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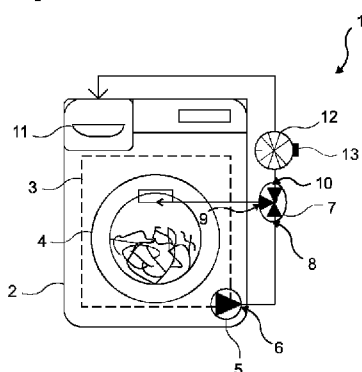
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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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 (11). At least one impeller (12) is positioned between the diverter valve (7) and the detergent dispenser (11) and/or the drum and at least one sensor (13) detects the movement of the impeller (12).

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 impeller disposed at the outlet of the diverter valve and at least one sensor which detects the rotational movement of the impeller as a result of the impact of the water. In this embodiment, the movement of the impeller is detected by a movement sensor.
- [0011] In the preferred embodiment of the present invention, the impeller 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 impacts the impeller disposed in the pipe delivering the water towards the detergent dispenser after leaving the diverter valve, and the water continues its flow towards the detergent dispenser. The change in the position of the impeller is detected by the sensor and it is

easily and simply determined through which outlet the water passes.

- [0012] In another embodiment of the present invention, the impeller 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 impeller is positioned between the diverter valve and the drum.
- [0013] In an embodiment of the present invention, the sensor comprises a magnet disposed at the hub of the impeller and a sensing element which detects the magnetic field of the magnet.
- [0014] 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.
- [0015] 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.

[0016] A washer/dryer realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0017] Figure 1 - is the schematic view of a washer/dryer.

[0018] Figure 2 - is the schematic view of the washer/dryer in another embodiment of the present invention.

[0019] 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. Impeller
13. Sensor

[0020] 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 (11); at least one impeller (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 movement of the impeller (12).

[0021] 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 water impacts the impeller (12), which is on the path following the outlet (9 or 10) the fluid passes after leaving the diverter valve (7), so as to rotate the same, and then is guided to the detergent dispenser (11) or to the drum (4). When the impeller (12) starts to rotate, the movement of the impeller (12) 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.

[0022] In the preferred embodiment of the present invention, the washer/dryer (1) comprises an impeller (12) which is disposed on the second outlet (10) and which is positioned between the detergent dispenser (11) and the diverter valve (7). 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 impacts the impeller (12) disposed in the pipe connected to the second outlet (10) so as to rotate the impeller (12) and to be guided to the detergent dispenser (11). When the impeller (12) starts to rotate, the movement of the impeller (12) is detected by the sensor (13) and it is easily and simply determined that the fluid passes through the second outlet (10) (Figure 1).

[0023] In another embodiment of the present invention, the washer/dryer (1) comprises an impeller (12) which is disposed on the first outlet (9) and which is positioned between the drum (4) and the diverter valve (7). The fluid leaving the diverter valve (7) first passes through the first outlet (9) and impacts the impeller (12) disposed in the pipe which connects the first outlet (9) to the drum (4). The fluid impacting the wings of the impeller (12) rotates the impeller (12) so as to be guided to the drum (4). When the impeller (12) starts to rotate, this movement of the impeller (12) is detected by the sensor (13) and it is easily and simply determined that the fluid passes through the first outlet (9) (Figure 2).

[0024] In the preferred embodiment of the present invention, the sensor (13) is a movement sensor.

[0025] In an embodiment of the present invention, the sensor (13) comprises a

magnet disposed at the hub of the impeller (12) and a sensing element which detects the change in the magnetic field generated by the magnet which rotates with the rotation of the impeller (12).

[0026] 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 (11), **characterized by** at least one impeller (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 movement of the impeller (12).
2. A washer/dryer (1) as in Claim 1, **characterized by** the impeller (12) which is disposed on the second outlet (10) and which is positioned between the detergent dispenser (11) and the diverter valve (7).
3. A washer/dryer (1) as in Claim 1, **characterized by** an impeller (12) which is disposed on the first outlet (9) and which is positioned between the drum (4) and the diverter valve (7).
4. A washer/dryer (1) as in Claim 1, **characterized by** the sensor (13) which is a movement sensor.
5. A washer/dryer (1) as in Claim 1, **characterized by** the sensor (13) comprising a magnet disposed at the hub of the impeller (12) and a sensing element which detects the change in the magnetic field generated by the magnet.

Figure 1

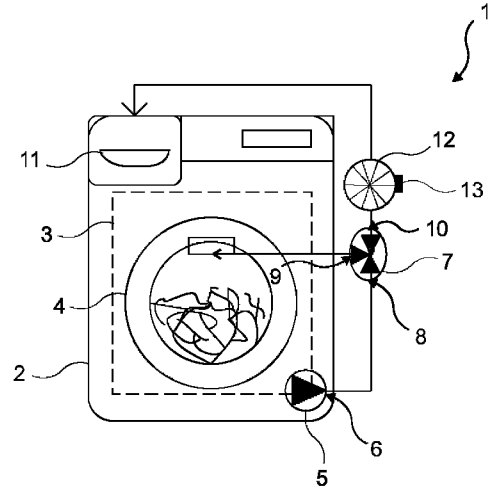
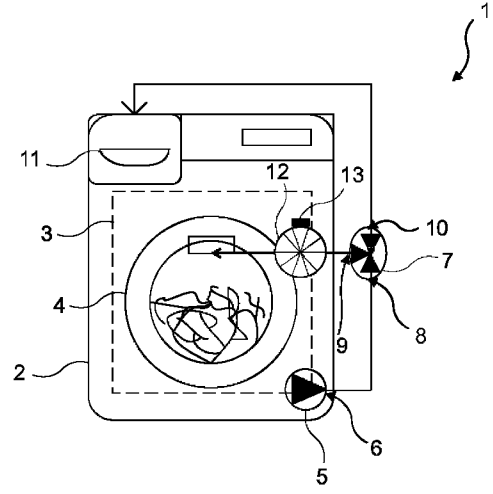


Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/080017

A. CLASSIFICATION OF SUBJECT MATTER

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ADD. D06F39/08 D06F33/02

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)

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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.
Y	WO 2018/048634 A1 (ILLINOIS TOOL WORKS [US]) 15 March 2018 (2018-03-15) paragraph [0002] paragraph [0043] - paragraph [0047]; figures 1, 2	1-5
Y	WO 2011/077412 A1 (ELBI INT SPA [IT]; DA PONT PAOLO [IT] ET AL.) 30 June 2011 (2011-06-30) page 1, line 3 - line 8 page 3, line 1 - line 20; figure 1 page 4, line 17 - line 28	1-5
A	EP 2 578 739 A1 (ELECTROLUX HOME PROD CORP [BE]) 10 April 2013 (2013-04-10) paragraph [0046] - paragraph [0055]; figures 1, 2 paragraph [0066] - paragraph [0069]	1-5



Further documents are listed in the continuation of Box C.



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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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