water takes place, with the particularity that, as said, during the phase BB the water is made to pass through the compartment 2; in this way the bleach contained in the small tank 5 is conveyed to the-washing tub.

The machine continues the movement of the laundry in the water containing the bleach for approximately 15 minutes, it then discharges the water used for the bleaching; the two rinses C and D follow with clean water and then the final spinning phase E. The dedicated bleaching cycle then terminates.

In this way the treatment of the laundry with bleach is clearly better than the solutions used as a compromise with the known art. First of all there is no heating of the liquid of the treatment, that has negative affects on the bleaching action. Secondly because the duration of the phase BB guarantees the complete exploitation of the chemical action of the bleach. Thirdly because the two rinses C and D guarantee the complete elimination of the bleach residues from the laundry, without the risk of cancelling the whitening agents present in the detergents used for the eventual successive wash.

It is finally clear that, after the bleaching treatment as provided above, the user of the machine is free to select any other washing program provided by the machine, even being different from that represented in figure 5.

From the given description the characteristics

and advantages of the laundry washing machine according to the invention result in being clear.

In particular they are represented by the fact that, according to the invention use of bleach is permitted even with laundry washing machines equipped with simple and economical dispensers; moreover this takes place automatically without the user having to carry out abnormal operations, such as introducing the bleach during the charging of the water or selecting a program not being specific for bleaching. The machine according to the invention is furthermore equipped with a specific program, dedicated to bleaching, that allows for completely exploiting the characteristics of the bleach, without influencing the efficiency of the detergents used in the eventual successive washing phase and therefore without the typical problems of the known art. Such specific bleaching program can be realised without additional costs or circuitry complications to the laundry washing machine, by way of simple modifications to a generic washing cycle (intense wash), that only implicates a modest lengthening of the treatment times of such cycle.

It is clear that other variants are possible to the laundry washing machine described as an example without for this departing from the inventive idea, as it is clear that in the practical realisation of the invention the various elements described can be substituted with technically equivalent elements.

For instance the described machine could be of the electronically controlled type and therefore have a microprocessor, in union with or in place of an electromechanical timer, which completely or partially takes care of controlling the washing programs. In view of this the user could therefore be in a position to program beforehand the combined operations of bleaching and washing by way of simple command means, such as keys, without any other interventions.

It is finally clear that the rinsing phase of the generic cycle in which the withdrawing of the bleach takes place does not necessarily have to be the second (BB), but could also be the first. In light of this, figure 6 illustrates a possible variant of the intense washing cycle according to the present invention; such cycle differs in practice from the cycle of figure 5 in that it eliminates a rinse and in that the rinse, indicated with AA, in which the withdrawal of the bleach takes place is the first of those provided, then followed by two usual rinses C and D and the final spinning phase E. With the purpose of the bleach treatment, therefore, the cycle of figure 6 on the other hand has an overall duration being less than that of figure 5 (and slightly greater than that of the known cycle of figure 4): it is however to be noted that with the purpose of the wash, the elimination of a rinse compared to the known art does not have negative effects, in that it is compensated by the lengthening of the rinse AA.

To the man of the art it is clear that the invention is, in its essence, adaptable be it for top loading machines or front loading machines, as it is clear that in the practical realisation of the invention the various realisable details described could be substituted with technically equivalent elements.

Claims

1. Laundry washing machine, of the type comprising a container of the washing agents (1) divided into compartments (2,3,4), and precisely a first compartment (2), for the pre-wash detergents, a second compartment (3), for the detergents of the actual wash and a third compartment (4) for the softener, characterised in that a removable tank (5) is provided for containing a liquid bleach, apt at being inserted in said first compartment (2), so as that said first compartment (2) can be alternately used for containing the detergents for the pre-wash or, by way of the tank (5), for containing the liquid bleach.

2. Laundry washing machine, according to claim 1, characterised in that said removable tank (5) has a siphon (7) and/or an indicator (8) of the liquid bleach dosage.

3. Laundry washing machine, according to claim 1, characterised in that said container (2) is of the slidable drawer type (fig. 1) or of the angular movable type (fig. 2).

4. Laundry washing machine, according to claim 1, characterised in that it provides a specific bleach treatment program (BB, C, D, E; AA, C, D, E), with the automatic withdrawal of said bleach from said container (1).

5. Laundry washing machine, according to the previous claim, characterised in that said specific bleaching program is obtained from a sequence of operative phases (BB, C, D, E; AA, C, D, E) making up part of a generic treatment program (fig. 5; fig. 6) and by the fact that means are provided for manually selecting said specific program in the range of said generic program (fig. 5; fig. 6).

6. Laundry washing machine, according to claim 1, characterised in that said specific treatment program (BB, C, D, E; AA, C, D, E) solely provides for the use of cold water.

7. Laundry washing machine, according to claims 5 or 6, characterised in that said generic treatment program (fig. 5; fig. 6) comprises at least one long rinsing phase being of a substantially greater dur-

ation than the rinsing phases normally provided for in a similar treatment program provided by a machine of the type known (fig. 4).

8. Laundry washing machine, according to claim 7 characterised in that said generic treatment program provides two or more rinses, the overall duration of which is substantially greater than a similar treatment program provided for by a machine of the type known (fig. 4), eventually followed by a spinning phase, in particular of a high speed (600 rpm).

9. Laundry washing machine, according to the previous claim, characterised in that at least one cold rinse (BB; AA) is provided, of a duration comprised of 10-20 minutes, followed by at least a second and a third cold rinse (C, D), each being of a duration of approximately 4-6 minutes, followed by at least one spinning phase (E) of a high speed (600 rpm).

10. Laundry washing machine, according to claims 5 and 9, characterised in that said specific treatment program comprises the succession of said first cold rinse (BB; AA), said second and third cold rinse (C, D) and said spinning phase (E).

11. Laundry washing machine, according to claim 7, characterised in that at least in the occasion of said long rinsing phase (BB; AA) the water to be charged to the washing tub of the machine is made to pass through said first compartment (2), for the eventual conveyance to the tub of the liquid bleach.

12. Laundry washing machine, according to at least one of the previous claims, characterised in that command means are provided for the advance programming of the combined operations of said specific program with a different washing program provided by the machine.

13. Laundry washing machine, comprising all the known elements for its functioning, characterised in that it provides a specific bleach treatment program (BB, C, D, E; AA, C, D, E), with the automatic withdrawal of the liquid bleach from a container (1) of washing agents, said specific bleach program in particular being obtained from a sequence of operative phases making up part of a generic treatment program (fig. 5; fig. 6), the selection of said specific program in the range of said generic program being obtained by way of appropriate command means, the various operative phases of said specific bleach treatment program (BB, C, D, E; AA, C, D, E) being realised with cold water.

14. Laundry washing machine, according to the previous claim, characterised in that said specific bleach treatment program (BB, C, D, E; AA, C, D, E) comprises at least one movement phase (BB; AA) of the laundry in the water with the bleach for a duration longer than a normal rinsing phase (10-20 minutes), followed by at least a first and a second rinsing phase (C, D), each in particular being of a duration comprised of 4-8 minutes, followed by at least one spinning phase (E) being of a high rotational speed (600 rpm) of a basket containing the laundry.

15. Method for bleaching laundry in a laundry washing machine of the domestic type, characterised in that it provides in succession, a movement phase (BB; AA) of the laundry in the water containing the bleach, for a period of time being greater than a normal rinsing phase (10-20 minutes), a first and a second rinse (C, D) of the laundry in clean water, a final spinning phase (E), said movement (BB; AA) and rinsing (C, D) phases in particular being realised with cold water.

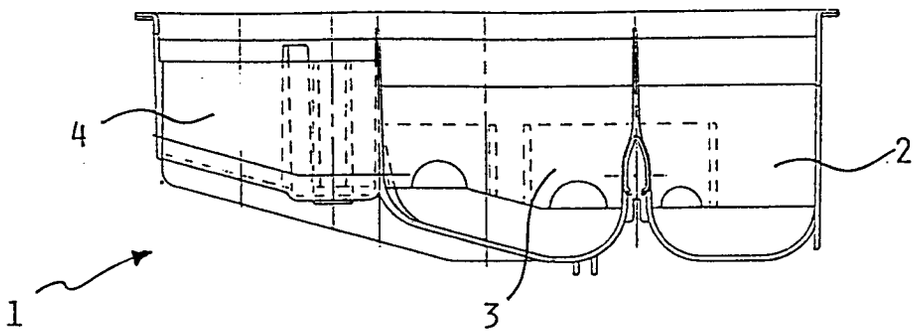
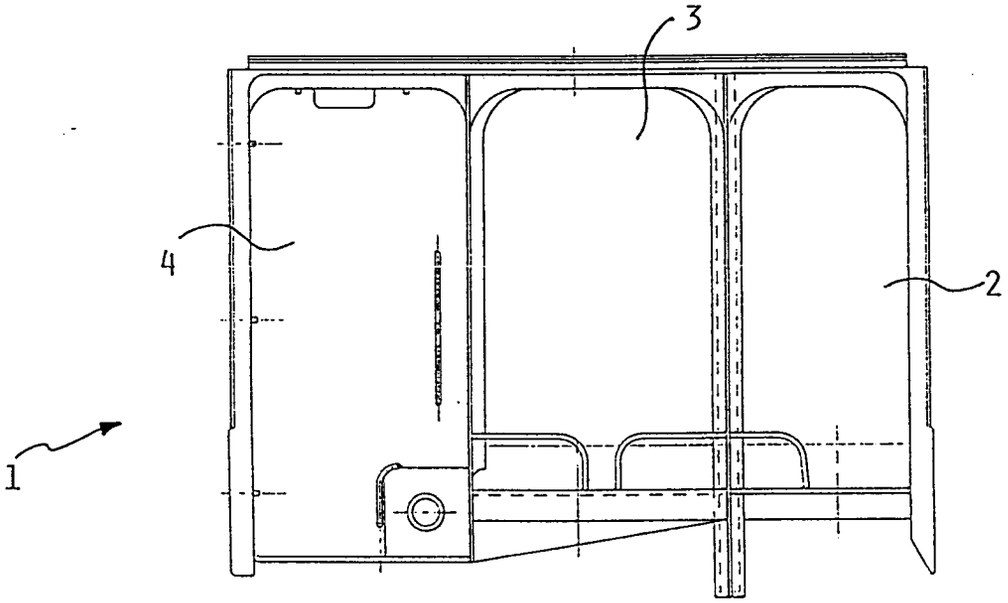
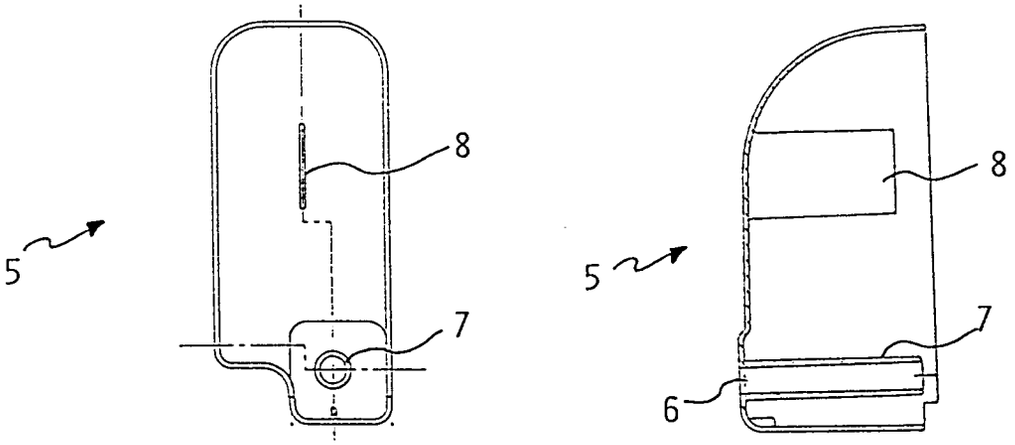


FIG. 1





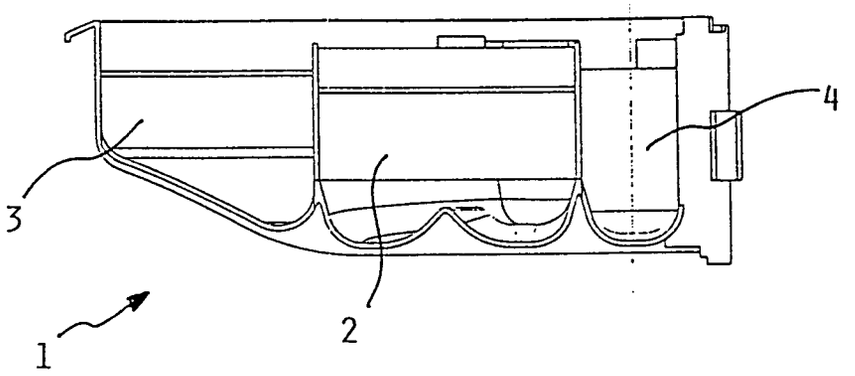
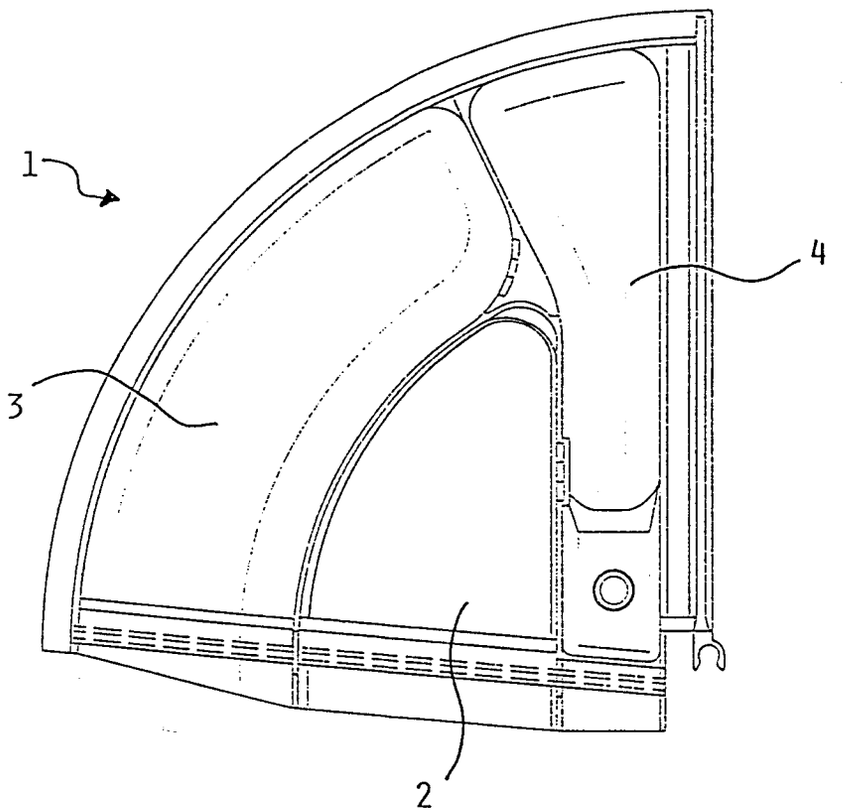
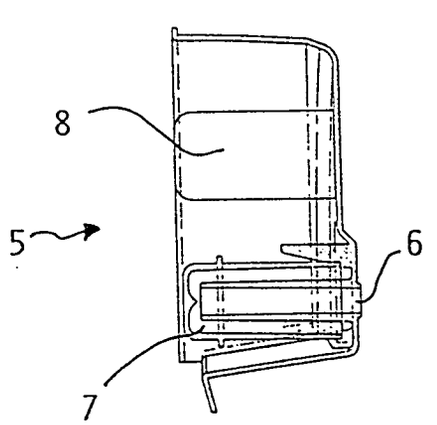
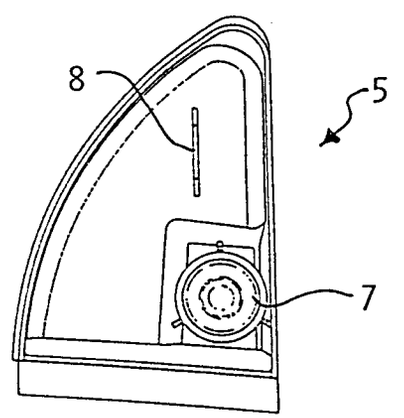


FIG. 2







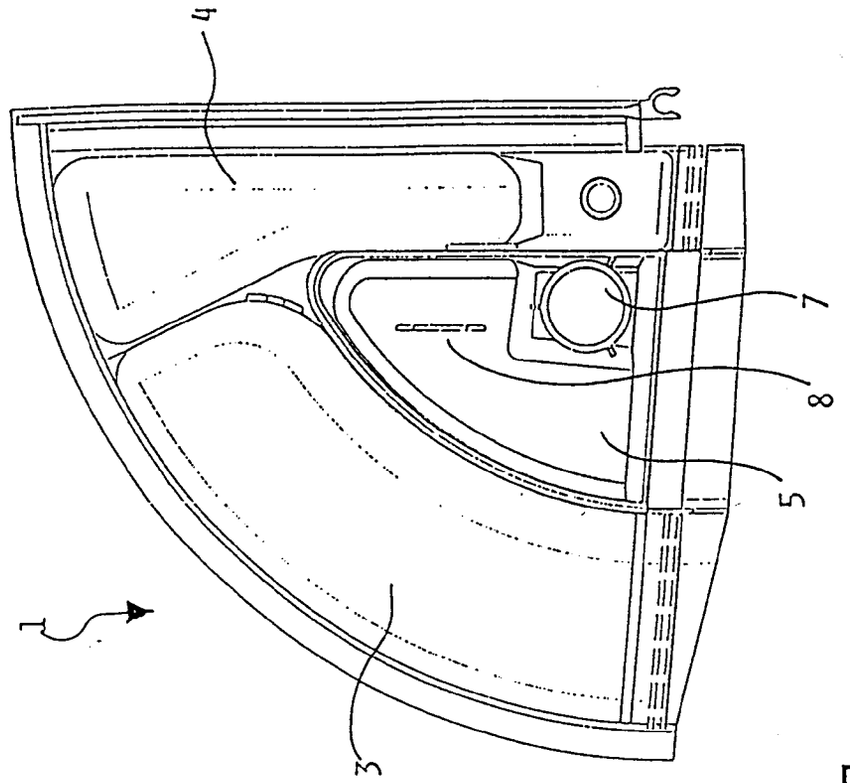
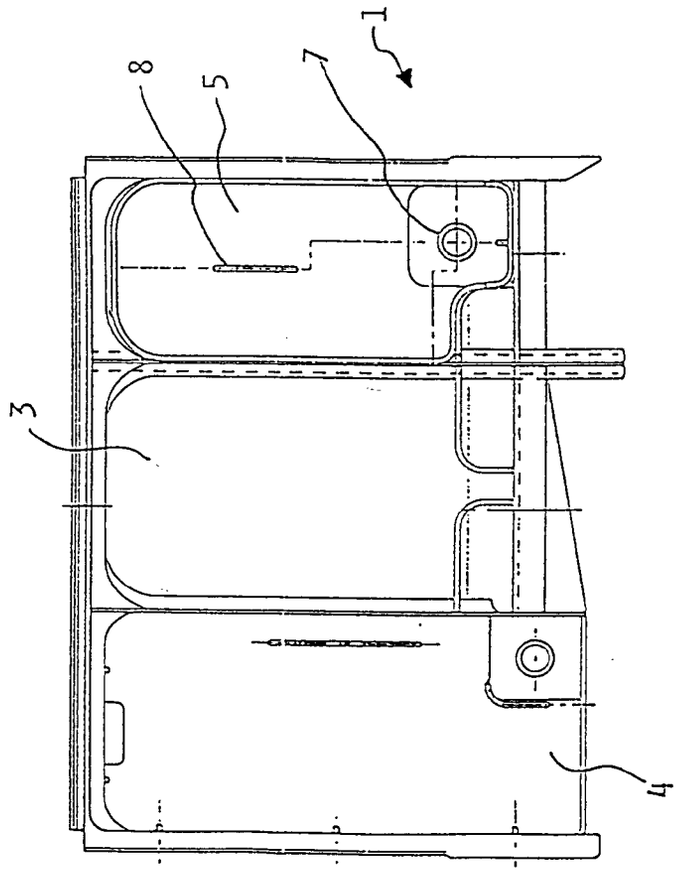


FIG. 3



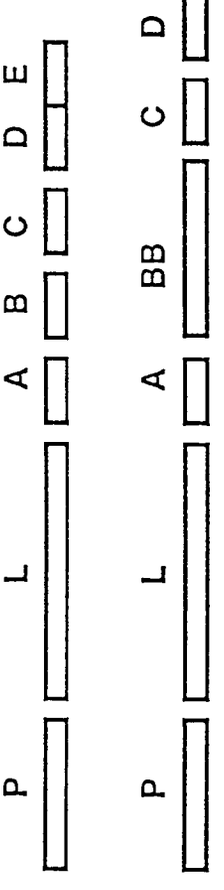


FIG. 4

FIG. 5

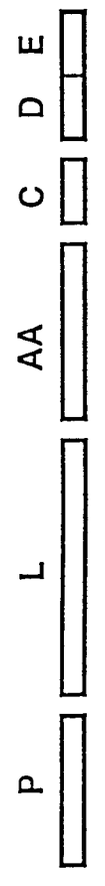


FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 10 8039

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.6)
Y	EP-A-0 169 604 (PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LTD) * page 5, line 28 - page 8, line 29; claims 2,8; figures 1-3 *	1,2	D06F39/02
Y	EP-A-0 496 708 (FUMAGALLI,S.C/O CANDY S.P.A.) * column 2, line 35 - column 4, line 8; claims 3,5; figures 1,3 *	1,2	
A		4,11	
A	EP-A-0 505 777 (LICENTIA PATENT-VERWALTUNGS-GMBH) * the whole document *	1	
A	US-A-4 188 807 (GRAF,R.ET AL)		
A	PATENT ABSTRACTS OF JAPAN vol. 2 no. 103 (M-031) ,24 August 1978 & JP-A-53 069470 (HITACHI LTD) 20 June 1978, * abstract *		TECHNICAL FIELDS SEARCHED (Int.Cl.6) D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 September 1995	Munzer, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
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