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(54) **Domestic washing machine with improved filter**

(57) Domestic washing machine, of both the front-loading and top-loading type, comprising a filter compartment (1) and an associated closing cap (2), and a small front panel (3) on the inside of which said compartment is formed, wherein said cap is provided with a through-hole (4) which can be closed by a respective small lid

(5); said hole is arranged in a projecting position with respect to said cap and said small front panel and is arranged in a position substantially at the bottom of said cap, when the latter is closed. Moreover the cap is provided with a raised central grip (8) and said hole is arranged on said central grip.

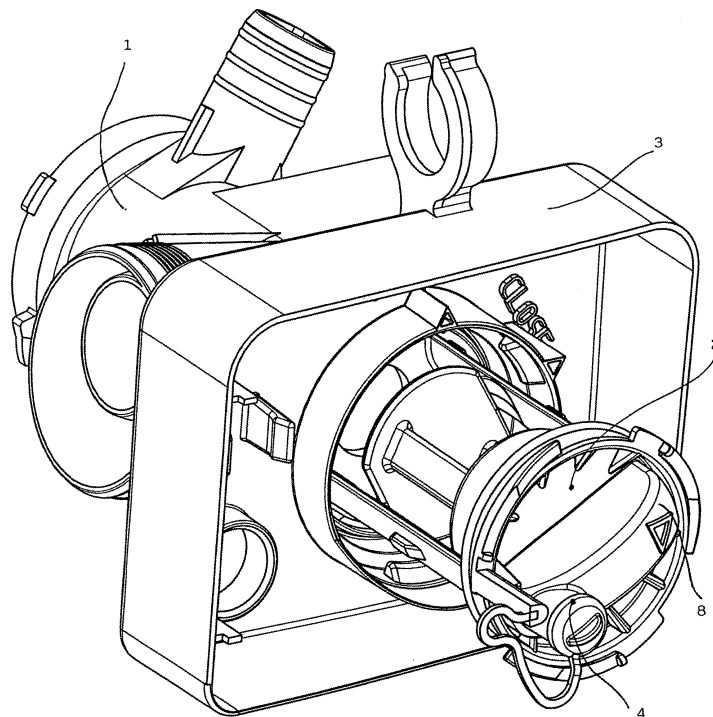


FIG. 3

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Description

[0001] The invention relates to an improved type of washing machine, of both the front-loading and the top-loading type, provided with a discharge pump and a filter for protecting said motor.

[0002] It is known that fabric washing machines, in particular if for domestic use, are equipped with a rotating drum inside a tub which is filled with washing liquid; at the end of the washing process this liquid, which has collected on the bottom of the tub, is pumped externally and then discharged.

[0003] For this purpose, the bottom of the tub is provided with a discharge outlet which, via a suitable sleeve, leads into an underlying pumping unit from where this liquid is drawn and then pumped externally.

[0004] This pumping action is performed by means of an impeller which is housed inside a suitable pumping chamber, said impeller being operated by a respective electric motor.

[0005] A well-known problem is that of the possibility of loose filaments or other bodies present in the tub entering into said housing and being wound around or getting tangled with said impeller, stopping it from operating or in any case preventing a uniform discharge action.

[0006] To overcome this problem, it is common practice to provide said machine with a filter which is arranged in a suitable compartment situated logically upstream of said pumping chamber and able to intercept said bodies before they are introduced into said pumping chamber; periodically said filter, which logically with use of the machine tends to accumulate the foreign bodies or said loose filaments, must be cleaned and freed of said bodies, in order to prevent it from becoming clogged, preventing the flow of liquid into the pumping chamber.

[0007] In order to allow normal access for extraction of said filter, the filter is situated in the front part of the machine and is connected to a cap, the function of which is simultaneously to support and extract said filter and logically close the compartment inside which said filter is housed.

[0008] This condition may, however, cause the following problem: when said cap is opened, the quantity of washing liquid which is present in the bottom zone of the machine, namely in the discharge pump or in the pumping chamber, in the filter itself and in the associated tubes, and which remains there also at the end of the discharging operation, flows out by means gravity through the opening of said filter compartment, which is closed by said cap.

[0009] Since this cap is very low down, it is not possible to use an ordinary external receptacle, even with a low edge, and, as is well-known, this liquid therefore flows out onto the ground underneath the machine, creating obvious problems for the user.

[0010] Moreover, this device is disadvantageous also in all those circumstances where the bottom of the machine must be totally emptied of liquid, e.g. before the

winter season when the temperature falls well below 0°C and the machine is not used.

[0011] In order to overcome this problem it is known to use a special small flexible pipe "C" between the compartment "V" inside which said filter is housed, and specifically between the bottom zone of said compartment, and the small front wall "P" where the cap "T" of the filter is fitted, as clearly shown in Figures 1 and 2; said flexible pipe is provided at its free end with a small closure "H" which can be opened by the user.

[0012] Operation of this flexible pipe consists in extracting it, arranging said closure "H" on a special and suitable container (which is now possible since said closure "H" may be moved away from said front wall "P") and opening said small closure "H" so as to allow the liquid upstream of the filter to flow out freely, into said container and not onto the ground.

[0013] Once this operation has been performed, said flexible pipe "C" is closed again and placed back in position and then the cap "T" is opened in order to extract the filter; this operation therefore avoids any spillage of liquid since it has just been removed.

[0014] However, the presence of said flexible pipe and the respective connection devices involves additional costs which are totally undesirable in the case of a product which must be extremely competitive; moreover, the frequent extraction of said flexible pipe sometimes causes, owing to an excessive pulling force, separation of the inner end "N" of the pipe "C" from the filter compartment, with the logical consequence of complete flooding.

[0015] It would therefore be desirable, and this is the object of the patent, to provide a washing machine provided with a filter which is accessible from the front and a device for discharging the liquid remaining in the bottom of the circuits and the water pipes of the machine, which is devoid of said constraints and drawbacks.

[0016] This object is achieved with a particular type of washing machine provided with a filter and with the associated devices described by way of a non-limiting example with reference to the accompanying drawings in which:

- Fig. 3 shows an exploded view of a filter unit and cap for closing it, according to the invention;
- Fig. 4 shows a perspective external view of a filter unit according to the invention, with the filter closing cap rotated in the closed position;
- Figures 5A and 5B show two views, equivalent to Fig. 4, but with the closing cap in the open position and with two respective operating conditions according to the invention;
- Fig. 6 shows a "front/rear" vertical middle cross-section through the filter unit according to Fig. 3;
- Figs. 7 and 8 show two external views of two respective variants of a component of the invention.

[0017] A washing machine according to the prior art comprises a filter compartment 1 arranged behind its

front wall and closed by a special cap 2; said filter compartment opens out at the front in a small front panel 3 which is provided in particular for production reasons and which can often in turn be closed by a respective closing flap not shown.

[0018] According to the invention and with reference to Figures 3 and 6 to 8, said cap 2 has, formed therein, a through-hole 4 which can be closed by a suitable small lid 5, using one of many means known in the art, and which are therefore not included in the present invention.

[0019] The function of said hole 4 is to form a discharge path, with a limited flowrate, for the liquid contained in the bottom parts of the hydraulic circuit of the machine, to be used before opening said cap 2, so that said liquid is completely discharged before opening the filter cap; therefore, when said filter is opened the danger of a large amount of liquid flowing out onto the ground is eliminated.

[0020] Conveniently, in order to prevent the liquid which flows out from said hole 4 from in turn flowing out onto the ground, said hole 4 itself may be formed so as to project substantially, both from the cap and from said small panel 3 (see in particular Figures 6 and 7) such that it is easy to insert underneath it an ordinary household receptacle of suitably capacity able to collect all the liquid which flows out.

[0021] Since said cap 2 normally has a raised and central straight grip 8 (a feature which is known in order to facilitate the cap unscrewing and screwing operation), it is particularly advantageous for said hole to be arranged on said grip so as to take advantage of its projecting extension and facilitate the collecting action of an external container (see in particular Figures 6 to 8).

[0022] Moreover, in order to ensure that the greatest possible amount of liquid is discharged from said hole 4, it is obvious to position said hole, which must be provided with an associated small lid 5, in a position at the bottom of said cap when obviously the latter is situated in the closed position, as shown in Fig. 5A.

[0023] Finally, in order to avoid the risk of the small lid 5 being lost because of its small size, in view also of the awkward position of the filter which prevents easier monitoring thereof, it is appropriate for said small lid 5 to be joined by a flexible lead 6 to a suitable point 7 of the said cap 2 (Figs. 7 and 8); this obviously allows, after closing said cap 2, said small lid 5 to be gripped immediately and easily.

through-hole (4) from the inside to the outside and **in that** said hole can be closed by a respective small lid (5).

5 **2.** Washing machine according to Claim 1, **characterized in that** said hole (4) is arranged in a projecting position with respect to said cap (2) and said small front panel (3).

10 **3.** Washing machine according to Claim 1 or 2, **characterized in that** said hole (4) is arranged in a position substantially at the bottom of said cap (2) when the latter is closed.

15 **4.** Washing machine according to Claim 4, **characterized in that** said small lid (5) is provided with a flexible lead (6) which joins it to a point (7) on said cap (2).

20 **5.** Washing machine according to one of the preceding claims, **characterized in that** said cap (2) is provided with a raised central grip (8) and said hole (4) is arranged on said central grip.

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Claims

50 **1.** Domestic washing machine, of both the front-loading and top-loading type, comprising:

- a filter compartment (1);
- a cap (2) for closing said compartment;
- a small front panel (3) on the inside of which said compartment is formed, **characterized in that** said cap (2) is in turn provided with a

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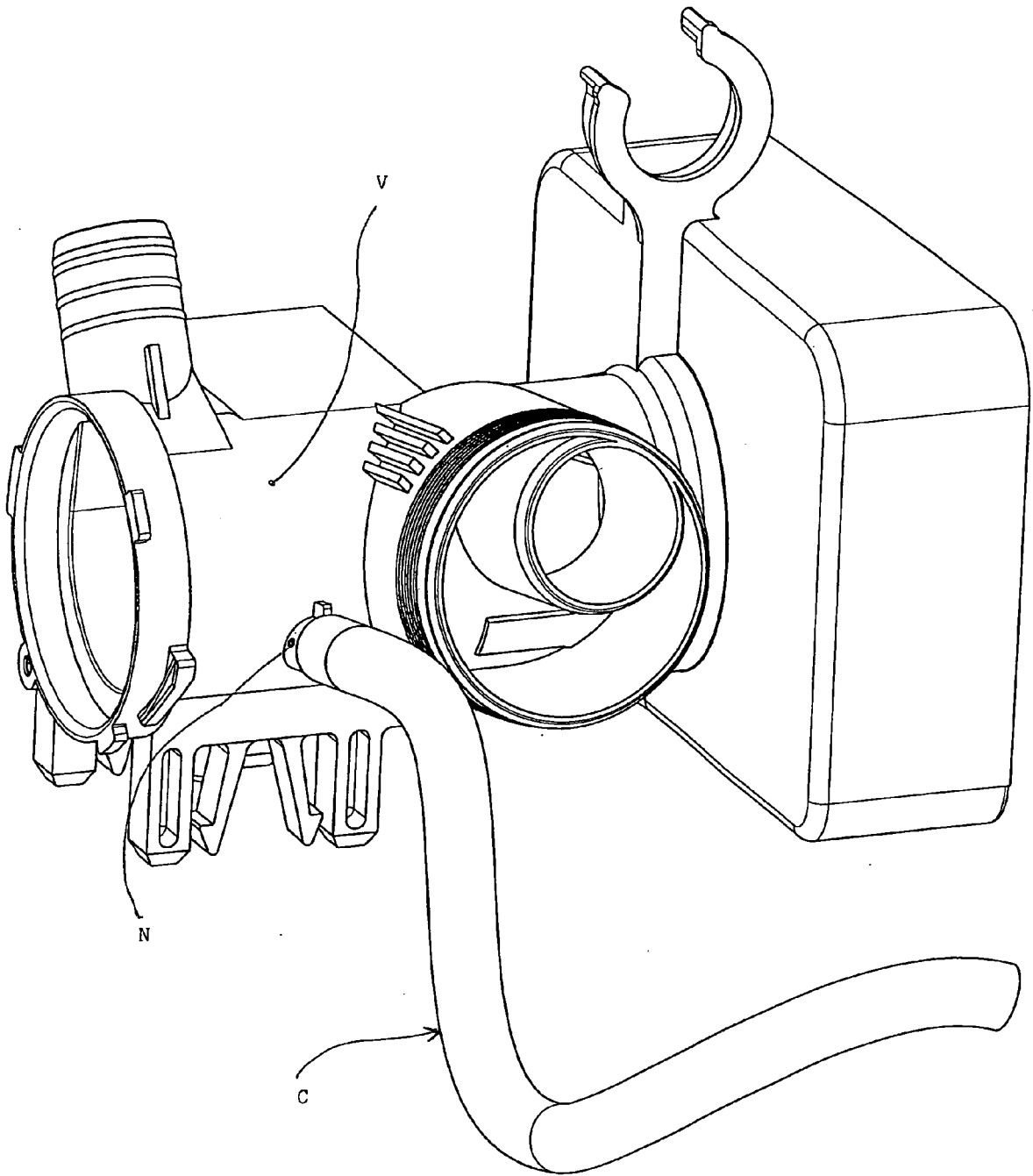


FIG. 1

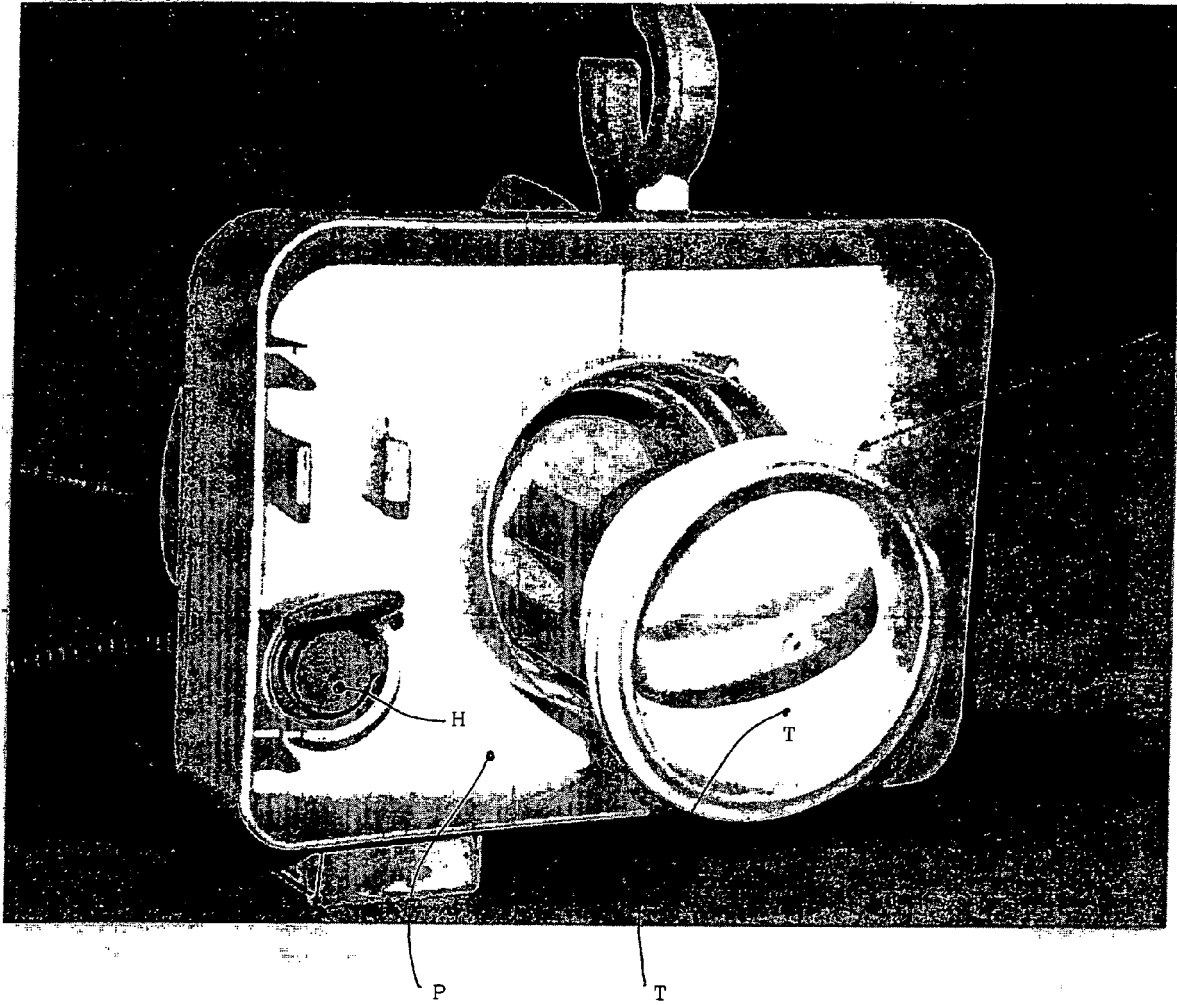


FIG. 2

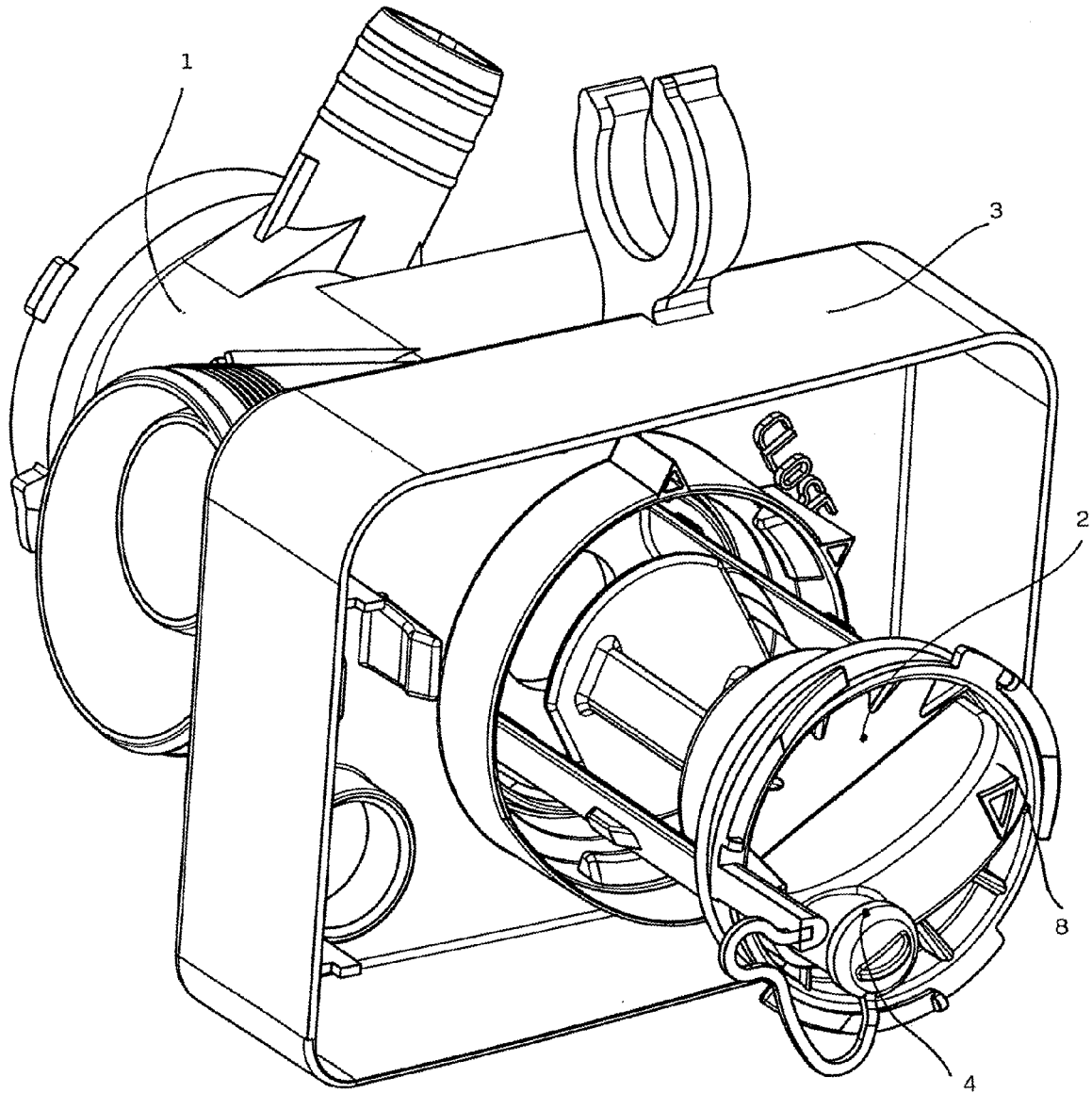


FIG. 3

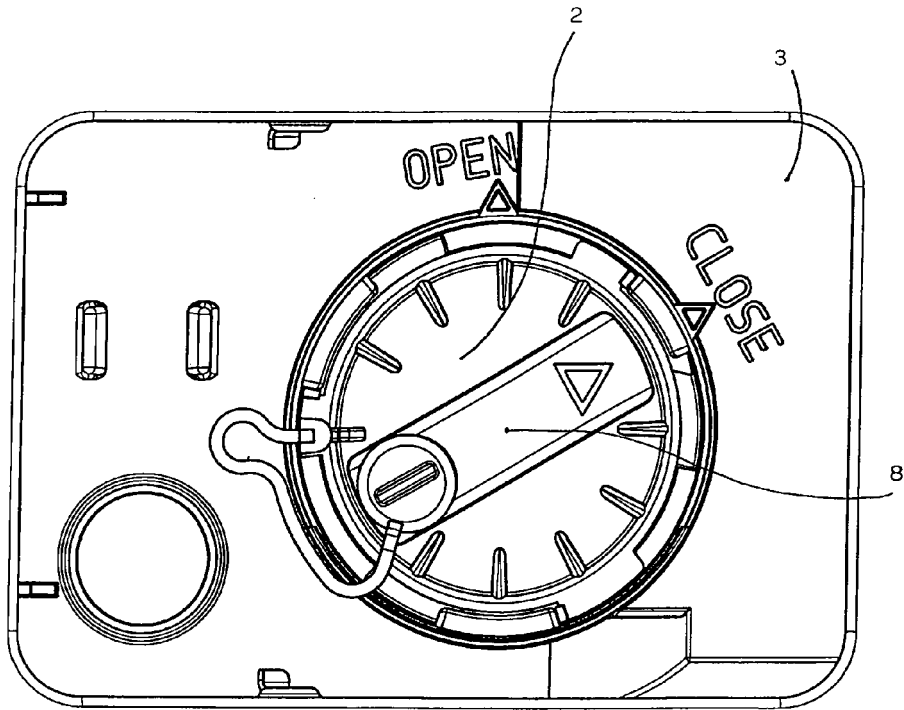


FIG. 4

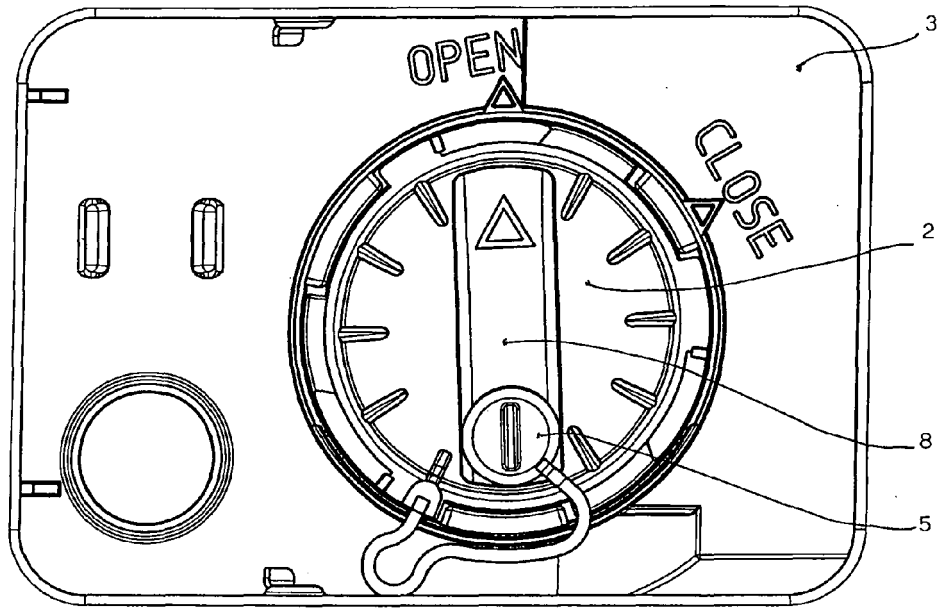


FIG. 5A

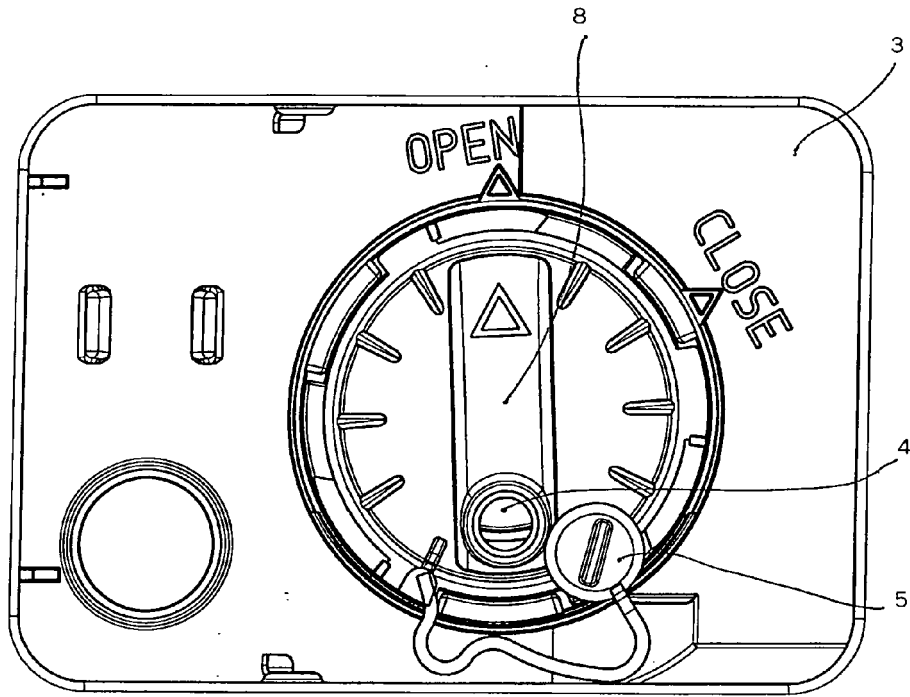


FIG. 5B

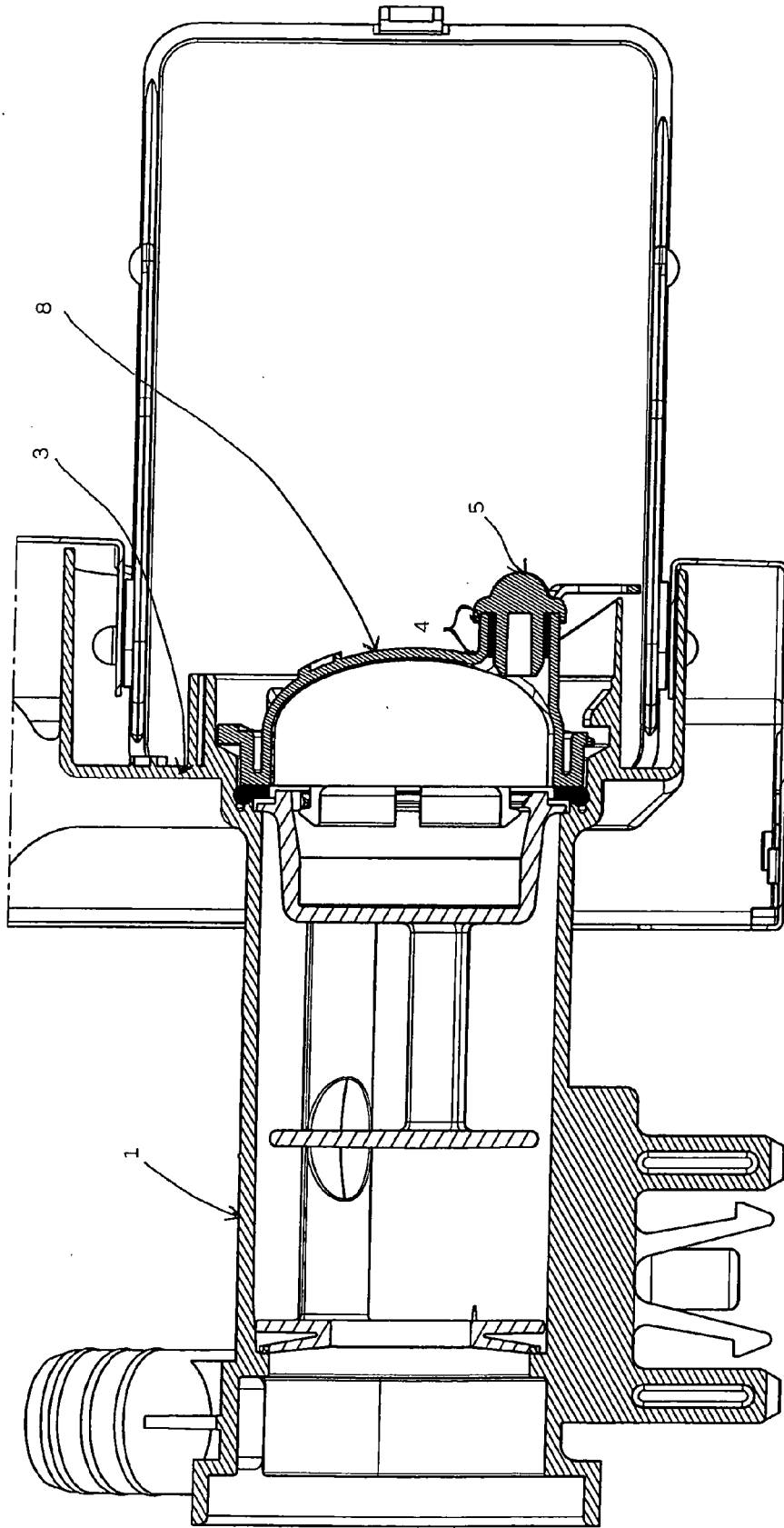


FIG. 6

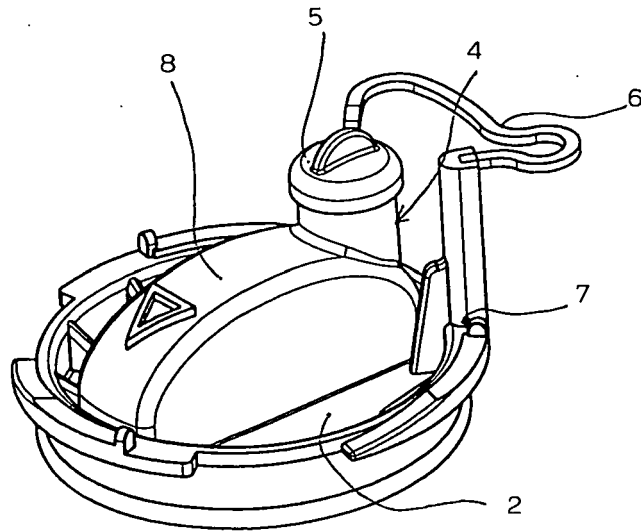


FIG. 7

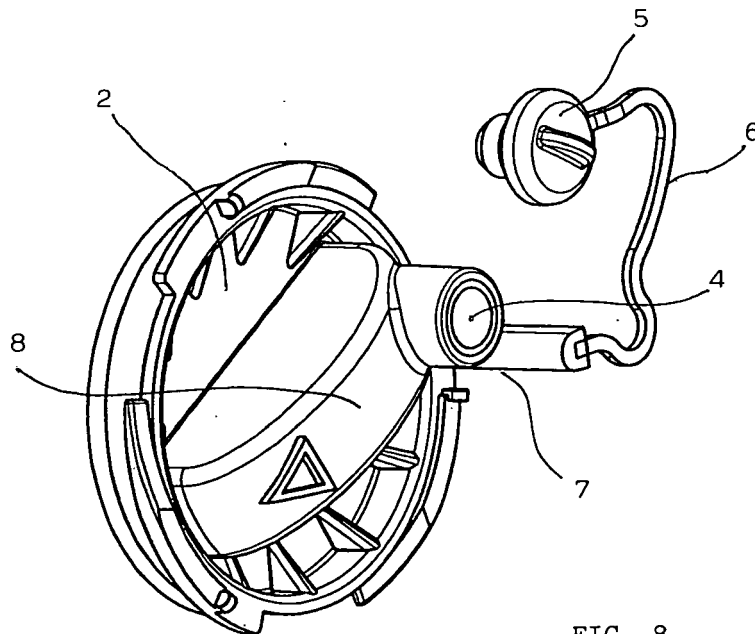


FIG. 8



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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* the whole document *	5	
X	DE 36 20 566 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 23 December 1987 (1987-12-23)	1	
Y	* the whole document *	5	
X	US 2 651 190 A (HORVATH JOHN F) 8 September 1953 (1953-09-08)	1,4	TECHNICAL FIELDS SEARCHED (IPC) D06F
Y	* column 12, line 59 - column 13, line 10; figures 2,10 *	5	
Y	WO 02/097184 A (ELECTROLUX HOME PROD CORP [BE]; ZANELLO FABIO [IT]; VALENT LUCIO [IT];) 5 December 2002 (2002-12-05)	5	
	* figure 1 *		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 October 2007	Examiner DIAZ, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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