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(54) Method for preventing kitchenware articles from breaking during washing in a dishwasher

(57) A method for preventing kitchenware articles sensitive to thermal shocks from breaking as a result of sudden cooling during washing in a dishwasher (1), the method comprising the steps oft

i) performing a first washing step by spraying a heated washing liquid against a first zone (21) that accommodates the articles which might break as a result of sudden cooling, the first zone (21), relative to the physical vertical, being located above a second zone (22) for accommodating kitchenware articles, the first and second zones (21, 22) being located inside a washing compartment (2) in the dishwasher;

ii) performing a second washing step using a new washing liquid initially cooler than the washing liquid sprayed just before the end of the first washing step, the second washing step comprising:

- a first operating sub-step of spraying the new washing liquid into the washing compartment (2) without alloving the new washing liquid to come into contact with the first washing zone (21);
- a sub-step of heating the new washing liquid, this heating sub-step being at least partly simultaneous with the first operating sub-step;
- a second operating sub-step, following the first operating sub-step, in which the new washing liquid strikes the first zone (21) of the washing compartment (2). [Figure 1]

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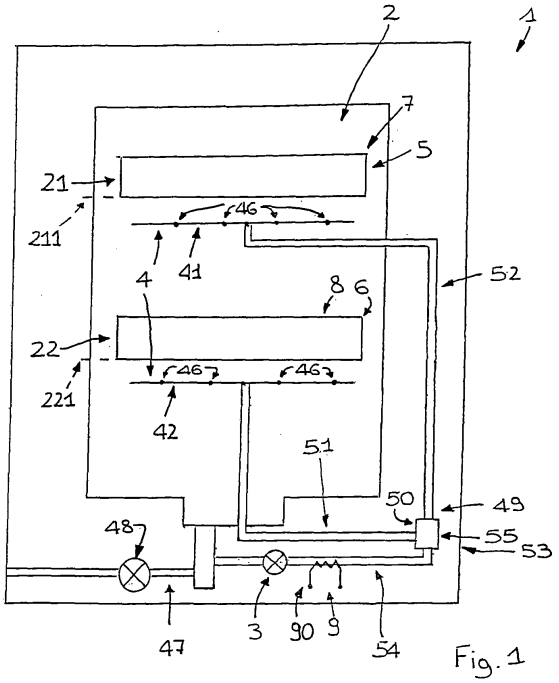

Fig. 1

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Description

[0001] This invention relates to a method for preventing kitchenware articles which are sensitive to thermal shocks from breaking as a result of sudden cooling during washing in a dishwasher.

[0002] For example, but without limiting the scope of the invention, kitchenware articles which might break as a result of sudden cooling may be bowls or glasses made of glass or china.

[0003] It is known that washing such kitchenware articles is an extremely delicate operation. Amongst the various disadvantages, one of the most serious is that linked to breaking as a result of thermal shock after sudden cooling. During normal washing in a dishwasher, the articles to be washed which are placed in a washing compartment are subject to repeated heating and cooling.

[0004] In particular, the washing cycle usually comprises a main wash followed by a series of rinses. During the main wash, the washing liquid is loaded on the bottom of the washing compartment. Said washing liquid is drawn by a pump and a rotating sprayer sprays it against the kitchenware articles. After making contact with the kitchenware articles, gravity causes the washing liquid to collect again on the bottom of the washing compartment again and it can again be drawn by the pump for spraying against the kitchenware articles. The washing liquid pumped from the washing compartment may be heated by an electric heating element located along a duct connecting the bottom of the washing compartment and the sprayer. The washing liquid normally consists mostly of water drawn from the water mains and, therefore, at the start of washing its temperature is usually below 20°C (said temperature depends on outside environmental conditions, for example during some seasons and in some regions of the planet it could be 4°C). After heating, after a predetermined period the washing liquid will have a temperature of around 45°C.

[0005] Consequently, kitchenware articles which might break as a result of sudden cooling are heated by the washing liquid to a temperature close to 40°C. Then the washing liquid is drained and a new washing liquid is loaded for the subsequent rinse cycles. Said washing liquid usually consists mostly of water drawn from the water mains and therefore is at a temperature considerably lower than that of the kitchenware articles (for example, it could be at 19°C). If said liquid were to come into contact with kitchenware articles which might break as a result of sudden cooling, thermal shocks could occur which would be such that they could cause the kitchenware articles to break.

[0006] For that reason, there are prior art dishwashers which, before operating the pump which pumps the liquid to the sprayer, switch on the heating element for short periods at suitable time intervals to pre-heat the washing liquid to be sprayed. Said solution is not without disadvantages, such as the risk of damaging the heating element. Since the washing liquid is not moved by the pump, there is the risk that the heating element could overheat. Moreover, heating of the washing liquid is localised close to the heating element and is not very efficient.

[0007] In this context, the technical purpose which forms the basis of this invention is to propose a method for washing kitchenware articles which might break as a result of sudden cooling that overcomes the above-mentioned disadvantages of the prior art.

[0008] In particular, this invention has for an aim to propose a method for washing kitchenware articles which might break as a result of sudden cooling which avoids the risk of damaging such kitchenware articles.

[0009] The technical purpose indicated and the aims specified are substantially achieved by a method for washing kitchenware articles which might break as a result of sudden cooling comprising the technical features described in one or more of the appended claims.

[0010] Further features and advantages of the invention are more apparent in the non-limiting description which follows of a preferred non-limiting embodiment of a method illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic view of a dishwasher which implements a method according to this invention;
- Figure 2 is a graph showing on the y-axis the temperature detected at the dishwasher washing compartment and on the x-axis the time measured from the start of a washing cycle which implements the method according to this invention.

[0011] This invention relates to a method for preventing kitchenware articles which are sensitive to thermal shocks from breaking as a result of sudden cooling during washing in a dishwasher 1. In particular, the method is implemented when the user selects a specific programme for washing kitchenware articles which might break as a result of sudden cooling (the programme is often called "crystal cycle" or "delicate cycle"). The method comprises the steps of performing a first washing step by spraying a heated washing liquid against a first zone 21 that accommodates the articles which might break as a result of sudden cooling. The first zone 21, relative to the physical vertical, is located above a second zone 22 for accommodating kitchenware articles. The first and second zones 21, 22 are inside a dishwasher 1 washing compartment 2 during the first washing step.

[0012] The first washing step usually comprises also spraying the second zone 22 of the washing compartment 2. In particular, spraying of the second zone 22 may take place simultaneously with the spraying of the first zone 21 of the washing compartment 2 (if nothing else because the second zone 22 is under the first washing zone 21 and gravity causes the washing liquid to fall, also wetting the second zone 22).

[0013] The first washing step comprises spraying the washing liquid against the second zone 22 of the washing compartment 2.

[0014] During the first washing step the first and second zones 21, 22 may be sprayed directly with the washing liquid simultaneously or alternatively first one and then the other.

[0015] Before the first washing step; the user must have placed the kitchenware articles which might break as a result of sudden cooling in the first zone 21 and any other, less delicate kitchenware articles (pans, cutlery, etc.) in the second zone 22. The presence or absence of kitchenware articles in the second zone 22 does not affect implementation of the method. According to one particular embodiment (described in more detail below) the kitchenware articles which might break as a result of sudden cooling could be placed either in the first or second washing zone 21, 22. Heating of the washing liquid used in the first washing step may take place at least partly simultaneously with the first washing step, or it may take place before the start of the first washing step:

[0016] A washing cycle may normally comprise:

- one or more pre-washes (sometimes these are absent, as in the example schematically illustrated in Figure 2);
- a main wash (labelled A in Figure 2);
- one or more rinses (labelled B and C in Figure 2).

[0017] Advantageously, the first washing step comprises the main wash.

[0018] Advantageously, the washing liquid used in the first washing step comprises water to which at least one detergent may be added.

[0019] Heating of the washing liquid used during the first washing step is linked to the fact that the water is drawn from the water mains and therefore is at ambient temperature (not high enough for an efficient degreasing action).

[0020] At the start of the first washing step the kitchenware articles placed in the first zone 21 are substantially at ambient temperature. Consequently, contact with the washing liquid at ambient temperature does not create risks of breakage.

[0021] After performing its washing action, the washing liquid used during the first washing step usually collects, due to gravity, on the bottom of the washing compartment 2 and can be drawn again and sprayed again on the kitchenware articles to be washed.

[0022] Advantageously, the first washing step has a predetermined duration (in the example in Figure 2 the duration is 22.5 minutes).

[0023] Advantageously, the method involves draining from the washing compartment 2 the first washing liquid used during the first washing step (this step is indicated by the arrow labelled A1 in Figure 2). During said step the washing liquid used in the first washing step is suitably expelled from the dishwasher 1 through a drainage channel 47 along which a drainage pump 48 is located. This occurs at the end of the predetermined duration of the first washing step. Obviously, minimal amounts of the washing liquid used during the first washing step may remain on the kitchenware articles or on the walls of the washing compartment 2 (for example in the form of droplets).

[0024] The method also involves performing a second washing step using a new washing liquid. Said new washing liquid, at least initially, is cooler than the washing liquid sprayed just before the end of the first washing step. Therefore, the temperature of the new washing liquid sprayed against the kitchenware articles at the start of the second washing step is lower than the temperature of the washing liquid sprayed against the kitchenware articles just before the end of the first washing step. The second washing step is usually a first rinse (labelled B in Figure 2) which (advantageously, but not necessarily) could be followed by other rinses (for example, rinse C in Figure 2).

[0025] The washing liquid used in the first washing step and the new washing liquid used in the second washing step could be of the same type. For example, the washing liquid used in the first washing step and the new washing liquid could comprise water to which detergents may have been added. The particles of the new washing liquid are substantially no longer the same particles of liquid used for the first washing step.

[0026] Advantageously, the second washing step comprises a sub-step of feeding the new washing liquid into the washing compartment 2. During said feeding step, gravity causes the new washing liquid to occupy the bottom of the washing compartment 2.

[0027] The second washing step also comprises a first operating sub-step (labelled B1 in Figure 2). Said first operating sub-step involves spraying the new washing liquid into the washing compartment 2 without allowing the new washing liquid to come into contact with the first washing zone 21. During said first operating sub-step, the new washing liquid is drawn from the washing compartment 2 and, relative to the direction of the physical vertical, at last partly sprayed upwards from the bottom of the second washing zone 22. The new washing liquid is also sprayed with insufficient force for it to reach a first predetermined height 211 where the first washing zone 21 of the washing compartment 2 is located.

[0028] The kitchenware articles which might break as a result of sudden cooling placed in the first zone 21 are still warm following the first washing step and if the new liquid (which at least at the start of the second washing step is noticeably cooler than the kitchenware articles) were to strike them, they could break.

[0029] The sub-step of feeding the new washing liquid involves pumping water at ambient temperature from an external source. Advantageously, the water is drawn from the water mains. It may then have any detergents required added to it in order to form the new washing liquid.

[0030] For example, initially the new washing liquid could be sprayed at a temperature close to 19°C (said value is provided by way of example only, since it de-

pends on the temperature of the outside environment. In winter or in geographical areas with a cold climate, said temperature could be much lower).

[0031] Advantageously, after being sprayed and performing a washing action on the kitchenware articles, the new washing liquid collects, due to gravity, on the bottom of the washing compartment 2, from where it can be drawn again for spraying.

[0032] The second washing step therefore comprises a sub-step of heating the new washing liquid. Advantageously, the heating sub-step is at least partly simultaneous with the first operating sub-step. Advantageously, heating means 9 are used for the heating. Advantageously, the dishwasher 1 comprises a feed conduit 49 extending between the washing compartment 2 and the spraying means 4 which spray the washing liquid into the washing compartment 2.

[0033] Appropriately, the heating means 9 are located along the feed conduit 49. In particular, the heating means 9 comprise a heating element 90.

[0034] The new washing liquid therefore acquires heat from the heating means 9. At the end of the heating sub-step the temperature of the new washing liquid is between 35°C and 50°C, preferably equal to around 45°C.

[0035] The duration of the heating sub-step is linked to a predetermined condition. The predetermined condition may be the detection of a predetermined temperature by means of a sensor which comes into contact with the new washing liquid or which is located in the washing compartment 2.

[0036] Alternatively, the predetermined condition is a predetermined interval of time. In the latter case, the duration of the heating step is equal to a preset interval of time. The heating means 9 are switched off at the end of the preset interval of time.

[0037] Advantageously, the first operating sub-step is substantially simultaneous with the heating sub-step.

[0038] The new washing liquid is gradually heated up during the first operating sub-step. This is due to the fact that the new liquid repeatedly comes into contact with the heating element 90. The particles of the new washing liquid, after being sprayed by the spraying means 4, again collect on the bottom of the washing compartment 2, from where they are drawn and thanks to the conduit 49 again directed towards the spraying means 4. This forces the particles of the new washing liquid to pass the heating element 90 several times, thus gradually increasing the temperature of the new washing liquid.

[0039] Advantageously, during the second washing step, the new washing liquid may be topped up one or more times.

[0040] The second washing step also comprises a second operating sub-step, following the first operating sub-step, in which the new washing liquid is sprayed into the washing compartment 2 and strikes the first zone 21 of the washing compartment 2. This allows washing of the kitchenware articles placed in the first washing zone 21. During the second operating sub-step, the new washing liquid also suitably strikes the second zone 22 of the washing compartment 2.

[0041] Advantageously, the second operating sub-step starts after the sub-step of heating the new washing liquid. During the second operating sub-step the new washing liquid is at a temperature high enough to prevent the kitchenware articles which are sensitive to sudden cooling from breaking. During the second operating sub-step (see B2 in Figure 2) the temperature detected in the washing compartment 2 is approximately constant and equal to that reached at the end of the heating sub-step (at most there will be slight cooling due to heat dissipation to the outside).

[0042] Appropriately, according to the method, in the second operating sub-step, the new washing liquid reaches a first rack 5 in which the first zone 21 of the washing compartment 2 is obtained. This allows washing of the kitchenware articles which might break as a result of sudden cooling that the user previously placed in the first zone 21 of the washing compartment 2. Normally, in dishwashers equipped with two racks, the most delicate articles are placed in the upper rack, whilst the lower rack is used for sturdier pans and kitchenware articles (therefore the user is familiar with this separation).

[0043] According to the method, during the first operating sub-step, the new washing liquid is sprayed upwards from under the second zone 22 of the washing compartment 2 with sufficient force for it to reach a second height 221 which is below the first height 211 and where the second washing zone 22 of the washing compartment 2 is located.

[0044] According to the method, in the first operating sub-step, the new washing liquid, without reaching the first 5 rack, comes into contact with a second rack 6 in which the second zone 22 of the washing compartment 2 is obtained. The second rack 6, relative to the direction of the physical vertical, is positioned below the first rack 5. During the first operating sub-step initially the new washing liquid is still too cool for washing the warm kitchenware articles which might break as a result of sudden cooling located in the first rack 5. While waiting for the new washing liquid to heat up it is therefore used for washing the kitchenware articles that the user previously placed in the second rack 6.

[0045] In an alternative embodiment of the method, during the first operating sub-step the new washing liquid is sprayed upwards from under the second zone 22 of the washing compartment 2 with insufficient force for it to reach a second height 221 which is below the first height 211 and where the second washing zone 22 of the washing compartment 2 is located. For example, this would allow kitchenware articles which might break as a result of sudden cooling to be placed in either the first or the second washing zone 21, 22.

[0046] In general, the first height 211 is further from a horizontal surface below the dishwasher 1 than the second height 221. The first height 211 is at the lower edge of the first washing zone 21. The second height 221 is

at the lower edge of the second washing zone 22.

[0047] During the first and second operating sub-steps, the first and second racks 5, 6 are inside the washing compartment 2. Both the first rack and/or the second rack 5, 6 can normally be removed from the washing compartment 2 to allow the kitchenware articles to be loaded and unloaded.

[0048] In general, the method comprises adjusting the rotation speed of a feed pump 3 which pumps the new washing liquid from the washing compartment 2 to at least one nozzle 46 belonging to the spraying means 4 which sprays it into the washing compartment 2. The nozzle 46 is part of the washing compartment 2 spraying means 4. During the first operating sub-step said rotation speed is less than during the second operating sub-step, so as not to impart (during the first operating sub-step) sufficient energy to the washing liquid sprayed upwards from under the second zone 22 to reach the first zone 21 of the washing compartment 2. Appropriately, the pump 3 is of the centrifugal type.

[0049] In the particular embodiment in which during the first operating sub-step the liquid sprayed upwards does not reach either the first or the second washing zone 21, 22 the pump 3 rotation speed is such that it prevents the washing liquid sprayed upwards from under the second zone 22 having sufficient force to reach the second zone 22 of the washing compartment 2.

[0050] Therefore, when switching from the first sub-step to the second sub-step there is an increase in the feed pump 3 rotation speed. Advantageously, during the first operating sub-step the centrifugal pump 3 rotation speed is between 1600 and 1800 rpm. During the second operating sub-step the centrifugal pump 3 rotation speed is between 2000 and 2500 rpm (not necessarily maintaining a constant value): The rotation speed values indicated above are provided purely by way of example and depend on the pressures to be obtained.

[0051] Reducing the mechanical energy supplied by a motor to the pump 3 also reduces the energy that the pump 3 transfers to the new washing liquid and therefore during the first operating sub-step the latter is sprayed lower than during the second operating sub-step. This means that during the first operating sub-step the new washing liquid is prevented from coming into contact with the kitchenware articles in the first zone 21 (and in a particular embodiment also with those in the second washing zone 22). During the second operating sub-step the new washing liquid may be sprayed higher than during the first operating sub-step and so may also reach the first zone 21 of the washing compartment 2 in which the user previously placed the kitchenware articles which might break as a result of sudden cooling.

[0052] Advantageously, the method may comprise regulating the load losses in the conduit 49, said load loss adjustment being determined by varying the geometry of the conduit 49 (for example, by adjusting the transit cross-section of a point of the conduit 49).

[0053] During the first operating sub-step the load losses in the conduit 49 are higher than during the second operating sub-step.

[0054] To switch from the first to the second operating sub-step the load losses along the conduit 49 in which the pump 3 is located could be reduced.

[0055] To adjust the pressure of the jet, the method therefore comprises acting on the pump 3 rotation speed or on the geometry of the conduit 49 which draws the new washing liquid from the bottom of the washing compartment 2 so that it can again be sprayed against the kitchenware articles placed in the washing compartment 2.

[0056] Advantageously, according to the method, during the first operating sub-step the new washing liquid is sprayed upwards only from under the second zone 22. This also makes it possible to reduce the possibility that the new washing liquid will come into contact with the first zone 21 of the washing compartment 2. According to the method, during the second operating sub-step the new washing liquid is at least partly sprayed from the bottom upwards. Moreover, during the second operating sub-step the new washing liquid is at least partly sprayed from an intermediate position between the first and second zones 21, 22 of the washing compartment 2. This allows the best possible' washing even of the kitchenware articles placed in the first zone 21 of the washing compartment 2 and which might break as a result of sudden cooling.

[0057] Appropriately, the first and/or the second operating sub-step is/are performed in a predetermined interval of time.

[0058] At the end of the second operating sub-step the new washing liquid is disposed of outside the dishwasher 1. In the non-limiting embodiment provided by way of example and illustrated in the accompanying drawing, after the second operating sub-step there is a third washing step (labelled C in Figure 2). The third washing step repeats the sub-steps already described in connection with the second washing step (using a new washing liquid compared with that used during the second washing step).

[0059] After repeating the sub-steps already described in connection with the second washing step, the third washing step may comprise a new step of heating the washing liquid being used (initially introduced at a temperature close to ambient temperature). Advantageously, said new heating step is carried out for a predetermined interval of time. Appropriately (see C1 in Figure 2) the new heating step brings at least the first washing zone 21 to a temperature of between 60°C and 70°C (advantageously around 65°C).

[0060] The temperature of the washing compartment 2 during the third washing step is then maintained at a substantially constant temperature for a predetermined interval of time (see C2 in Figure 2). During C2 the liquid being used is no longer heated.

[0061] Then a step of drying the articles washed and placed in the washing compartment 2 begins. Advanta-

geously, the third washing liquid is drained during the drying step.

[0062] Figure 1 shows a non-limiting example of a dishwasher 1 which implements the method described above. Said dishwasher 1 comprises the washing compartment 2 and first and second means 7, 8 for positioning kitchenware articles inside the washing compartment 2. The first positioning means 7 are above the second positioning means 8 relative to the direction of the physical vertical.

[0063] The first positioning means 7 form the first washing zone 21, whilst the second positioning means 8 form the second washing zone 22.

[0064] In a first embodiment not illustrated the first and second positioning means 7, 8 are integrated in a single rack (which can normally be removed from the washing compartment 2). For example, the first positioning means 7 could comprise a flap applied to the lateral walls of the rack, whilst the second positioning means 8 could comprise for example the bottom of the rack.

[0065] In an alternative embodiment the dishwasher 1 comprises a first rack and a second rack 5, 6 which are located in the washing compartment 2. The first rack 5 comprises the first positioning means 7 and is obtained above the second rack 6 which in turn comprises the second positioning means 8. The first rack and the second rack 5, 6 can normally be removed from the washing compartment 2. During washing the first and second racks 5, 6 are inside the washing compartment 2.

[0066] The dishwasher 1 also comprises the means 4 for spraying the washing liquid into the washing compartment 2. The spraying means 4 comprise at least a first sprayer 42. Relative to the physical vertical the first sprayer 42 is below the second positioning means 8 for the kitchenware articles.

[0067] Advantageously, the first sprayer 42 is located below the second rack 6. The spraying means 4 may also comprise a second sprayer 41 interposed between the first and second racks 5, 6. The first and second sprayers 42, 41 are rotating and comprise a plurality of nozzles 46 allowing the outflow of the liquid used to wash the kitchenware articles.

[0068] Advantageously, the feed conduit 49 comprises a first duct 54 extending from the washing compartment 2. The first duct 54 has a branch 50 downstream of the pump 3. Extending from the branch 50 there is a second duct 51 which allows the first sprayer 42 to be fed and a third duct 52 which allows the second sprayer 41 to be fed. Advantageously, the dishwasher 1 comprises shutoff means 53 which allow or inhibit the flow of a liquid along the second and/or third ducts 51, 52. For example, the shutoff means 53 comprise a first valve 55 located at the branch 50. The valve 55 allows fluid communication of the first duct 54 with the second duct 51 or with the third duct 52 or with both or neither of the two. The valve 55 has one inlet and two outlets. Interposed between the inlet and the outlets there is a mobile element which allows fluid communication between the inlet and one of the two outlets or both of the two outlets or neither of the outlets. The inlet is at one end of the first duct 54, the two outlets are respectively at one end of the second and one end of the third ducts 51, 52.

[0069] The dishwasher 1 also comprises means for adjusting at least one jet of the washing liquid coming out of the first sprayer 42. The adjusting means allow the jet to adopt a first and a second operating condition. Said adjusting means could be a variable speed pump or means for varying the geometry of the conduit 49 (in particular, they allow narrowing or widening of a transit cross-section of the conduit 9).

[0070] In the first operating condition, even if undisturbed by the second positioning means 8 or by the kitchenware articles placed in them, the jet has insufficient force to reach the first positioning means 7. In a first embodiment of the dishwasher, in the first operating condition said force is, however, sufficient to reach the second positioning means 8. In a second embodiment of the dishwasher, in the first operating condition said force is, however, insufficient to reach the second positioning means 8. Therefore, in the first operating condition the first operating sub-step described above with reference to the second washing step is implemented.

[0071] Advantageously, the first sprayer 42 is obtained under the second rack 6. In the first operating condition of the first embodiment, the jet of the first sprayer 42 reaches the second rack 6, but not the first rack 5. In the first operating condition the second sprayer 41 is switched off.

[0072] In the second operating condition, if undisturbed by the second positioning means 8 and by the kitchenware articles placed in them, the jet of the first sprayer 42 might have sufficient force to reach the first positioning means 7.

[0073] Moreover, in the second operating condition the second sprayer 41 sprays at least one jet of the new washing liquid towards the first rack 5.

[0074] This allows implementation of the second operating sub-step described above with reference to the second washing step.

[0075] This invention has important advantages. First, it allows the washing of kitchenware articles which might break as a result of sudden cooling in a dishwasher, minimising the risk of breakages.

[0076] Another important advantage is linked to optimisation of the washing time, since even when the washing liquid has a temperature such that its use is not recommended on warm kitchenware articles which might break as a result of sudden cooling, it is still used for washing less delicate kitchenware articles (for example, those made of steel).

[0077] It shall be understood that the invention described above may be modified and adapted in several ways without departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by other technically equivalent elements. In practice, all the materials used, as well as the dimen-

sions, may vary according to requirements.

Claims

1. A method for preventing kitchenware articles sensitive to thermal shocks from breaking as a result of sudden cooling during washing in a dishwasher (1), the method comprising the steps of:

   i) performing a first washing step by spraying a heated washing liquid against a first zone (21) that accommodates the articles that might break on account of sudden cooling, the first zone (21), relative to the physical vertical, being located above a second zone (22) for accommodating kitchenware articles, the first and second zones (21, 22) being located inside a washing compartment (2) in the dishwasher (1);
   ii) draining the washing compartment (2) of the washing liquid used during the first washing step;
   iii) performing a second washing step using new washing liquid initially cooler than the washing liquid sprayed just before the end of the first washing step, the second washing step comprising:

   - a sub-step of feeding the new washing liquid into the washing compartment (2);
   - a first operating sub-step in which the new washing liquid is sprayed into the washing compartment (2) without allowing the new washing liquid to come into contact with the first washing zone (21); during this first operating sub-step, the new washing liquid being, relative to the direction of the physical vertical, drawn from the washing compartment (2) and at least partly sprayed upwards from the bottom of the second washing zone (22) of the washing compartment (2), the new washing liquid being sprayed with insufficient force for it to reach a first predetermined height (211) where the first washing zone (21) of the washing compartment (2) is located;
   - a sub-step of heating the new washing liquid, this heating sub-step being at least partly simultaneous with the first operating sub-step;
   - a second operating sub-step, following the first operating sub-step, in which the new washing liquid is sprayed into the washing compartment (2) and strikes the first zone (21) of the washing compartment (2).

2. The method according to claim 1, **characterized in that** during the first operating sub-step, the new washing liquid is sprayed upwards from under the second zone (22) of the washing compartment (2) with insufficient force for it to reach a second predetermined height (221) below the first predetermined height (211) where the second washing zone (22) of the washing compartment (2) is located.

3. The method according to claim 1, **characterized in that** during the first operating sub-step, the new washing liquid is sprayed upwards from under the second zone (22) of the washing compartment (2) with sufficient force for it to reach a second predetermined height (221) below the first predetermined height (211) where the second washing zone (22) of the washing compartment (2) is located.

4. The method according to claim 3, **characterized in that**:

   - during the second operating sub-step, the new washing liquid reaches a first rack (5) in which the first zone (21) of the washing compartment (2) is obtained;
   - in the first operating sub-step, the new washing liquid, without reaching the first rack (5), coming into contact with a second rack (6) in which the second zone (22) of the washing compartment (2) is obtained; the second rack (6), relative to the direction of the physical vertical, being positioned below the first rack (5);

   at least during the first and the second operating sub-step, the first and the second rack (5, 6) being inside the washing compartment (2).

5. The method according to any of the foregoing claims, **characterized in that** the first operating sub-step is substantially simultaneous with the sub-step of heating forming part of the second washing step.

6. The method according to any of the foregoing claims, **characterized in that** it comprises adjusting the rotation speed of a feed pump (3) which pumps the new washing liquid from the washing compartment (2) to at least one nozzle (46) which sprays it into the washing compartment (2); said rotation speed being, during the first operating sub-step, less than during the second operating sub-step so as not to impart sufficient energy to the washing liquid sprayed upwards from under the second zone (22) to reach the first zone (21) of the washing compartment (2).

7. The method according to any of the foregoing claims, **characterized in that** it comprises regulating the load losses in a conduit (49) running from the washing compartment (2) to the spraying means (4), said load loss adjustment being determined by varying the geometry of the conduit (49); the load losses in

the conduit (49) during the first operating sub-step being higher than during the second operating sub-step.

8. The method according to claim 7 when it depends directly or indirectly on claim 6, **characterized in that** the spraying means (4) comprise the nozzle (46).

9. The method according to any of the foregoing claims, **characterized in that** during the first operating sub-step the new washing liquid is sprayed upwards only from under the second zone (22), whilst during the second operating sub-step the new washing liquid is sprayed at least partly from the bottom upwards and from an intermediate position between the first and the second zone (21, 22) of the washing compartment (2).

10. The method according to any of the foregoing claims, **characterized in that** the first and/or the second operating sub-step is/are performed in a predetermined interval of time.

11. The method according to any of the foregoing claims, **characterized in that** the sub-step of feeding the new washing liquid comprises pumping water at ambient temperature from an external source.

12. The method according to any of the foregoing claims, **characterized in that** the washing liquid used in the first washing step and the new washing liquid used in the second washing step are of the same type.

13. The method according to any of the foregoing claims, **characterized in that** the washing liquid used in the first operating sub-step is heated at least partly during the first washing step or it is heated before the first washing step.

14. The method according to any of the foregoing claims, **characterized in that** the first washing step also comprises spraying the washing liquid against the second zone (22) of the washing compartment (2).

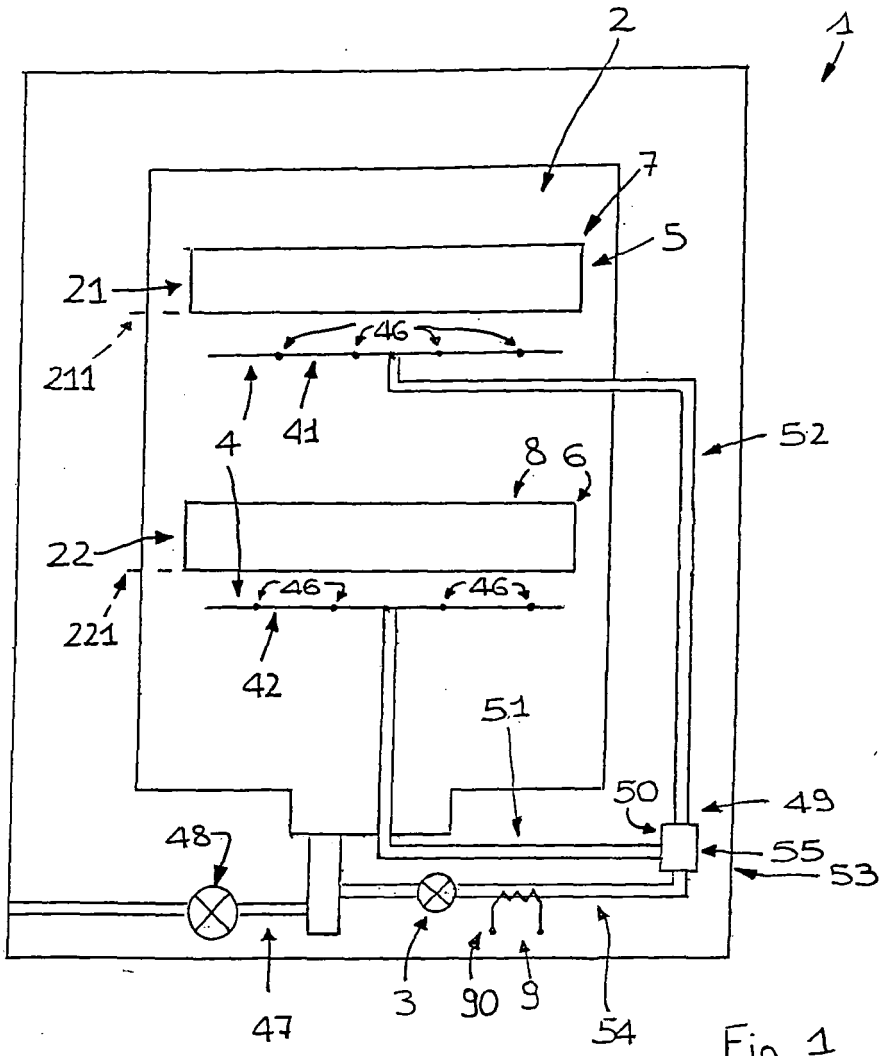

Fig. 1

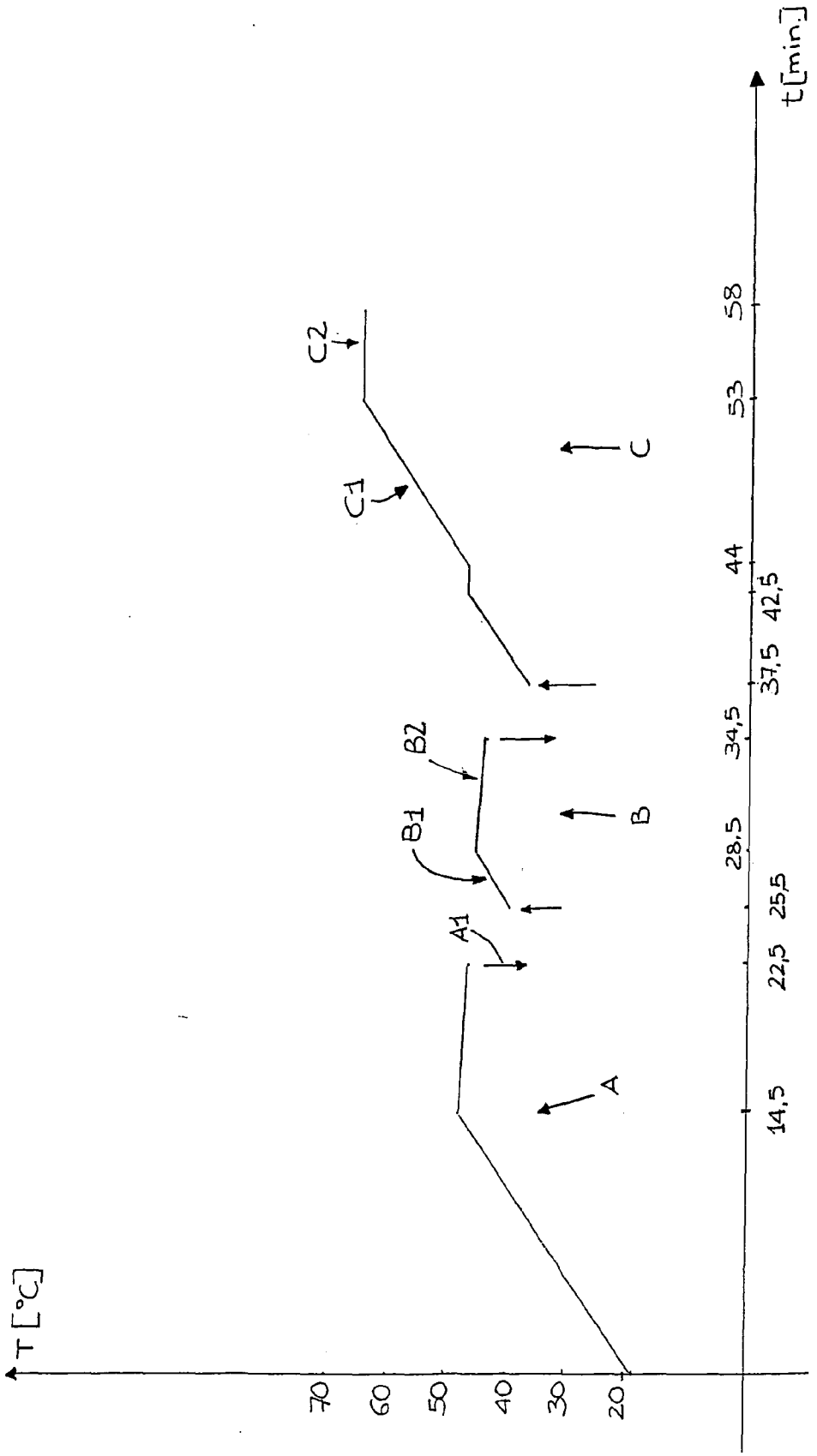
T [°C]
70
60
50
40
30
20
t[min]
14,5
22,5
25,5
28,5
34,5
37,5
42,5
44
53
58
A
A1
B
B1
B2
C
C1
C2

Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 09 01 5604

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 March 2010	Lopez Vega, Javier

CATEGORY OF CITED DOCUMENTS

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