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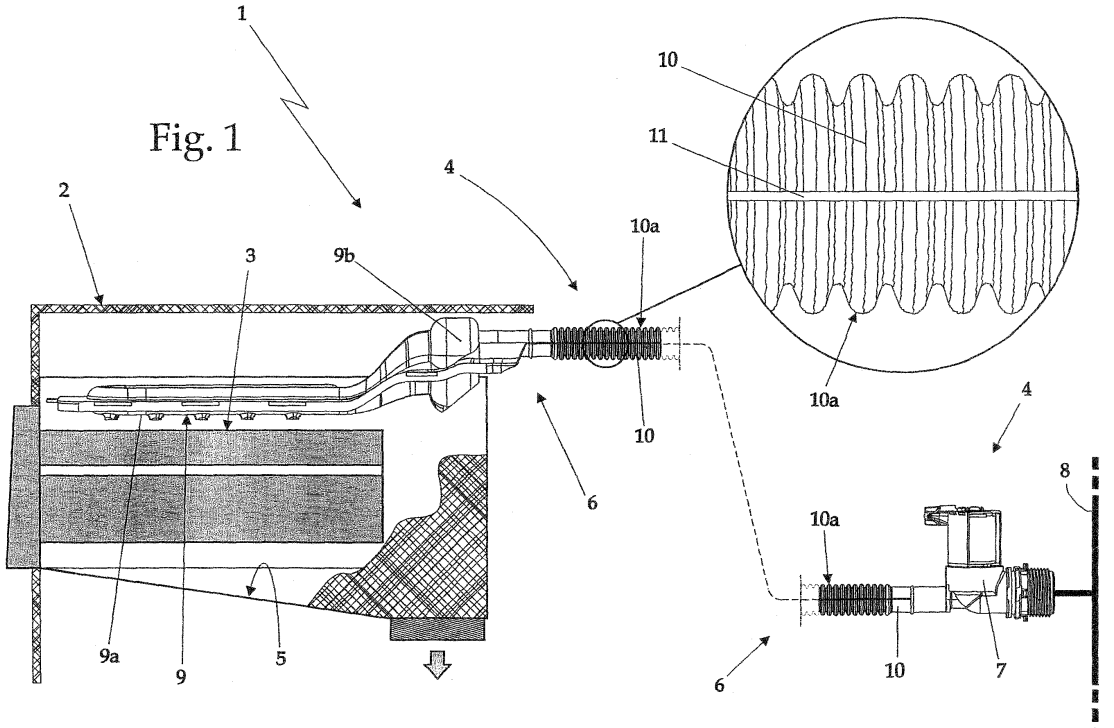
(54) **Home washing machine**

(57) A home washing machine (1) having a detergent container (3) and a detergent container flush circuit (4) which, on command, feeds water into the compartment of said detergent container (3) to flush the detergent or similar out of the compartment in controlled manner; the detergent container flush circuit (4) having a water supply pipe (6), which terminates directly over the detergent container (3) and has an end portion designed to sprinkle water into the compartment of the detergent container (3) underneath, and at least one valve (7) for regulating pressurized-water flow to the end portion of said water supply pipe (6) to sprinkle the compartment on command; the water supply pipe (6) being formed in one piece with a sprinkler head (9) and a connecting pipe (10), and having two longitudinal tabs (11) projecting on opposite sides of the connecting pipe (10), at least along the whole length of a flexible intermediate portion (10a) of said connecting pipe (10).

Fig. 1



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Description

[0001] The present invention relates to a home washing machine.

[0002] More specifically, the present invention relates to the water supply pipe of the detergent drawer flush circuit of a front-loaded home washing machine, to which the following description refers purely by way of example.

[0003] As is known, most front-loaded home washing machines have a detergent drawer at the front, which is normally divided into a number of compartments for wash detergent and/or softener; and a drawer flush circuit which, on command, selectively feeds a given amount of water into each drawer compartment to flush the detergent or softener out of the compartment in controlled manner and down into a catch tray located directly beneath the drawer and communicating with the wash tub of the machine.

[0004] In currently marketed washing machines, the detergent drawer flush circuit substantially comprises a water supply pipe, which terminates directly over the detergent drawer, and is designed at the end to selectively feed a dense shower of water droplets by gravity into the individual compartments of the detergent drawer underneath; and a number of electrically controlled on-off valves for regulating pressurized-water flow to the end of the water supply pipe, so as to selectively sprinkle each compartment in the drawer independently of the others.

[0005] More specifically, the water supply pipe comprises a sprinkler head located directly over the drawer and divided into a number of independent drip coils, each of which is located over a respective detergent drawer compartment and has a number of discharge nozzles for gravity feeding a dense shower of water droplets into the compartment underneath; and a number of connecting pipes, each for connecting the outlet of a respective on-off valve to the inlet of a corresponding drip coil of the sprinkler head.

[0006] Each on-off valve being connected directly to the water mains and therefore supplied with water at over 2-bar nominal pressure, each connecting pipe must be capable of safely withstanding pressure peaks (of a much as 8 bars) caused by clogging of the pipe at the sprinkler head inlet.

[0007] Conversely, because the sprinkler head drip coils only function correctly with water at ambient pressure, the sprinkler head has, at the inlet to each coil, a respective intermediate pressure-balancing chamber, through which the water from the connecting pipe flows, and which communicates directly with the outside to bring the water flowing into the drip coil to the same pressure as the surrounding air (i.e. to atmospheric pressure).

[0008] Unfortunately, being of widely differing shape, size and operating performance, the sprinkler head the connecting pipes are currently manufactured using two different blow molding methods, thus resulting in two separate plastic parts that must be fixed together when assembling the machine.

[0009] The sprinkler head, in fact, is hollow, made of rigid plastic material, operates at ambient pressure, and so need not be particularly resistant to water pressure; whereas the connecting pipes are tubular, made of plastic material with flexible parts, and must safely withstand pressure peaks of even three-four times nominal water mains pressure.

[0010] Because of the need to ensure good pressure resistance, in fact, manufacturers have so far been forced to produce the connecting pipes using special molds capable of accommodating and blow molding a cylindrical hose of plastic material of a much smaller nominal diameter and much thicker than those of the hose used to mold the sprinkler head.

[0011] It is an object of the present invention to reduce the manufacturing cost of the detergent drawer flush circuit, while at the same time also reducing the time taken to assemble it to the washing machine.

[0012] According to the present invention, there is provided a home washing machine as claimed in Claim 1 and preferably, though not necessarily, in any one of the dependent Claims.

[0013] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows schematically, with parts in section and parts removed for clarity, the top portion of a home washing machine in accordance with the teachings of the present invention;

Figure 2 shows an underside view of the detergent drawer flush circuit in Figure 1.

[0014] Number 1 in Figure 1 indicates as a whole a preferably, though not necessarily, front-loaded home washing machine, which substantially comprises a preferably, though not necessarily, parallelepiped-shaped casing 2; and a detergent drawer 3 housed removably inside a seat on the front face of casing 2, and having at least one compartment for a given amount of detergent and/or softener for use in the wash cycle.

[0015] Washing machine 1 also comprises a drawer flush circuit 4, which, on command, feeds a given amount of water into the compartment of detergent drawer 3 to flush the detergent or softener out of the compartment in controlled manner and down into a catch tray 5 located directly beneath detergent drawer 3 and communicating with the wash tub (not shown) of the machine.

[0016] More specifically, with reference to Figures 1 and 2, drawer flush circuit 4 comprises a water supply pipe 6, which terminates directly over detergent drawer 3, and is designed at the end to feed a dense shower of water droplets by gravity into the compartment of detergent drawer 3 underneath; and at least one electrically controlled on-off valve 7 interposed between water supply pipe 6 and the water mains 8 of the building in which the washing machine is installed, to regulate pressurized-

water flow to the end of water supply pipe 6, so as to sprinkle the compartment of detergent drawer 3 on command.

[0017] In the example shown, electrically controlled on-off valve 7 is a conventional controlled-open-close solenoid valve 7.

[0018] Water supply pipe 6 comprises a sprinkler head 9 located directly over detergent drawer 3, to substantially cover the compartment of detergent drawer 3, and designed to form internally a coil 9a, which is located over the compartment of detergent drawer 3 and has a number of discharge nozzles for gravity feeding a dense shower of water droplets into the compartment underneath; and a connecting pipe 10, which connects the outlet of on-off valve 7 to the inlet of coil 9a of sprinkler head 9, and has at least one highly flexible corrugated portion 10a.

[0019] With reference to Figures 1 and 2, sprinkler head 9 also comprises, at the inlet to coil 9a, a pressure-balancing chamber or cavity 9b, through which the water from connecting pipe 10 flows, and which communicates directly with the outside to bring the incoming water into coil 9a rapidly to the same pressure as the surrounding air (i.e. to atmospheric pressure).

[0020] Unlike known washing machines, however, water supply pipe 6 is defined by a single blow-molded hollow part made of plastic material, and in which sprinkler head 9 and connecting pipe 10 are formed simultaneously, and the portion of supply pipe 6 corresponding to connecting pipe 10 also has two projecting longitudinal tabs 11, which project from opposite sides of connecting pipe 10, preferably, though not necessarily, along the whole length of the connecting pipe, or at least along the whole length of corrugated portion 10a of the connecting pipe, and are of a nominal width of over 2 millimetres.

[0021] In other words, coil 9a, pressure-balancing cavity 9b, and connecting pipe 10 for connection to on-off valve 7 are formed in one piece from a single hose of plastic material by a blow molding process which also simultaneously forms two longitudinal tabs 11 of over 2 millimetres in width along at least the two opposite sides of corrugated portion 10a of connecting pipe 10.

[0022] In the example shown, the two projecting longitudinal tabs 11 project from the sides of connecting pipe 10 along the whole length of connecting pipe 10, and are of a nominal width of over 3 millimetres.

[0023] Operation of washing machine 1 will be clear from the above description, with no further explanation required.

[0024] As regards drawer flush circuit 4 and, more specifically, water supply pipe 6, on the other hand, tests show that the two longitudinal tabs 11, of over 2 mm in width, on the portion of supply pipe 6 forming connecting pipe 10, or at least the corrugated portion 10a of connecting pipe 10, provide for firmly sticking the portions of the plastic hose not required to form connecting pipe 10, thus ensuring sufficient pressure resistance to withstand any pressure peaks caused by clogging of connecting pipe 10 immediately upstream from pressure-balancing cavity 9b.

[0025] The advantages of a one-piece water supply pipe 6 are obvious : drawer flush circuit 4 is cheaper to produce and faster to install on the washing machine, thus greatly reducing the manufacturing cost of washing machine 1.

[0026] Clearly, changes may be made to washing machine 1 and drawer flush circuit 4 without, however, departing from the scope of the present invention.

[0027] For example, detergent drawer 3 may be divided into a number of compartments for detergent and/or softener for use in the wash cycle, and drawer flush circuit 4 feeds water selectively and independently into each drawer compartment to flush the detergent or similar out of the compartment in controlled manner.

[0028] In which case, sprinkler head 9 of pipe 6 comprises a number of coils 9a, each of which is located over a respective compartment of detergent drawer 3, and has a number of nozzles for gravity feeding a dense shower of water droplets into the compartment underneath; and drawer flush circuit 4 comprises a number of on-off valves 7, each for regulating pressurized-water flow to a respective coil 9a of sprinkler head 9.

[0029] More specifically, in this variation, water supply pipe 6 comprises a number of connecting pipes 10, each connecting the outlet of a respective on-off valve 7 to the inlet of a corresponding coil 9a of sprinkler head 9.

[0030] Obviously, in this case, too, the connecting pipes 10 are formed in one piece with sprinkler head 9, and have two projecting longitudinal tabs 11, of over 2 millimetres nominal width, on either side; and sprinkler 9 has a respective pressure-balancing chamber or cavity 9b at the inlet of each coil 9a.

Claims

1. A home washing machine (1) comprising an open-topped detergent container (3) having at least one compartment for detergent or similar for use in the wash cycle; and a container flush circuit (4) which, on command, feeds water into the compartment of said detergent container (3) to flush the detergent or similar out of the compartment in controlled manner; the container flush circuit (4) comprising a water supply pipe (6), which terminates directly over said detergent container (3) and has an end portion designed to sprinkle water into the compartment of the detergent container (3) underneath, and at least one controlled-open-close on-off valve (7) for regulating pressurized-water flow to the end portion of said water supply pipe (6) to sprinkle said compartment on command; the water supply pipe (6) comprising a sprinkler head (9) located directly over the detergent container (3) and designed to sprinkle water into the compartment of the detergent container (3) underneath, and a connecting pipe (10) having at least

one flexible intermediate corrugated portion (10a), and connecting said on-off valve (7) to said sprinkler head (9); the home washing machine (1) being **characterized in that** the water supply pipe (6) is formed in one piece with said sprinkler head (9) and said connecting pipe (10), and comprises two longitudinal tabs (11) projecting on opposite sides of the connecting pipe (10), at least along the whole length of the flexible intermediate portion (10a) of the connecting pipe.

2. A washing machine as claimed in Claim 1, **characterized in that** said water supply pipe (6) is made of plastic material and blow molded in one piece.

3. A washing machine as claimed in Claim 1 or 2, **characterized in that** said sprinkler head (9) is designed to form at least one coil (9a) located over said at least one compartment of the detergent container (3) and having a number of nozzles for gravity sprinkling water into the compartment underneath; and at least one pressure-balancing chamber (9b), which is interposed between the coil (9a) and the connecting pipe (10), is fed through with the water from said connecting pipe (10), and communicates directly with the outside to bring the pressure of the incoming water to said coil (9a) rapidly to the same pressure as the surrounding air.

4. A washing machine as claimed in any one of the foregoing Claims, **characterized in that** said longitudinal tabs (11) are of a nominal width of over 2 millimetres.

5. A washing machine as claimed in any one of the foregoing Claims, **characterized in that** said detergent container (3) comprises a number of compartments for detergent or similar for use in the wash cycle; and said container flush circuit (4) feeds water, on command, into each compartment of said detergent container (3) selectively and independently of the others.

6. A washing machine as claimed in Claim 5, **characterized in that** said sprinkler head (9) is divided into a number of independent coils (9a), each located over a respective compartment of said detergent container (3), and having a number of nozzles for gravity sprinkling water into the compartment underneath; and said container flush circuit (4) comprises a number of controlled-open-close on-off valves (7), each for regulating pressurized-water flow to a respective coil (9a) of the sprinkler head (9), to sprinkle the respective compartment on command.

7. A washing machine as claimed in any one of the foregoing Claims, **characterized in that** said detergent container (3) is a detergent drawer (3) housed removably in a seat formed in the casing (2) of said washing machine (1).

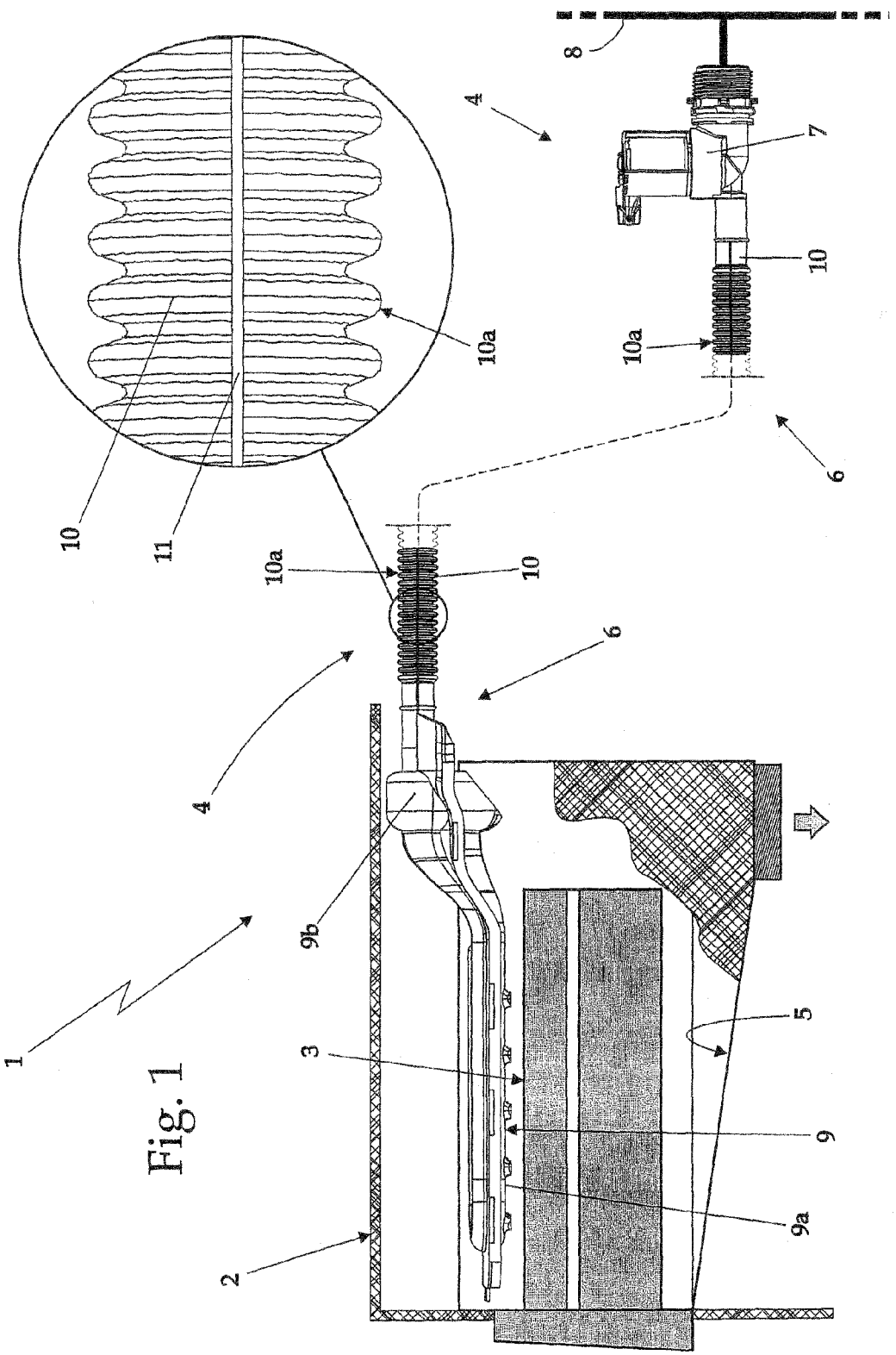

Fig. 1

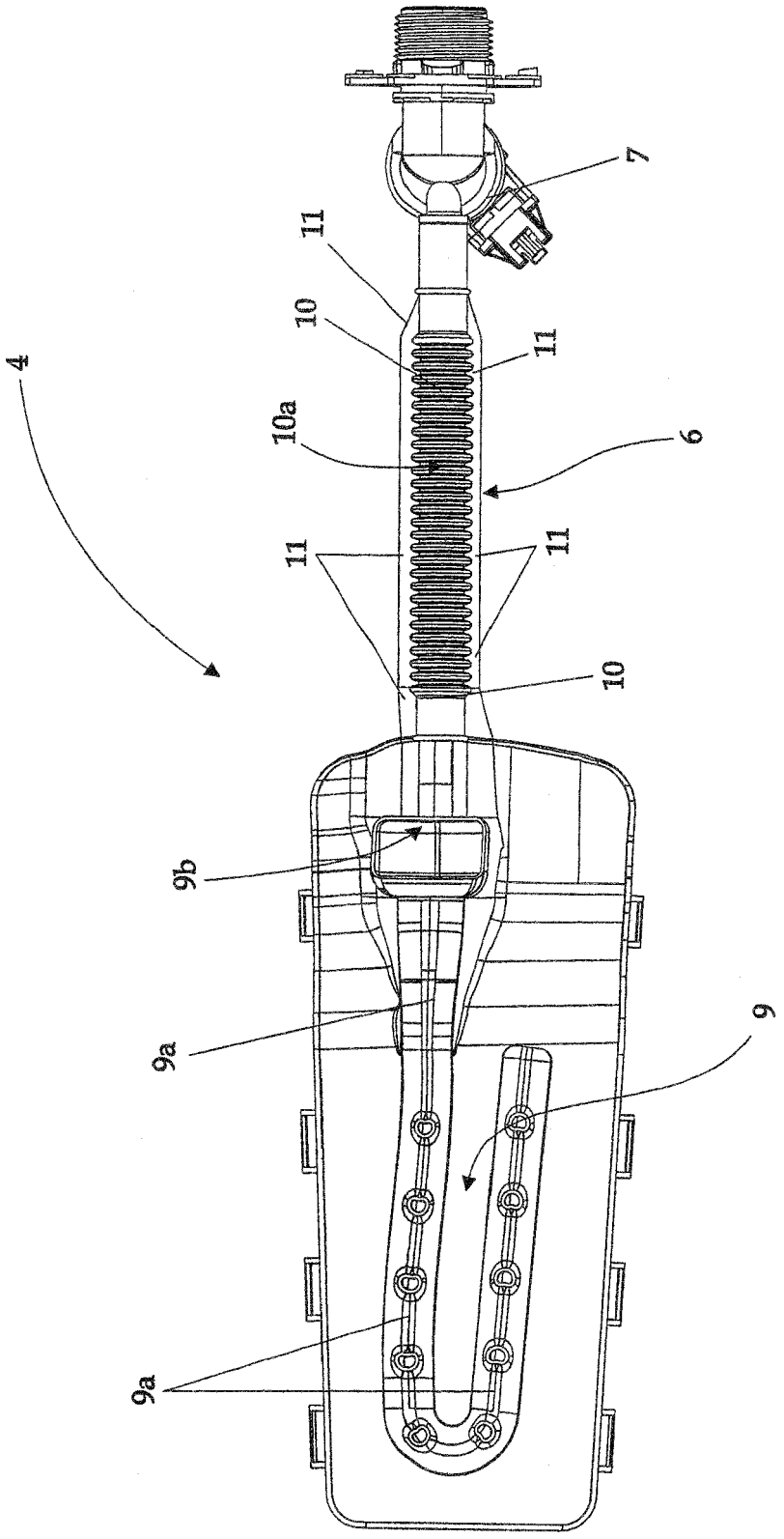

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 0399

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 16 10 147 A1 (SIEMENS ELEKTROGERAETE GMBH) 19 November 1970 (1970-11-19) page 1, lines 1-10; page 2, line 26 - page 4, last line; figure	1-7	INV. D06F39/02
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TECHNICAL FIELDS SEARCHED (IPC)

D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 July 2008	Clivio, Eugenio

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 15 0399

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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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82