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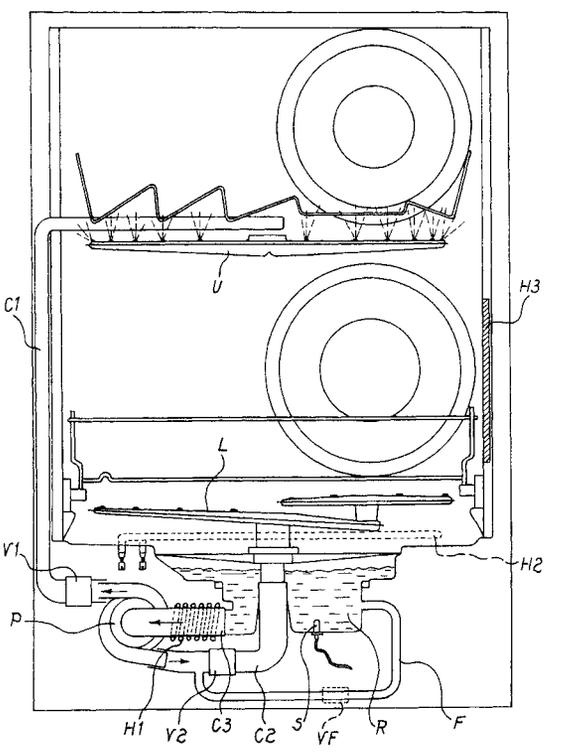
(54) Dishwasher provided with a preheating cycle

(57) A dishwasher includes a washing pump (P) connected to the sprinklers (U, L) through delivery ducts (C1, C2), the water reaching the pump (P) through a supply duct (C3) coming from the collecting chamber (R), a heater (H1) to heat the water, a sensor (S) to detect the temperature thereof and valves (V1, V2) on the ducts (C1, C2) to interrupt the water delivery from the pump (P) to the sprinklers (U, L), as well as a recirculation duct (F) connecting the pump (P) to the collecting chamber (R). In this way it is possible to carry out the pre-heating of the water by circulating it only between the pump (P) and the chamber (R), with a lower consumption of water and electric power and greater comfort for the user upon loading of the dishwasher.

Fig.1



EP 1 004 266 A1

Description

[0001] The present invention relates to dishwashing machines, and in particular to a dishwasher for domestic use provided with means to carry out a pre-heating cycle.

[0002] It is known that in order to achieve an effective cleaning of the dishes it is necessary for the washing water to reach a temperature of 55°-65°C, typically through heating by one or more electrical resistors. There are also dishwashers intended to be connected to the hot water hydraulic network, but this is a significant limitation and reduces the overall energetic efficiency anyway. In fact the water is heated in another place and then supplied to the dishwasher with an unavoidable loss of heat along the path.

[0003] Therefore the preferred arrangement is that of heating the water directly in the dishwasher at the beginning of the washing cycle, and then again during the cycle in order to keep the water at the required temperature. However, the initial heating step contributes to the prolonging of the overall duration of the cycle which sometimes the user might wish to shorten, e.g. in order to have the clean dishes available sooner and/or to be able to carry out sooner the washing of another load of dishes.

[0004] Some types of dishwasher allow to shorten the length of the washing cycle by carrying out a pre-heating cycle prior to the loading of the dishes. In other words, when the dishwasher is still empty, the water is loaded and initially heated by activating the washing pump and sprinkling the water through the sprinklers until the desired temperature is reached. When the dishwasher indicates to the user that the water has reached the set temperature, then he can load the dishes and start the real washing cycle.

[0005] However, this kind of "idle" running has two types of drawback respectively relating to consumptions and user's comfort. First of all, the circulation of hot water throughout the dishwasher implies the heating of all the parts of the dishwasher, which results in a certain consumption of water and electric power as well as a certain duration of the pre-heating cycle.

[0006] Moreover, when the user opens the dishwasher to load the dishes he receives a wave of heat and runs the risk of burning himself with the hot water spread over all the surfaces.

[0007] On the other hand, waiting till the tank cools down before loading the dishes involves a partial loss of the advantage provided by the pre-heating and an unavoidable decrease in the energetic efficiency.

[0008] Therefore the object of the present invention is to provide a dishwasher suitable to overcome the above-mentioned drawbacks.

[0009] This object is achieved by means of a dishwasher having the characteristics disclosed in claim 1. Other advantageous features are disclosed in the dependent claims.

[0010] A first fundamental advantage of the dishwasher according to the present invention is that it carries out the pre-heating cycle in a shorter time and with a lower consumption of water and electric power.

[0011] A second significant advantage of this dishwasher is that it restricts to the tank bottom the spread of hot water, whereby the user does not run any risk of burning himself and can easily load the dishwasher as soon as the pre-heating cycle is over.

[0012] A further advantage of this restricted spread of the heated water is the greater "thermal inertia" of the machine, which reduces the decrease in temperature of the water in case the user does not immediately start the washing cycle. In this way, there is a reduction in the waste of energy caused by the need to re-heat the water if the user lets it cool down for some time.

[0013] These and other advantages and characteristics of the dishwasher according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof with reference to the only drawing, annexed as fig.1, wherein it is diagrammatically illustrated in a front view.

[0014] With reference to said figure, there is seen that a dishwasher according to the invention conventionally includes a washing pump P connected through a first duct Cl to the upper sprinkler U and through a second duct C2 to the lower sprinkler L. The water reaches pump P through a third duct C3 coming from the collecting chamber R formed on the bottom of the tank, a first heating member H1 being spiral-wound around said supply duct C3. One or more further heating members may be provided, for example, in the form of an immersed heater H2 or a contact heater H3 arranged behind a wall of the tank. The temperature of the water is detected in chamber R by a sensor S connected to a control unit (not shown) which provides the deactivation of the heating member(s) when the water reaches the set temperature.

[0015] The novel aspect of the dishwasher according to the present invention consists of a pair of valves V1, V2 arranged so as to respectively close ducts C1, C2, and of a recirculation duct F branching out from duct C2 (upstream from valve V2) and terminating into chamber R. Also duct F may be closed by a valve VF, if present, which however is not used during the pre-heating step.

[0016] When the user sets the pre-heating function, the dishwasher loads the pre-established amount of water while valves V1 and V2 interrupt the delivery to the upper U and lower L sprinklers, respectively. The pump P is activated together with the heating member H1, whereby the water is heated by circulating only in the lower portion of the dishwasher between pump P and chamber R through ducts F and C3. Once sensor S has detected the reaching of the set temperature, the control unit deactivates pump P and heater H1 and sends out an optical and/or acoustic signal of "machine ready".

[0017] In case of delay in the use of the dishwasher, when sensor S detects that the temperature has fallen

below a certain threshold value, pump P and heater H1 are activated again to take the water back to the set temperature.

[0018] Therefore it is clear that by restricting the circulation of the water to the lower portion of the dishwasher (pump P, chamber R, ducts C3 and F), the water heating is achieved more quickly while the washing tank is not affected thus preventing any inconvenience to the user. Furthermore, the mass of heated water maintains the temperature longer since it is less spread throughout the machine.

[0019] After the user has loaded the dishes and confirmed the start of the washing cycle, pump P is activated again and valves V1 and V2 are deactivated through a double opening/closing cycle so as to prevent a thermal shock to the other parts of the machine not affected by the pre-heating. In other words, valves V1, V2 are not immediately opened and left open, but they are firstly opened a couple of times for a few seconds and then closed again, before the final opening lasting for the whole washing cycle when, on the contrary, valve VF, if present, is closed.

[0020] It is clear that the above-described and illustrated embodiment of the dishwasher according to the invention is just an example susceptible of various modifications. In particular, in the illustrated embodiment there are provided two valves V1, V2 since pump P has two separate deliveries for the two sprinklers U, L, but it is clear that in case of a single-delivery pump with subsequent branching of ducts C1, C2, F a single three-way valve controlling the delivery to the three ducts C1, C2 and F would be sufficient. Moreover, the heating of the water may be carried out by a heater placed in a different location with respect to the illustrated heater H1, e.g. a heater in chamber R or on duct F, or by more than one heater.

Claims

1. A dishwasher including a washing pump (P) connected to sprinklers (U, L) through delivery ducts (C1, C2), the water reaching said pump (P) through a supply duct (C3) coming from a collecting chamber (R) formed on the bottom of the washing tank, and including as well at least one heating member (H1) to heat the water and a temperature sensor (S) to detect the water temperature, characterized in that it further includes valve means (V1, V2) to interrupt the water delivery from the pump (P) to said sprinklers (U, L), as well as a recirculation duct (F) connecting the pump (P) to said collecting chamber (R).

2. A dishwasher according to claim 1, characterized in that it includes further valve means (VF) to interrupt the water delivery through the recirculation duct (F).

3. A dishwasher according to claim 1 or 2, characterized in that the washing pump (P) is a double-delivery pump connected to the upper sprinkler (U) through a first duct (C1), on which a first valve (V1) is mounted, and to the lower sprinkler (L) through a second duct (C2), on which a second valve (V2) is mounted.

4. A dishwasher according to claim 3, characterized in that the recirculation duct (F) branches out from the second duct (C2) at a point upstream from the second valve (V2).

5. A dishwasher according to claim 1 or 2, characterized in that the washing pump (P) is a single-delivery pump having mounted at its outlet a three-way valve capable of interrupting the supply to the sprinklers (U, L) while maintaining the supply to the recirculation duct (F).

6. A dishwasher according to one or more of the preceding claims, characterized in that the heating member (H1) consists of a resistor wound around the supply duct (C3) between the collecting chamber (R) and the pump (P).

7. A dishwasher according to one or more of the preceding claims, characterized in that the temperature sensor (S) detects the water temperature inside the collecting chamber (R).

8. A pre-heating cycle for a dishwasher according to one or more of the preceding claims, characterized in that it includes the following steps:

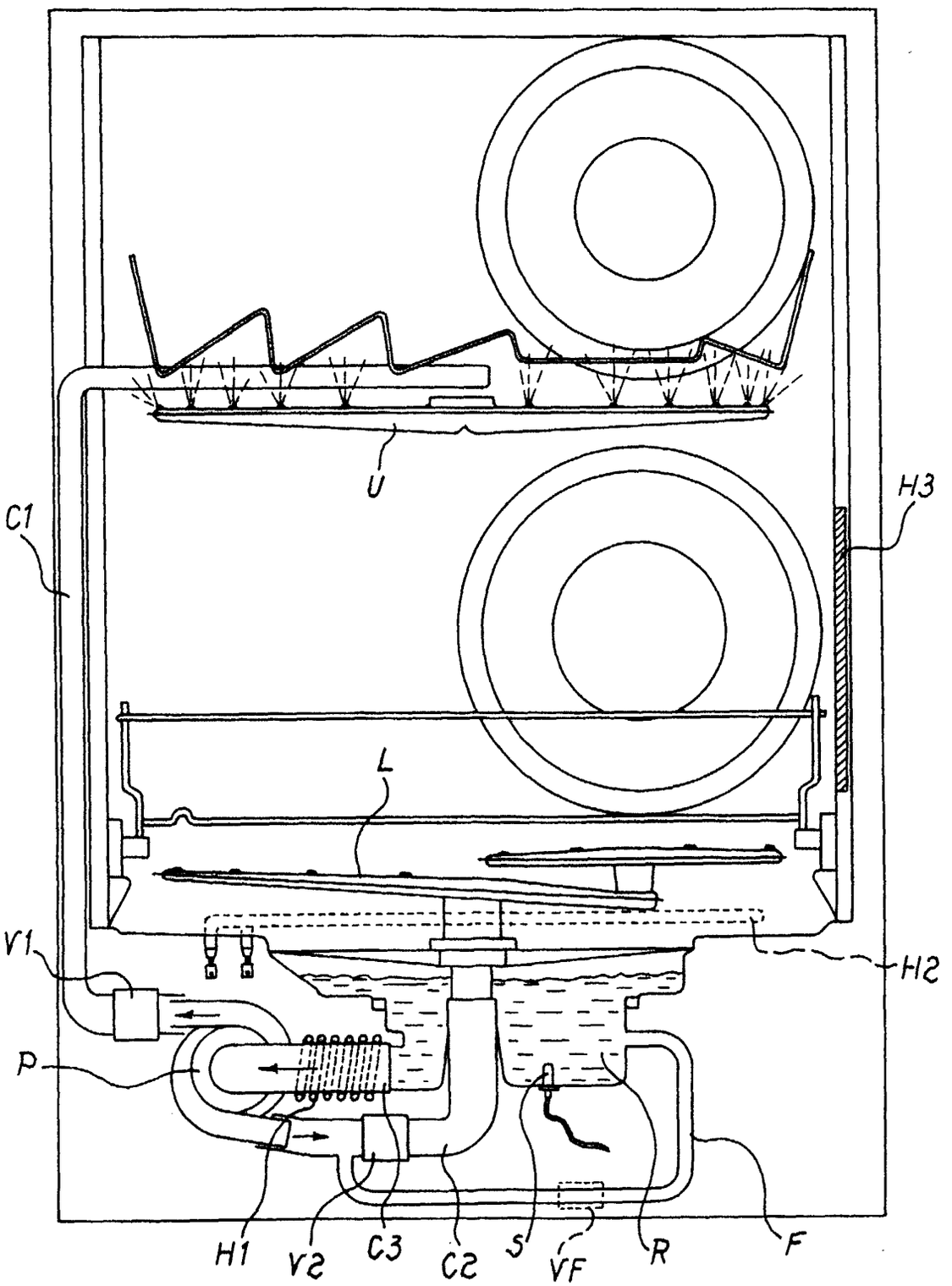
   a) loading a pre-established amount of water;
   b) activating the valve means suitable to interrupt the water delivery to the sprinklers;
   c) activating the washing pump and at least one heater;
   d) circulating the water between the pump and the collecting chamber until a set temperature is achieved;
   e) deactivating the pump and the at least one heater;
   f) sending out an optical and/or acoustic signal of "machine ready".

9. A washing cycle for a dishwasher according to one or more of the preceding claims, characterized in that it includes a pre-heating cycle according to claim 8 followed by the following steps:

   a) deactivating the valve means for a few seconds;
   b) activating again the valve means for a few seconds;
   c) repeating steps a) and b) one or more times;

d) deactivating the valve means;
e) carrying out the washing, rinsing and, if any, drying steps.

Fig.1



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EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0669

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	US 4 754 770 A (FORNASARI PAOLO) 5 July 1988 (1988-07-05) * column 1, line 52 - column 2, line 38; figures 1-3 *	1	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	3 April 2000	Laue, F

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