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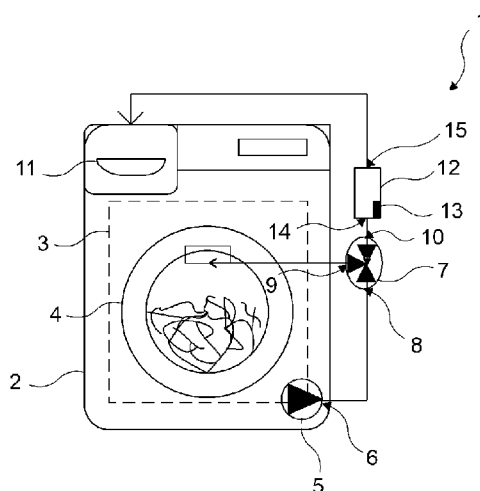
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(54) Title: A WASHER/DRYER COMPRISING A DIVERTER VALVE

Figure 1



(57) Abstract: The present invention relates to a washer/dryer (1) comprising a body (2); a tub (3) which is disposed into the body (2); a drum (4) which is disposed in the tub (3), which rotates around its own axis and wherein the laundry is placed; a detergent dispenser (11) which is disposed into the body (2) and wherein cleaning agents are loaded; a pump (5) which is fixed to the body (2); a diverter valve (7) which has an inlet (8) connected to the pump outlet (6), a first outlet (9) for spraying water into the drum (4) and a second outlet (10) for delivering water into the detergent dispenser.



Description**A WASHER/DRYER COMPRISING A DIVERTER VALVE**

- [0001] The present invention relates to a washer/dryer wherein the open or closed position of the diverter valve is determined.
- [0002] Especially in laundry washing machines, the detergent dispensers which are continuously used by the user get dirty and adversely affect sensory perception for a number of reasons. The dirt in the detergent dispenser can be caused by textile particles formed during the washing and/or drying of the laundry, or caused by the detergent and softener loaded before each washing process remaining on the dispenser surface. Due to the detergent and softener residues remaining on the humid dispenser surface, visible and bacterial formations occur on the dispenser surface, which adversely affects the perception and health. Moreover in the dryers, the detergent residues on the dispenser surfaces get dry and must be cleaned by the user before each drying process.
- [0003] One of the cleaning methods includes the guiding of the water preheated in the washer/dryer back into the detergent dispenser. The water is guided into the detergent dispenser by the diverter valve. The water flow from the pump outlet is divided into two by means of the diverter valve. The diverter valve delivers the water to the jet nozzle group or detergent cleaning group. With the use of the diverter valve, the water is guided to two different directions. When the diverter valve is open, the water is delivered into the detergent dispenser, and when closed, the water is discharged. As the water may continuously change direction, the diverter valve continuously moves. This movement causes problems of noise and leakproofing. Moreover, in order to prevent fabric fibers from being delivered into the detergent dispenser, it is required to determine whether the diverter valve is active or not.
- [0004] The diverter valve operates thanks to a thermoactuator therein. The shutter in the diverter valve enables the water to be guided to different outlets. When not energized, only one outlet of the diverter valve is open and when energized the other outlet is opened. The problem in these embodiments is that when the diverter valve is energized, the outlet

direction is not changed and/or when not energized the shutter does not return to its previous position. In such conditions, safety problems may arise. Therefore, it is very critical to determine whether the diverter valve is open or closed and at which position.

- [0005] In the state of the art European Patent Application No. EP3366827, a laundry washing machine is disclosed, comprising a diverter valve fixed onto the side wall of the body.
- [0006] Another state of the art embodiment is disclosed in the Korean Patent Application No. KR20130025672. In this embodiment, the laundry washing machine comprises a detergent dispenser which can be easily cleaned and which is composed of a plurality of detachable containers.
- [0007] Another state of the art embodiment is disclosed in the International Patent Application No. WO2017025117. In this embodiment, the diverter valve is mounted onto the side of the body of the washer/dryer.
- [0008] In another state of the art European Patent Application No. EP1197593, a washer/dryer is disclosed, comprising a control method for controlling the diverter valve fixed onto the body.
- [0009] The aim of the present invention is the realization of a washer/dryer wherein it is determined whether the diverter valve is open or closed.
- [0010] The washer/dryer realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises at least one tank disposed at the outlet of the diverter valve and at least one sensor for detecting the water level in the tank. In this embodiment, the water level is detected by means of a level sensor disposed into the tank.
- [0011] In the preferred embodiment of the present invention, the tank is connected to the second outlet of the diverter valve to which the pipe delivering water to the detergent dispenser is connected, and is located between the diverter valve and the detergent dispenser. In this embodiment, the water fills into the tank which is located on the path that the water takes after leaving the diverter valve towards the detergent dispenser, and afterwards the guided remaining water is directed to the detergent dispenser. When the water level in the tank changes, this

change is detected by the sensor and it is easily and simply determined through which outlet the water passes.

[0012] In an embodiment of the present invention, the tank and the detergent dispenser are adjacent to each other.

[0013] In another embodiment of the present invention, the tank is connected to the first outlet of the diverter valve to which the pipe spraying water into the drum is connected. In this embodiment, the tank is positioned between the diverter valve and the drum.

[0014] In another embodiment of the present invention, two tanks are connected to the first and second outlets of the diverter valve.

[0015] In order to prevent formation of residues and to remove the residues in the detergent dispenser, a jet pump is used to deliver water into the detergent dispenser at certain intervals. The jet pump and the water heater are operated before the washing and/or drying program and while first cold water is delivered, with the heating of the water hot water is delivered into the detergent dispenser. By delivering cold water into the detergent dispenser before and after the process, precleaning is carried out at the beginning of the process and cooling is carried out at the end of the process. Just after the opening of the detergent dispenser, a small amount of cold water is delivered from the diverter valve into the detergent dispenser, thus decreasing the temperature of the surfaces of the detergent dispenser. Depending on the algorithm, the cleaning program is started both with the user pushing the cleaning button and at the end and beginning of certain washing/drying cycles. In another cleaning method, with the use of the diverter valve, the water is guided to two different directions. When the diverter valve is open, the water is delivered into the detergent dispenser, and when closed, the water is discharged. By determining whether the diverter valve is active or not, water containing fibers and detergent is prevented from being delivered into the detergent dispenser while being discharged.

[0016] By means of the present invention, it is accurately determined whether the diverter valve is in the open or closed position. Thus, the cleaning process can be carried out at higher temperatures. Moreover, the detergent

dispenser can be cleaned at the end of each washing process.

Furthermore, the detergent dispenser can be cleaned after a certain number of washer/dryer operations determined by the user or the producer.

[0017] A washer/dryer realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0018] Figure 1 - is the schematic view of a washer/dryer.

[0019] Figure 2 - is the schematic view of the washer/dryer in another embodiment of the present invention.

[0020] Figure 3 - is the schematic view of the washer/dryer in another embodiment of the present invention.

[0021] The elements illustrated in the figures are numbered as follows:

1. Washer/dryer
2. Body
3. Tub
4. Drum
5. Pump
6. Pump outlet
7. Diverter valve
8. Inlet
9. First outlet
10. Second outlet
11. Detergent dispenser
12. Tank
13. Sensor
14. Tank inlet
15. Tank outlet

[0022] The washer/dryer (1) comprises a body (2); a tub (3) which is disposed into the body (2); a drum (4) which is disposed in the tub (3), which rotates around its own axis and wherein the laundry is placed; a detergent dispenser (11) which is disposed into the body (2) and wherein cleaning agents are loaded; a pump (5) which is fixed to the body (2); a diverter valve (7) which has an inlet (8) connected to the pump outlet (6), a first

outlet (9) for spraying water into the drum (4) and a second outlet (10) for delivering water into the detergent dispenser; at least one tank (12) which is positioned between the diverter valve (7) and the detergent dispenser (11) and/or the drum (4); and at least one sensor (13) which detects the level of the fluid in the tank (12).

- [0023] The diverter valve (7) operates thanks to a thermoactuator therein. The diverter valve (7) enables the fluid to be guided to different outlets (9 or 10). If not energized, the fluid is guided only to the first outlet (9) and the fluid is guided to the second outlet (10) when energized. The fluid leaving the diverter valve (7) fills first into the tank (12). The fluid fills into the tank (12), which is on the path following the outlet (9 or 10) the fluid passes after leaving the diverter valve (7), and the fluid diverted afterwards is delivered to the detergent dispenser (11) or to the drum (4). When the water level in the tank (12) changes, this change is detected by the sensor (13) and it is easily and simply determined through which outlet (9 or 10) the fluid passes and hence whether the diverter valve (7) is in the open or closed position.
- [0024] In the embodiment of the present invention, the washer/dryer (1) comprises a tank inlet (14) which is arranged on the tank (12) and which is connected to the first or second outlet (9 or 10), and a tank outlet (15) for delivering the fluid leaving the tank (12) to the detergent dispenser (11) or the drum (4).
- [0025] In the preferred embodiment of the present invention, the washer/dryer (1) comprises a tank (12) which is disposed on the second outlet (10) and which is positioned between the detergent dispenser (11) and the diverter valve (7) (Figure 1). In this embodiment, when energized the fluid is guided to the second outlet (10). The fluid leaving the diverter valve (7) first passes through the second outlet (10) and then fills into the tank (12) via the tank inlet (14). The fluid fills into the tank (12), which is connected to the second outlet (10), after leaving the diverter valve (7) and the fluid diverted afterwards passes through the tank outlet (15) to be delivered to the detergent dispenser (11). When the water level in the tank (12) changes, this change is detected by the sensor (13) and it is easily and

simply determined that the fluid has passed through the second outlet (10) (Figure 1).

[0026] In the preferred embodiment of the present invention, the sensor (13) is a level sensor.

[0027] In another embodiment of the present invention, the washer/dryer (1) comprises a tank (12) which is disposed on the first outlet (9) and which is positioned between the drum (4) and the diverter valve (7). In this embodiment of the present invention, the tank inlet (14) is connected to the first outlet (9). The fluid leaving the diverter valve (7) first passes through the first outlet (9) and then fills into the tank (12) via the tank inlet (14). The fluid fills into the tank (12), which is connected to the first outlet (9), after leaving the diverter valve (7) and the fluid diverted afterwards passes through the tank outlet (15) to be delivered to the drum (4). When the water level in the tank (12) changes, this change is detected by the sensor (13) and it is easily and simply determined that the fluid has passed through the first outlet (9) (Figure 2).

[0028] In yet another embodiment of the present invention, the washer/dryer (1) comprises two tanks (12) which are disposed on the first and second outlets (9 and 10) and which are positioned between the detergent dispenser (11) and the drum (4) and the diverter valve (7) (Figure 3).

[0029] By means of the present invention, the detergent dispenser (11) is cleaned and prevented from remaining dirty before and/or after each washing and/or drying program. Moreover, since the position of the diverter valve (7) is accurately determined at the beginning of the cleaning process, the cleaning process can be carried out at higher temperatures. Moreover, depending on the number of cycles, the cleaning process can be started after a certain number of cycles determined by the user or the producer. Furthermore, by accurately determining the position of the diverter valve (7), the cleaning process can be carried out at the end of each washing program.

Claims

1. A washer/dryer (1) **comprising** a body (2); a tub (3) which is disposed into the body (2); a drum (4) which is disposed in the tub (3), which rotates around its own axis and wherein the laundry is placed; a detergent dispenser (11) which is disposed into the body (2) and wherein cleaning agents are loaded; a pump (5) which is fixed to the body (2); a diverter valve (7) which has an inlet (8) connected to the pump outlet (6), a first outlet (9) for spraying water into the drum (4) and a second outlet (10) for delivering water into the detergent dispenser, **characterized by** at least one tank (12) which is positioned between the diverter valve (7) and the detergent dispenser (11) and/or the drum (4); and at least one sensor (13) which detects the level of the fluid in the tank (12).
2. A washer/dryer (1) as in Claim 1, **characterized by** a tank inlet (14) which is arranged on the tank (12) and which is connected to the first or second outlet (9 or 10), and a tank outlet (15) for delivering the fluid leaving the tank (12) to the detergent dispenser (11) or the drum (4).
3. A washer/dryer (1) as in Claim 1, 2, **characterized by** the tank (12) which is disposed on the second outlet (10) and which is positioned between the detergent dispenser (11) and the diverter valve (7).
4. A washer/dryer (1) as in Claim 1, **characterized by** the sensor (13) which is a level sensor.
5. A washer/dryer (1) as in Claim 1, 2, **characterized by** a tank (12) which is disposed on the first outlet (9) and which is positioned between the drum (4) and the diverter valve (7).
6. A washer/dryer (1) as in Claim 1, 2 and 5, **characterized by** the tank inlet (14) which is connected to the first outlet (9).
7. A washer/dryer (1) as in any one of the above claims, **characterized by** two tanks (12) which are disposed on the first and second outlets (9 and 10) and which are positioned between the detergent dispenser (11) and the drum (4) and the diverter valve (7).

Figure 1

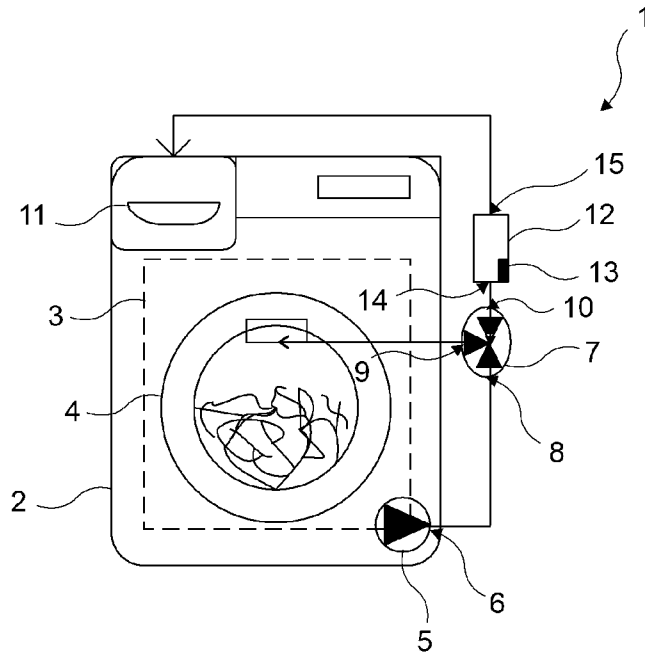


Figure 2

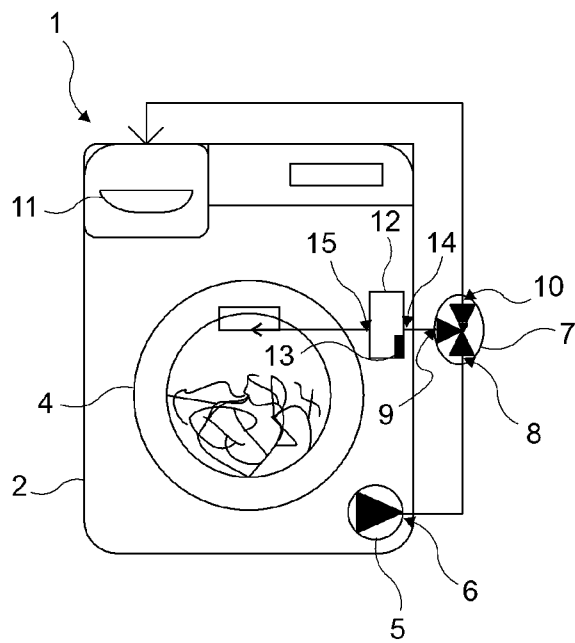
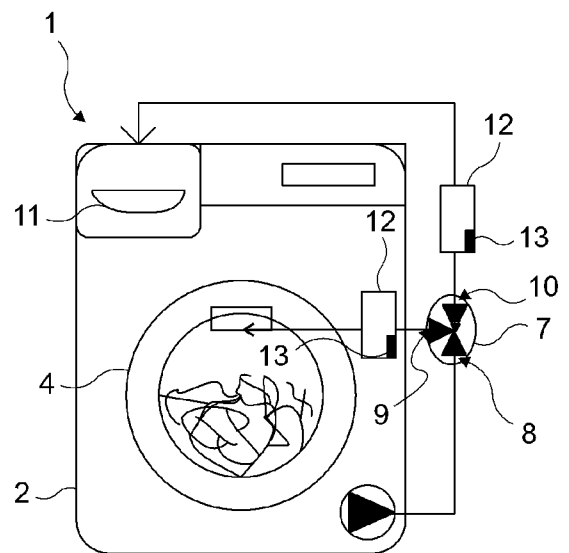


Figure 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/079949

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F39/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2014/153924 A1 (HAIER GROUP TECH R & D CT [CN]; HAIER GROUP CORP [CN]) 2 October 2014 (2014-10-02) paragraphs [0047] - [0049]; figure 1 -----	1-7
A	EP 2 578 739 A1 (ELECTROLUX HOME PROD CORP [BE]) 10 April 2013 (2013-04-10) paragraph [0069]; figures 1-2 -----	1-7
A	WO 2018/048634 A1 (ILLINOIS TOOL WORKS [US]) 15 March 2018 (2018-03-15) paragraph [0043]; figure 1 -----	1-7
A	EP 1 197 593 A2 (FISHER & PAYKEL [NZ]) 17 April 2002 (2002-04-17) cited in the application paragraphs [0006], [0026] - [0028]; figures 4-6 -----	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2014153924 A1	02-10-2014	CN 104074023 A WO 2014153924 A1	01-10-2014 02-10-2014
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