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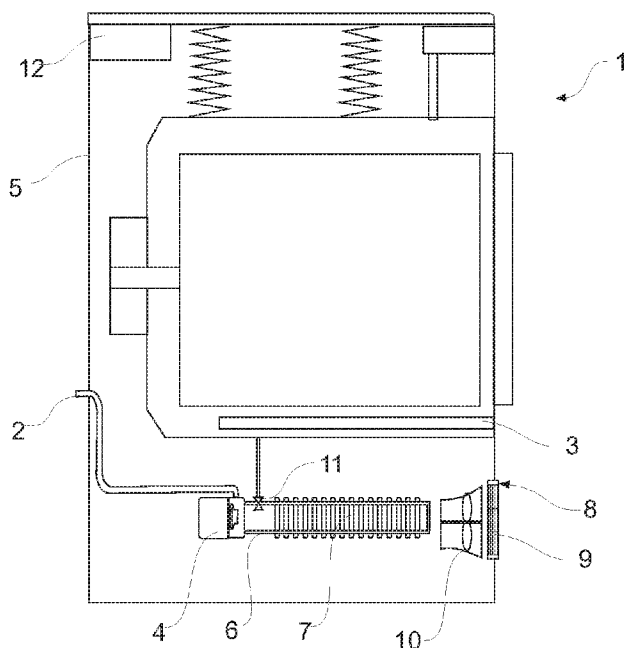
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(54) Title: A WASHER



(57) Abstract: The present invention relates to a washer (1) wherein the energy consumption is reduced. According to the present invention, heat exchange is provided between the environment and the washing water by circulating the water and/or the ambient air.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Description

A WASHER

- [1] The present invention relates to a washer wherein the energy consumption is reduced.
- [2] In washers, particularly in laundry and dish washers, the washing water has to be heated at different phases in accordance with the running program. Electric heaters which require high power are usually utilized for heating the water. For example in a laundry machine, the energy required for heating makes up in average 75 % of the total energy consumed for the complete washing process. Therefore in recent years the research carried out for reducing the energy consumption of washers is particularly directed towards reducing the energy consumed by the heaters.
- [3] In state-of-the-art documents no. EP914800, GB2402204, DE2730489, GB759022 and US4531572 explanation is given for embodiments regarding the heating of the cold fresh water taken in by making use of the heat in the hot waste water that is discharged.
- [4] In the British patent application no. GB2139083, a dishwasher is described wherein cold fresh water taken in a water reserve container adjacent to the washing tank and the cold water heated by the heat conduction from the washing tank is utilized in the next stage.
- [5] In the German patent application no. DE19758064, the description is given for heating the cold water by circulating round the wash chamber during a hot water washing stage and is used in the chamber in the next stage.
- [6] In the United States patent application no. US4245488, how the cold water taken into the machine is heated by motor power control circuit losses in the form of heat is explained.
- [7] In the international patent application no. WO03059142, explanation is given about the water taken into the dishwasher being circulated in a conduit that passes through the tub and over the heater, while the heater is on.
- [8] In the implementations cited above, the heat used for preheating of the fresh water taken in is only released after the machine operates for a while. Therefore at the beginning of the washing program, when the machine is not yet operated, heating of the fresh water first taken in is not possible.
- [9] In the German patent application no. DE3905222, the explanation is given for a method and devices for heating the fresh water with a temperature less than ambient temperature to the ambient temperature without consuming energy. The fresh water to be used in the washing is taken into a tank outside the machine long before the washing program and is kept there to reach the ambient temperature until the washing

program starts.

[10] The object of the present invention is the realization of a washer that provides the temperature of the washing water to be raised to the ambient temperature in a short period of time.

[11] The washer realized in order to fulfill the object of the present invention is explicated in the attached claims. In the said washer, the water taken from the mains and having a temperature less than the ambient temperature is circulated by a pump inside a heat exchanger that is in contact with the ambient air to rapidly raise its temperature to the ambient temperature. The heater is turned on after this stage, heating the water to the temperature required by the program. Since the heater is not turned on during circulation of water within the heat exchanger, no other energy other than that of the pump is consumed. Since the pump consumes much less energy than the heater, a rather low amount of energy is consumed for raising the temperature of the water from that of the mains to the ambient temperature.

[12] In another embodiment of the present invention, in order to further reduce the amount of time required to raise the temperature of water from that of the mains to the ambient temperature, the heat exchanger comprises fins that increase the heat exchange rate between water and the environment.

[13] In yet another embodiment, the heat exchanger is placed behind a window that opens to the outside of the machine body to increase the heat exchange between itself and the environment. The window is preferably closed with a grill that prohibits access of the user into the machine but allows flow of the air.

[14] In another embodiment of the present invention, in order to further increase the rate of the heat exchange, a fan is provided that enables the ambient air to pass over the heat exchanger. Accordingly, the heat exchange from the environment to water is maintained by forced circulation.

[15] The pump may be a dedicated pump that is utilized for only this process or a circulation or discharge pump already existing in the machine.

[16] The washer realized in order to fulfill the object of the present invention is illustrated in the attached figures, where:

[17] Figure 1 – is the schematic side view of a washer.

[18] The elements shown in the figures are numbered as follows:

[19] 1. Washer

[20] 2. Water inlet

[21] 3. Heater

[22] 4. Pump

[23] 5. Body

[24] 6. Heat exchanger

[25] 7. Fin

[26] 8. Window

[27] 9. Grill

[28] 10. Fan

[29] 11. Valve

[30] 12. Control unit

[31] The washer (1) of the present invention is utilized for washing items such as laundry, dishes etc. with water. The washer (1) comprises a body (5), a tub situated inside the body (4), into which items to be washed are emplaced, a water inlet (2) for taking in cold water from the mains, a pump (4) providing the circulation of water, a heat exchanger (6), in contact with ambient air, inside which mains water is circulated, with both ends connected to the pump (4), a valve (11) that provides delivery of water exiting the pump (4) to the tub or the heat exchanger (6), and a control unit (12) that carries out various functions.

[32] The control unit (12), at the start of a washing step requiring the use of water at a certain temperature (T_p), opens the valve (11), operates the pump (4) and provides the water at a lower temperature (T_s) taken in from the water inlet (2) to be circulated in the heat exchanger (6). The water activated by the pump (4) tours more than once inside the heat exchanger (6). Accordingly, the temperature of the water is raised up to almost the ambient temperature (T_a).

[33] The washer (1) comprises a heater (3) that provides heating of the water to the temperature required for the program selected by the user. The heater (3) that is not operated while the water is being circulated in the heat exchanger (6), if necessary, is turned on after this stage to heat the water up to the temperature (T_p) required by the washing program.

[34] Both ends of the heat exchanger (6) are connected to the pump (4). In the present invention, preferably a bisolenoid valve is utilized. Accordingly, the pump (4) can direct the water to the tub or to the heat exchanger (6). At the start of the washing program, the water taken in from the water inlet (2) is at the temperature (T_s) of the mains. The temperature (T_s) of the mains is between 8-15°C, although it may change depending on the climate and season wherein the machine (1) is used. The ambient temperature (T_a) is generally about 18-23°C. The water from the mains is passed through the valve (11) and circulated in the heat exchanger (6) for a while to provide its temperature to reach that of the ambient temperature. Consequently, the heater (3) that is turned on later can be operated for a lesser period of time since it heats the water starting from the ambient temperature (T_a) and not from the mains temperature (T_s) for reaching the temperature (T_p) required for the program. Furthermore, in some geographic regions wherein a hot climate is effective, since ambient temperature (T_a)

is about 30-40°C, in some programs employing a wash with low temperatures, circulating the water in the heat exchanger (6) is sufficient, and turning on the heater (3) is not required at all. The heating process of the water to the ambient temperature (T_a) by circulating within the heat exchanger (6) can be carried out just at the start of the program or before every step requiring the use of hot water. Accordingly consumption of energy is reduced considerably. The time period of circulating water in the heat exchanger (6) is either a fixed period predetermined by the producer or a variable period controlled by sensors (not shown in the figures) that measure the water temperature.

- [35] In another embodiment of the present invention, the washer (1) comprises fins (7) on the heat exchanger (6) that increase the exchange of heat between the water and the environment. Accordingly, the time needed to heat up the water to the ambient temperature (T_a) can be reduced further.
- [36] In another embodiment of the present invention, the washer (1) comprises a window (8) on the body (5) behind which the heat exchanger (6) is situated and a grill (9) mounted on the window (8) prohibiting the access of the user into the body (5) but allowing flow of the ambient air therethrough. By this means, the water circulated in the heat exchanger (6) is subjected to a more efficient heat exchange with the environment.
- [37] In yet another embodiment of the present invention, the washer (1) comprises a fan (10) inside the body (5), between the grill (9) and the heat exchanger (6) that forces the ambient air to pass over the heat exchanger (6). The fan (10) provides the heat exchange between the water and the environment to take place by forced circulation and further increases the rate of heat exchange. The fan (10) can be operated together with the pump (4) or alternately.
- [38] The washer (1) of the present invention is a dishwasher or a clothes washing machine.
- [39] The water to be used in the washer (1) of the present invention is first circulated in the heat exchanger (6) to be heated to the ambient temperature. While the water is circulated, the ambient heat is transferred to the water much more rapidly by means of the fan (10) and the fins (7). The pump (4) and the fan (10) are both devices that have a power consumption of around 50 Watts. The heater (3) consumes about 1900-2000 Watts of electricity. In the present invention, even if the pump (4) and the fan (10) are operated together, for example for 10 minutes, they consume about 50-75 % less energy than a heater (3) that is operated for 1 minute. In the washer (1) of the present invention, since circulating water instead of keeping it stationary is proposed, it is possible to raise the temperature of the water taken from the mains to the ambient temperature in a rather short period of time. Consequently the duration of the washing

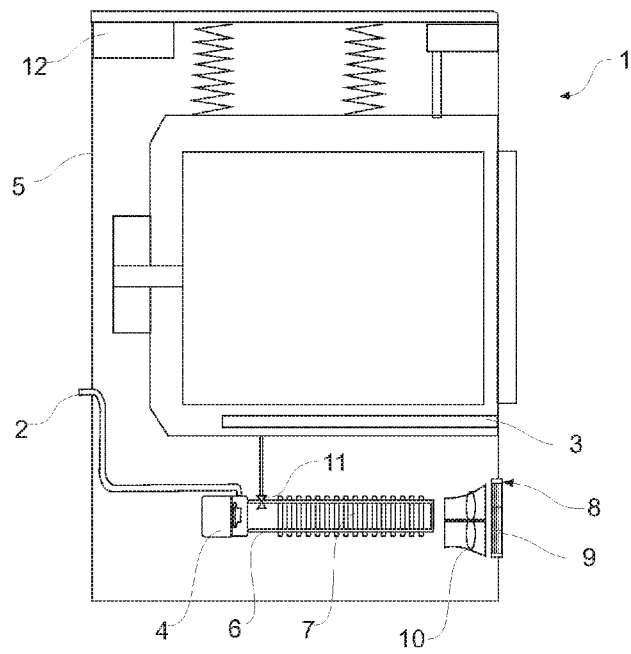
program is not extended too much.

- [40] The washer (1) of the present invention consumes less energy since the heater (3) is operated less. Furthermore, since water is taken in at the beginning of the washing program and heated during circulation instead of being kept stationary, the formation of dangerous microorganisms that multiply in stagnant water is prevented. Additionally, even if the washer (1) is not operated consecutively, the water can be heated to the ambient temperature without the use of the heater (3).

Claims

- [1] A washer (1) that is utilized for washing items such as laundry, dishes with water, comprising a body (5), a tub situated inside the body (4), into which items to be washed are emplaced, a water inlet (2) for taking in cold water from the mains, and a pump (4) providing the circulation of water, and characterized by a heat exchanger (6), in contact with the ambient air, inside which water is circulated, with both ends connected to the pump (4), a valve (11) that provides delivery of water exiting the pump (4) to the tub or the heat exchanger (6) and a control unit (12) adapted to open the valve (11) and to operate the pump (4) at the beginning of a washing step requiring the use of water at a certain temperature (T_p) providing circulation of the low temperature (T_s) water taken from the water inlet (2) until it almost reaches the ambient temperature (T_a).
- [2] A washer (1) according to Claim 1, characterized by a control unit (12) that circulates the water inside the heat exchanger (6) for a fixed period of time pre-determined by the producer.
- [3] A washer (1) according to Claim 1, characterized by a at least one sensor that measures the temperature of the water and a control unit (12) that is adapted to circulate the water inside the heat exchanger (6) until the temperature value measured by the sensor reaches the ambient temperature (T_a).
- [4] A washer (1) according to any one of the above claims, characterized by fins (7) situated on the heat exchanger (6) so as to increase the heat exchange between the water and the environment.
- [5] A washer (1) according to any one of the above claims, characterized by a window (8) that is formed on the body (5), behind which the heat exchanger (6) is situated and a grill (9) mounted on the window (8) prohibiting the access of the user into the body (5) but allowing the flow of ambient air.
- [6] A washer (1) according to Claim 5, characterized by a fan (10) situated inside the body (5), between the grill (9) and the heat exchanger (6) that forces the ambient air to pass over the heat exchanger (6).
- [7] A washer (1) according to any one of the above claims, which is a dishwasher.
- [8] A washer (1) according to any one of claims 1 to 6, which is a laundry washing machine.

FIGURE 1



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2006/054310

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/42 D06F39/00

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 A47L

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 39 05 222 A1 (KUSSMANN WOLFGANG [DE]) 23 August 1990 (1990-08-23) cited in the application the whole document	1
A	EP 0 326 502 A1 (MARTINEZ GEORGES) 2 August 1989 (1989-08-02) column 1, line 61 - column 2, line 14; figures	1
A	EP 0 914 800 A (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 12 May 1999 (1999-05-12) cited in the application paragraphs [0022], [0033], [0034]; figure 1	1
A	DE 33 11 098 A1 (NILLES HELMUT) 27 September 1984 (1984-09-27) abstract; figure	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3905222	A1	23-08-1990	NONE
EP 0326502	A1	02-08-1989	DE 68903958 D1 04-02-1993 DE 68903958 T2 29-04-1993 FR 2626588 A1 04-08-1989 JP 1308595 A 13-12-1989
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