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(74) Representative: **Vossius & Partner**
Siebertstrasse 4
81675 München (DE)

ing water drained through the siphon brake hole during the draining process, as one end of the backflow hose is connected to the siphon brake hole and the other end is directly/indirectly connected to the tub; and a switching element (403) preventing the washing water back-flowed into the backflow hose from being flowed into the tub.



Description

[0001] Generally, a washing machine is an apparatus for removing contaminants from laundry by using an emulsification function of detergent and a current caused by rotation of a pulsator or a drum in a state that the laundry is received in the pulsator or the drum together with washing water and detergent.

[0002] In recent years, a drum washing machine, in which the laundry and the washing water are collided by lifting and dropping the laundry as a side of a drum is horizontally installed, acquires popularity. This drum washing machine is in the limelight among users, since it causes damage to the laundry as little as possible while providing excellent washing effects.

[0003] A conventional drum washing machine includes a drum in which a laundry is received, a tub arranged in the drum to store washing water containing detergent, a driving motor driving the drum and a case forming a main body profile of the drum washing machine.

[0004] Hereinafter, the operation of the conventional drum washing machine will be explained.

[0005] First, once the washing machine is operated after the user puts the laundry into the drum, a washing process is performed as the laundry received in the drum and the washing water stored in the tub are collided by the rotation of the drum. And, after completing the washing process, a dehydrating process for removing the washing water or rinsing water from the laundry is performed as the drum is rotated at a high speed and a draining process is performed at the same time. After completing the dehydrating process, the user may take out the laundry to dry it or a drying process is further performed.

[0006] Meanwhile, according to the conventional drum washing machine, a siphon brake hole is formed on one side of a drain hose to prevent a siphon phenomenon after finishing the draining process.

[0007] In other words, the siphon brake hole is formed to prevent the siphon phenomenon which naturally drains the washing water even though the drain pump is temporarily deactivated when the drain hose is disposed at a lower position than a drain pump. Further, the washing water, which backflows via the siphon brake hole, flows into a dispenser along a backflow hose.

[0008] It is the object of the present invention to provide an improved washing machine.

[0009] This object is attained with the subject-matter of the claims.

[0010] The present embodiment has been made to preferably solve the above problems, and it is a preferred advantage of the present embodiment to provide a washing machine designed to prevent washing water from being reflowed into a drum by blocking the washing water drained through a siphon brake hole from being flowed into a dispenser during the draining process. That is, an object of the present embodiment to provide a washing machine structure capable of obviating the problem in

that a dehydrating effect is reduced as the washing water drained through the siphon brake hole is reflowed into the drum.

[0011] In accordance with one aspect of the present embodiment, the above and other advantages can be preferably accomplished by the provision of a washing machine. The washing machine includes a tub; a drain hose discharging washing water stored in the tub to outside, in which a siphon brake hole is formed at one side of the drain hose; a backflow hose guiding the washing water drained through the siphon brake hole during the draining process, as one end of the backflow hose is connected to the siphon brake hole and the other end is directly/indirectly connected to the tub; and a switching element preventing the washing water back-flowed into the backflow hose from being flowed into the tub.

[0012] In another aspect of the present embodiment, there is provided a washing machine. The washing machine includes a tub; a drum received in the tub; a dispenser connecting the tub and a water supply hose, in which detergent is provided; a drain pump draining washing water stored in the tub; a drain hose extended from the drain pump and provided with a siphon brake hole formed at its one side; a backflow hose extended from the siphon brake hole to the dispenser; and a switching element provided in an inner side of the backflow hose to open/close the hose depending on specific conditions.

Fig. 1 is an external perspective view showing a drum washing machine according to a preferred embodiment of the present invention.

Fig. 2 is a side cross-sectional view showing a drum washing machine according to a preferred embodiment of the present invention.

Fig. 3 is a system diagram showing a siphon brake device according to a preferred embodiment of the present invention.

[0013] Hereinafter, the present invention will be explained in detail with reference to accompanying drawings. However, the present invention is not limited to the following examples, but various variations and modifications may be made without departing from the scope of the present invention by adding, alternating and deleting another constituent.

[0014] Hereinafter, the present invention will be described with a drum washing machine by way of example to explain an idea of the present invention. However, the idea of the present invention is not limited to the drum washing machine, but it embraces all kinds of washing machines including an upright washing machine.

[0015] Figure 1 shows an external profile of a drum washing machine according to a preferred embodiment of the present invention and Figure 2 shows a side of a drum washing machine according to a preferred embodiment of the present invention.

[0016] Referring to Figs. 1 and 2, the drum washing machine 10 according to a preferred embodiment of the

present invention includes a case 100 forming external profile of the washing machine; a tub 300 installed inside the case 110 to store washing water and a front of the tub is opened; a drum 210 rotatably received inside the tub and a front of the drum is opened to put the laundry therein; a front cover 140 mounted on the front of the case 110 and provided with a laundry input opening 101; and a door 100 rotatably connected to one side of the front cover 140 to selectively open/close the laundry input opening 101.

[0017] In addition, the drum washing machine 10 further includes a driving motor 170 connected to the drum 210 through a driving shaft 171 in order to forcibly rotate the drum 210; a control panel 130 mounted on one side of the upper portion of the front cover 140 and provided with a plurality of buttons 131 to input operating condition of the washing machine; a dispenser 120 disposed at a side of the control panel 130 and drawably installed in the case 110, and through which detergent and fabric softener are supplied; and a water supply valve 191 controlling the flow of washing water into the dispenser 120.

[0018] In addition, the drum washing machine 10 further includes a water supply pipe 192 connecting the water supply valve 191 with the dispenser 120 and transporting washing water, which is fed from the outside as the water supply valve 191 is opened, to the dispenser 120; and a bellows 121 connecting the dispenser 120 with the tub 300 and providing a water course which runs into the tub 300 with washing water and detergent are mixed together.

[0019] In addition, the drum washing machine 10 further includes a damper 160 mounted on the lower portion of the tub 300 and damping the vibration generated as the drum 210 rotates; a drain pipe 180 connected to a bottom of the tub 300 in order to drain washing water stored in the tub 300; a drain pump 181 connected to the drain pipe 180 in order to forcibly drain washing water discharged from the drain pipe 180; and a drain hose 182 providing a water course which discharges washing water discharged from the drain pump 181 to the outside.

[0020] Further, a siphon brake device 400 is provided between the drain hose 182 and the dispenser 120, and further explanation of the siphon brake device 400 will be described later.

[0021] In addition, the drum washing machine 10 further includes a drying fan 150 supplying outdoor air into the drum 210 during the drying process; a drying duct 153 connecting the drying fan 150 with the drum 210; a heater 151 heating the sucked outdoor air; a connecting pipe 202 discharging the high-temperature high-moisture air imbibed moisture from the inside of the drum 210 to the outside; and an exhaust duct 200 connected to the connecting pipe 202 and mounted on a side of the case 100.

[0022] Hereinafter, the operation of the drum washing machine with the above mentioned constituents will be explained.

[0023] First, the user opens the door 100 and puts the

laundry into the drum 210. And, the user pushes a start button after inputting the operating condition through the buttons 131 provided in the control panel 130.

[0024] And then, the water supply valve is opened and therefore the washing water supplied through the water supply pipe 192 from the outside flows into the dispenser 120. And, the washing water flowed into the dispenser 120 is mixed with the detergent stored inside the dispenser 120. And, the washing water mixed with the detergent flows into the tub 300 through the bellows 121. the washing water continues to flow therein until a predetermined level is reached.

[0025] And, the water supply valve 191 is closed and the driving motor 170 starts to run when the washing water, which is to be flowed into the tub 300, reaches the predetermined level. And, the drum 210 is rotated by the driving shaft 171 which rotates as the driving motor 170 rotates. The laundry inputted into the drum 210 collides with the washing water, since the laundry is lifted to the highest point and fallen as the drum 210 rotates. And, the contaminants stuck into the laundry are removed by the emulsification function of the washing water containing the detergent while colliding the washing water and the laundry.

[0026] And, the draining process is started when the washing process is finished. In other words, the washing water contaminated during the washing process goes to the drain pump 181 through the drain pipe 180. And, the washing water moved to the drain pump 181 is discharged out of the washing machine 10 via the drain hose 182 by driving the drain pump 181.

[0027] And, when the rinsing process starts after finishing the drain process, the water supply valve 191 is opened and therefore clean washing water flows into the drum 210 through the water supply pipe 192, and thus, the rinsing process is progressed.

[0028] And, when the rinsing process is completed, the dehydrating process which is to dehydrate water soaked into the laundry by rotating the drum 210 at high speed is progressed. Here, the water generated from the dehydrating process is drained by operating the drain pump, and the siphon brake device prevents some of the drained water from being reflowed into the drum. The siphon brake device will be described later.

[0029] After that, electricity is applied to the heater 151 and therefore the air is heated to a high temperature when the drying process begins. And, the high-temperature low-moisture air is flowed into the tub 300 by rotating the drying fan 150, and thus, the laundry in the tub 300 is dehydrated by the inflow dry air. And, the air, which is turned into the low-temperature high-moisture air as the laundry is dehydrated, is discharged out of the drum washing machine 10 through the exhaust duct 200.

[0030] Figure 3 shows a system diagram of a siphon brake device according to a preferred embodiment of the present invention.

[0031] Referring to Fig. 3, the siphon brake device 400 includes a siphon brake hole 402; a backflow hose 401

connecting the siphon brake hole 402 with a backflow hole 122 formed in the dispenser 120; and a switching element 403 opening/closing the backflow hole 122.

[0032] Particularly, one side of the dispenser 120 is connected to the water supply pipe 192, detergent and fabric softener are stored in the dispenser to mix them with washing water flowed into the dispenser through the water supply pipe 192. The washing water mixed with the detergent is flowed into the tub 300 through the bellows 121.

[0033] The lower portion of the tub 300 is connected to the drain pipe 180, and the drain pipe 180 is connected to one side of the drain pump 181. And, the other side of the drain pump 181 is connected to the drain hose 182 to drain the washing water, which is discharged from the drain pump 181, out of the drum washing machine 10.

[0034] Meanwhile, a siphon brake hole 402 is formed in one side of the drain hose 182 to prevent a siphon phenomenon by inflowing air into the drain hose 182. The siphon phenomenon, which drains washing water inside the tub 300 out of the drum washing machine 10 when the drain pump is stopped for a while, is prevented because air is flowed into the siphon brake hole 402.

[0035] And, the siphon brake hole 402 and the backflow hole 122 of the dispenser 120 are connected to each other by the backflow hose 401.

[0036] And, a switching element 403 for selectively opening/closing the backflow hole 122 is formed in one side of the backflow hole 122. Particularly, the switching element 403 is closed by the high pressure washing water which is generated when the drain pump 181 operates. On the contrary, the switching element 403 is opened in case that the low pressure washing water is generated as the drain pump 181 is stopped. In other words, the switching element 403 is closed at a predetermined hydraulic pressure and more, and it is opened at a predetermined hydraulic pressure and less.

[0037] This switching element 403 closes the backflow hole 122 when the drum washing machine 10 conducts the draining process, as it is operated by the high pressure washing water generated by the drain pump 181. Therefore, it prevents the washing water drained out of the siphon brake hole 402 from being flowed into the dispenser 120. Accordingly, the drainage performance of the drum washing machine 10 is improved.

[0038] Here, the position of the switching element 403 is not restricted to one side of the backflow hole 121 in the dispenser 120, but the switching element 403 may be formed in any selected point of the backflow hose 401 in order to selectively open/close the backflow hose 401. Further, a check valve or an electromagnetic valve may be used as a switching element 403.

[0039] Hereinafter, the operation of the siphon brake device 400 will be explained.

[0040] First, the washing water stored in the tub 300 is flowed into the drain pump 181 through the drain pipe 180 when the drum washing machine 10 begins the draining process. After that, the washing water runs through

the drain hose 182 as the drain pump 181 operates.

[0041] And, some of the washing water is flowed into the siphon brake hole 402 formed in the drain hose 403. The drained washing water moves toward the dispenser 120 through the backflow hose 401.

[0042] At this time, the switching element 403 is operated by the high pressure washing water caused by the drain pump 181, and thus, it closes the backflow hole 122. Therefore, it prevents the washing water from being flowed into the dispenser 120. Accordingly, the re-entry of the washing water toward the dispenser 120 is prevented, and the re-entry of the washing water drained through the drain hose 182 toward the tub 300 is prevented.

Claims

1. A washing machine having a tub, a drum installed inside the tub and accommodating laundry therein, and a driving motor driving the drum, comprising:

a drain hose discharging washing water stored in the tub to outside, in which a siphon brake hole is formed at one side of the drain hose; a backflow hose guiding the washing water drained through the siphon brake hole during the draining process, as one end of the backflow hose is connected to the siphon brake hole and the other end is directly/indirectly connected to the tub; and a switching element preventing the washing water back-flowed into the backflow hose from being flowed into the tub.

2. The washing machine according to claim 1, further comprising:

a dispenser in which at least a detergent is stored,

wherein the other end of the backflow hose is connected to the dispenser.

3. The washing machine according to claim 1 or 2, wherein the switching element is provided in a connecting region between the backflow hose and the dispenser.

4. The washing machine according to any one of the preceding claims, wherein the switching element comprises a check valve or an electromagnetic valve.

5. The washing machine according to claim 1, wherein the switching element is closed when the pressure of the washing water is higher than a predetermined hydraulic pressure, and the switching element is

opened when the pressure of the washing water is lower than the predetermined hydraulic pressure.

6. The washing machine according to any one of the preceding claims, wherein the switching element is closed during a dehydrating process. 5
7. The washing machine according to any one of the preceding claims, wherein the switching element is provided adjacently to the dispenser. 10
8. The washing machine according to any one of the preceding claims, wherein the switching element is closed while the drain pump operates, and it is opened while the drain pump is in abeyance. 15

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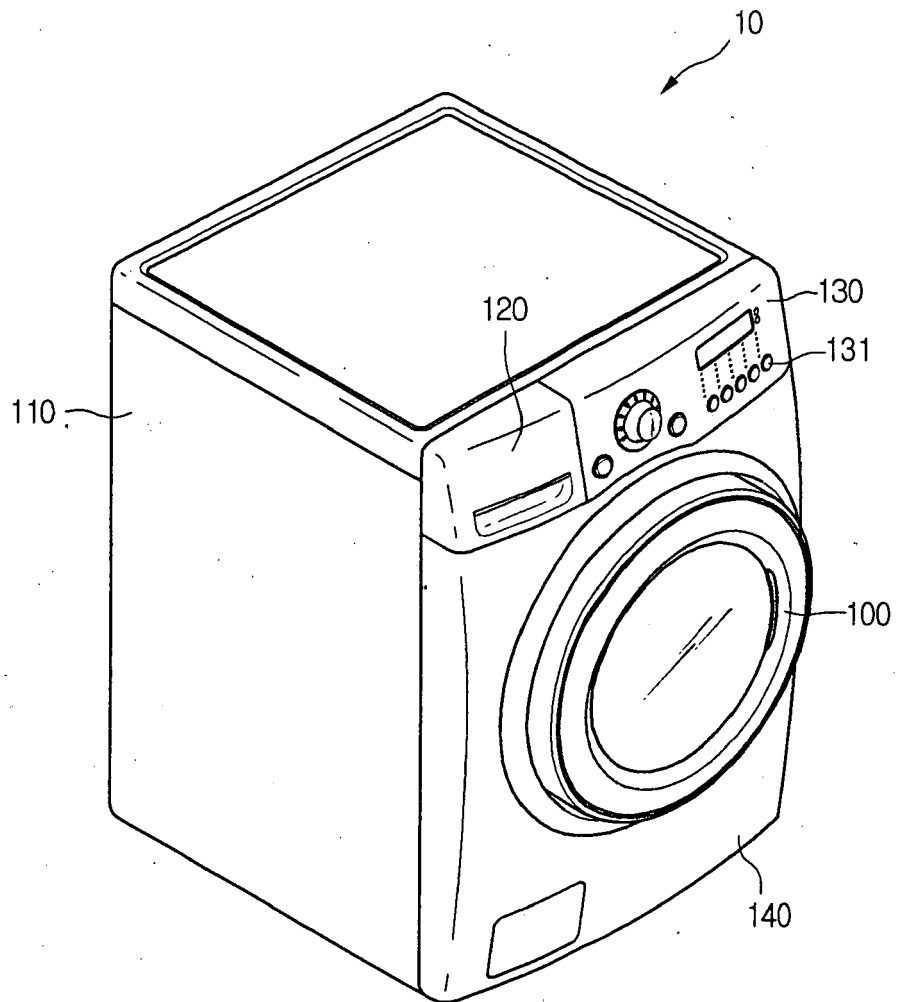


FIG. 1

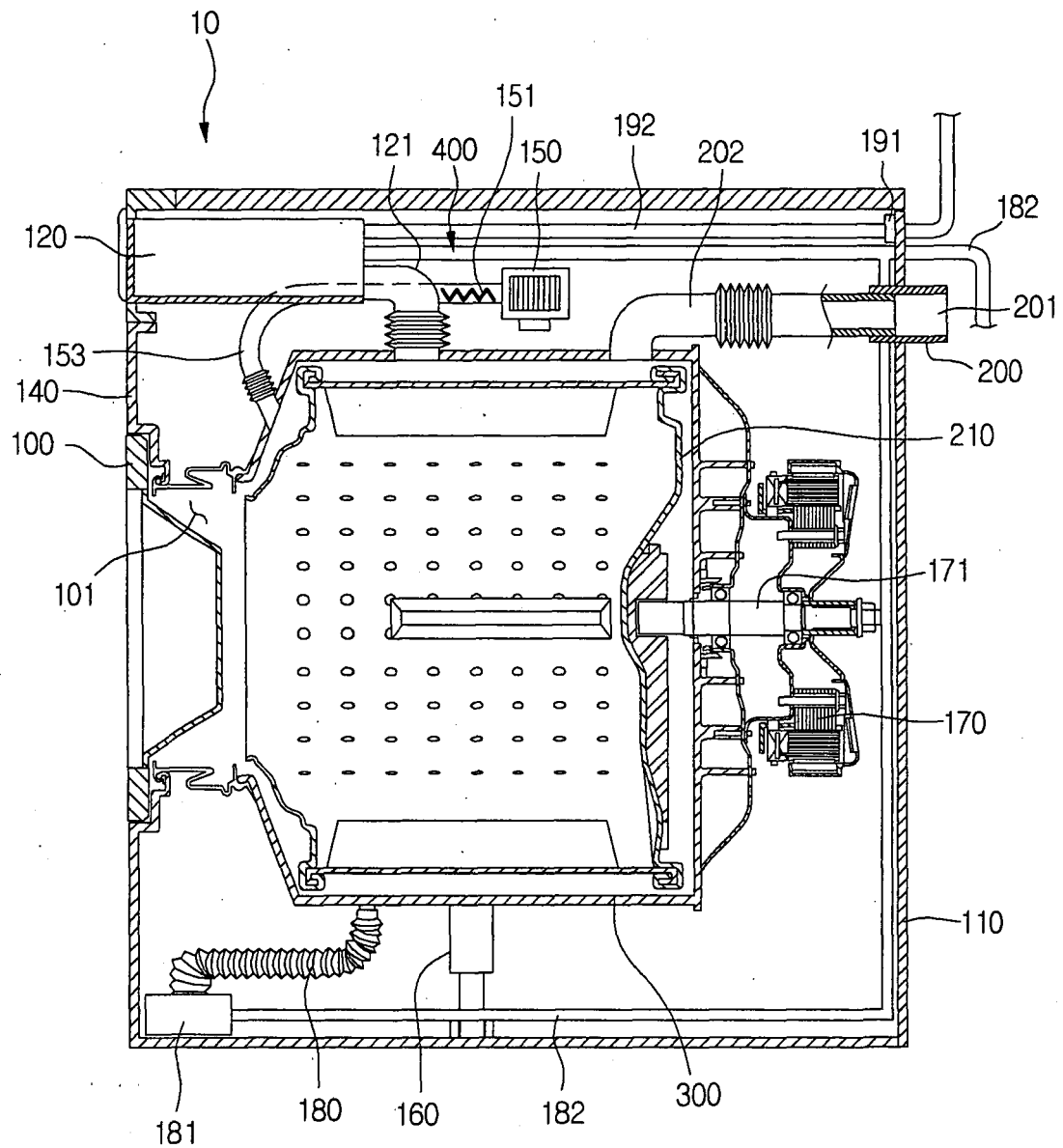


FIG. 2

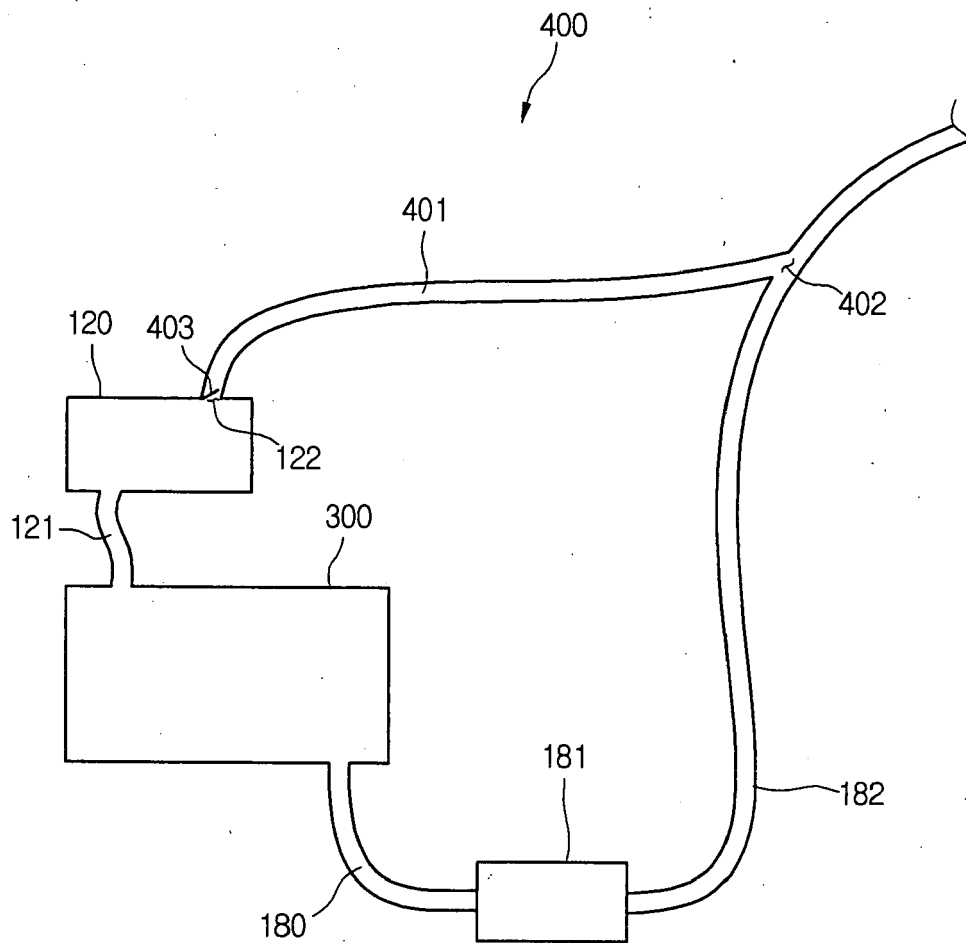


FIG.3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 01 9468

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 November 2007	Examiner Lodato, Alessandra
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.92 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 01 9468

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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