



(11) **EP 2 378 943 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
11.07.2012 Bulletin 2012/28

(51) Int Cl.:
A47L 15/13 ^(2006.01) **A47L 15/44** ^(2006.01)
D06F 39/02 ^(2006.01)

(21) Application number: **09805818.3**

(86) International application number:
PCT/IB2009/007800

(22) Date of filing: **17.12.2009**

(87) International publication number:
WO 2010/073085 (01.07.2010 Gazette 2010/26)

(54) **Washing method for washing appliances**

Waschverfahren für Waschgeräte

Procédé de lavage pour machines à laver

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

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(30) Priority: **22.12.2008 IT RN20080065**

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(43) Date of publication of application:
26.10.2011 Bulletin 2011/43

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Description

Technical Field

[0001] This invention relates to a washing method for a washing appliance capable of implementing the method. The washing appliance might be a laundry washing machine or a dishwasher.

Prior Art

[0002] Normally, dishwashers allow the dishes placed in a washing compartment to be subjected to a chemical wash and a mechanical wash simultaneously. In effect, they use nozzles located on one or more sprayers to spray a jet of liquid under pressure against the dishes to be washed. This liquid under pressure comprises a heated mixture of water and detergent. The liquid under pressure is heated by an electrical heating element. The liquid under pressure directed at the dishes removes dirt through a mechanical washing action while the detergent improves this washing action thanks to the surfactants and enzymes it contains.

[0003] One disadvantage of this is that it is difficult for the washing liquid to reach some parts of the dishes, especially when the washing compartment contains a large number of dishes heaped on top of each other. To overcome this disadvantage, prior art dishwashers use large amounts of water and detergent. Heating the mixture of water and detergent obviously has inherent costs, which are all the higher the greater the quantity of washing liquid to be heated is. Moreover, a higher consumption of detergent has disadvantages not only in terms of the costs of the detergent itself but also in terms of environmental pollution.

[0004] In this context, the technical purpose which forms the basis of this invention is to propose a washing appliance and a washing method that overcome the above mentioned disadvantages of the prior art. Document DE 10 2006 055 345 A1 discloses a method for operating a dishwasher comprising a washing compartment and an atomization facility including an ultrasound generator and a blower, wherein water mixed with active detergent substances is vaporized by the ultrasound generator and conveyed into the washing compartment by the blower.

Disclosure of the Invention

[0005] In particular, this invention has for an aim to provide a washing method that can reduce the consumption of washing liquid, in particular of the water and/or detergent used during washing.

[0006] Another aim of the invention is to provide a washing method that can reduce the consumption of electricity. A further aim of the invention is to provide a washing method that can improve the measure of the cleanness of the objects to be washed (particularly of the

dishes made of porous material).

[0007] The technical purpose and aims specified are achieved by a washing method comprising the technical features described in one or more of the accompanying claims.

Brief Description of the Drawings

[0008] Further features and advantages of the invention are more apparent in the non-limiting description which follows of a preferred non-exclusive embodiment of a washing appliance illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic view of a washing appliance suitable for implementing this invention;
- Figure 2 shows a detail of the washing appliance according to figure 1;
- Figure 3 shows an example of a washing cycle that implements the washing method; the variable on the x-axis is time, while the variable on the y-axis is the temperature measured during the washing cycle near the articles to be washed.

Detailed Description of the Preferred Embodiments of the Invention

[0009] In the accompanying drawings, the numeral 1 denotes a washing appliance.

[0010] The washing appliance 1 comprises a washing compartment 2 designed to accommodate the articles to be washed. The appliance 1 also comprises washing means 3 for mechanically washing the articles. Advantageously, the washing appliance 1 comprises a dishwasher 10. In that case, the articles placed in the washing compartment 2 are "dishes", meaning by this term any article suitable for washing in a dishwasher, namely: plates, crockery, pots, pans, cutlery, glassware, etc.

[0011] The washing compartment 2 comprises first means 21 for positioning the dishes. Advantageously, the first positioning means 21 comprise a first rack 210. Normally, there are second positioning means 22 located under the first positioning means 21. The second positioning means 22 comprise a second rack 220. The first and second racks 210, 220 can be pulled out from the washing compartment 2, but during the washing cycle are located inside the washing compartment 2.

[0012] The washing means 3 comprise at least one first sprayer 30 which directs at least one jet of liquid under pressure at the articles to be washed in the washing compartment 2.

[0013] Advantageously, the washing means 3 also comprise a second sprayer 300 which directs at least one jet of liquid under pressure at the articles to be washed in the washing compartment 2. The first and the second sprayer 30 and 300 are usually mounted one under the first rack 210 and the other under the second rack 220.

[0014] In an alternative embodiment not illustrated, the washing appliance 1 is a laundry washing machine. By "laundry washing machine" is meant a washing appliance 1 designed to wash textile items (garments, household linen, etc.). In that case, the washing means 3 comprise a rotary drum for receiving the articles (the textile items) to be washed. The rotary drum is located inside the washing compartment 2. As it rotates, the drum transfers motion to the laundry items it contains, thus stirring them and creating a mechanical action.

[0015] Generally speaking, the washing appliance 1 comprises means 40 for nebulizing an aqueous solution containing a chemical detergent in the washing compartment 2 (conveniently, this chemical detergent is a washing aid such as, for example, a washing powder). In this specification, the term chemical detergent may also refer to the rinse aid used in dishwashers. In the case of a dishwasher 10 the nebulizing means 40 are mounted on the door 7 which gives the user access to the washing compartment 2. More specifically, the nebulizing means 40 might be mounted on the inner door panel, that is, the part of the door 7 that delimits the inside of the washing compartment 2.

[0016] In alternative embodiments, the nebulizing means 40 are mounted on the first or the second rack 210, 220, or on the bottom, or one of the sidewalls of, the washing compartment 2. Advantageously, safety means may be provided to prevent the door 7 from being opened when the nebulizing means 40 are active. The safety means comprise a door lock that may be activated electronically or by an electromechanical actuator.

[0017] The nebulizing means 40 comprise a high-frequency (typically ultrasound) vibration actuator 400. More specifically, the vibration actuator 400 is an ultrasound piezoelectric actuator.

[0018] The nebulizing means 40 also comprise a container 41 which holds the aqueous solution to be nebulized. The vibration actuator 400 is functionally connected to the container 41. More specifically, the vibration actuator 400 is located inside the container 41. In the preferred embodiment, the vibration actuator 400 is in contact with the aqueous solution inside the container 41 (more specifically, the vibration actuator 400 is at least partly immersed in the aqueous solution inside the container 41).

[0019] When the vibration actuator 400 is set in high-frequency vibration it causes the aqueous solution inside the container 41 to vibrate, thereby nebulizing it.

[0020] The container 41 is fluid-dynamically connectable to the washing compartment 2 to enable the nebulized particles located in the container 41 to diffuse into the washing compartment 2.

[0021] The aqueous solution containing the chemical detergent might be obtained by placing a solid chemical detergent (powder or tablet) in contact with water (in particular water from the main household water supply).

[0022] Advantageously, the solid chemical detergent is placed in the container 41 by a user. For this purpose,

the container 41 may have an opening that can be conveniently closed by a door 420. Conveniently, a passage 421 in the door 420 allows the fluid dynamic connection between container 41 and the washing compartment 2 even when the door 420 is closed. That means the nebulized particles can diffuse into the washing compartment 2.

[0023] The washing appliance 1 also comprises a pipe 43 for feeding a liquid into the container 41. In the preferred embodiment, the feed pipe 43 allows the container 41 to be supplied with water.

[0024] If necessary, the aqueous solution might also comprise a chemical detergent in liquid form.

[0025] The nebulizing means 40 create an aerosol that diffuses into the washing compartment 2. An aerosol is a colloid in which a liquid or a solid are dispersed in a gas. In the preferred embodiment, the aerosol is an aqueous solution dispersed in a gas and the aqueous solution contains the chemical detergent. This causes the particles of the aqueous solution containing the chemical detergent to form a suspension in the atmosphere inside the container 41. This aerosol then diffuses into the washing compartment 2.

[0026] A mist that shrouds the articles to be washed is thus formed in the washing compartment 2. In the case of the dishwasher 10, for example, that makes it possible to reach even the parts of the articles to be washed that are difficult to access by the sprayers 30, 300.

[0027] Further, the mist tends to settle on the articles to be washed (typically on the dishes) forming a thin liquid film.

[0028] Preferably, the size of the aerosol particles is in the order of nanometres (the size of the particles falls preferably within a range of between 1 nanometre and 1 micrometre).

[0029] This allows particularly effective washing of dishes having a porous surfaces since the extremely small size of the particles allows the particles to find their way more easily into the surface irregularities of the dishes of this type and of the encrusted dirt deposits on them.

[0030] The washing appliance 1 also comprises a rinse aid tank 44. The tank 44 can be placed in fluid communication with the container 41 in order to feed the rinse aid (usually in liquid form) into the container 41 where it can be nebulized. Advantageously, the tank 44 is adjacent to the container 41 and can be fluid dynamically connected to the container 41 through an opening that can be occluded by a valve 45. As described in more detail below, the dishwasher 10 allows the rinse aid to be supplied to the washing compartment 2 by nebulization.

[0031] Advantageously, the washing appliance 1 comprises means 5 for temporally controlling the operation of the washing means 3 and of the nebulizing means 40. The temporal control means 5 can implement a first procedure where the nebulizing means 40 are switched on after the washing means 3 have been switched off.

[0032] The control means 5 comprise an electronic

control system 50 operatively connected to the washing means 3 and to the nebulizing means 40. More specifically, the electronic control system 50 controls the operation of the vibration actuator 400 and/or of a pump 6 in a hydraulic circuit 60 that enables the washing liquid to be fed under pressure to the washing means 3 and/or of a flow shutoff device 62 which allows, prevents or regulates the flow of washing liquid along the hydraulic circuit 60 (more specifically, it enables and/or regulates the flow of washing liquid to the first and/or to the second sprayer 30, 300).

[0033] The washing appliance 1 may comprise means for heating the washing compartment 2. Advantageously, the washing appliance 1 comprises a heating element 61 that heats a washing liquid before the latter is fed into the washing compartment 2 through the washing means 3. That way, the washing compartment 2 is heated by the washing liquid (advantageously to temperatures around 40°C). This allows the aerosol to have a more effective action, as explained in more detail below.

[0034] The present invention relates to a washing method for washing articles placed in a washing compartment 2 of a washing appliance 1. Said method may be implemented by a washing appliance having one or more of the technical features of the washing appliance 1 described above.

[0035] More specifically, in the preferred embodiment of it, the washing appliance 1 is a dishwasher 10 (but it might also be a laundry washing machine).

[0036] The method comprises implementing (more specifically, the method involving the implementation by the washing appliance 1 of) a first procedure comprising the steps of:

- subjecting the articles located in the washing compartment 2 to a mechanical wash (see reference A, Figure 3);
- applying a chemical detergent in aqueous solution in the form of a nebulized spray inside the washing compartment 2 so as to subject the articles (previously placed in the washing compartment 2) to a chemical wash.

[0037] The nebulized spray of aqueous solution is applied in the washing compartment 2 after completing the mechanical wash.

[0038] In the preferred embodiment, at least a part of the chemical wash performed through nebulization is not simultaneous with any step of mechanically washing the articles to be washed. At least two separate time steps are therefore contemplated: one of mechanical washing only and one of chemical washing only.

[0039] In the case of a dishwasher 10, the mechanical wash makes it possible to start attacking the more stubborn encrusted dirt on the dishes.

[0040] The mechanical washing step comprises the step of spraying a washing liquid under pressure against the articles to be washed. The pressure of the washing

liquid therefore enables a first wash to be performed. The washing liquid also softens the encrusted dirt, facilitating its mechanical removal.

[0041] The washing liquid under pressure is advantageously sprayed by the washing means 3 (more specifically, by the first and second sprayers 30, 300).

[0042] The washing liquid under pressure does not contain any chemical detergents to aid washing. More specifically, the washing liquid is water (in particular water from the main household water supply). Advantageously, after being sprayed, the washing liquid falls by gravity to the bottom of the washing compartment 2 (possibly after coming into contact with the dishes). Advantageously, during the step of spraying a washing liquid under pressure against the articles to be washed, the washing liquid that collects on the bottom of the washing compartment 2 is recycled and again sprayed against the articles to be washed. In effect, there is a pipe through which, thanks to the pump 6, the washing liquid is conveyed out of the bottom of the washing compartment 2 and pumped back to the washing means 3. All this occurs in a continuous cycle during the mechanical washing step. The pipe forms part of the hydraulic circuit 60.

[0043] Nebulization of the aqueous solution containing a chemical detergent is preceded by a step of heating the washing compartment 2 (or in any case heating the objects to be washed placed inside it). This step of heating the washing compartment 2 permits heating of the articles to be washed. The step of heating the washing compartment 2 is carried out simultaneously with the step of mechanically washing the articles to be washed.

[0044] The step of heating the washing compartment 2 comprises bringing the washing compartment 2, at least in the part of it where the articles to be washed are located, to a temperature in a range of between 30°C and 50°C (preferably around 90°C). In effect, the nebulization of the aqueous solution containing a chemical detergent determines the presence of suspended particles of detergent in the washing compartment 2. These particles of detergent comprise enzymes (in particular lytic enzymes) which break certain chemical bonds characteristic of proteins, lipids and carbohydrates. The action of these enzymes is at its optimum at temperatures in a range of between 30°C and 50°C, preferably around 40°C. Heating the washing compartment 2 (or in any case the objects to be washed placed inside it) before nebulization is therefore important for activating the lytic enzymes. The mechanical washing step is performed in a predetermined time interval of between 10 and 20 minutes. Alternatively, a temperature sensor might be provided in the washing compartment 2, the mechanical washing step coming to an end when the temperature sensor detects that a predetermined temperature (for example 40°C) has been reached.

[0045] The step of heating the washing compartment 2 comprises heating at least a first part of the washing liquid before spraying said first part of the washing liquid against the articles to be washed.

[0046] The step of heating a first part of the washing liquid is at least partly simultaneous with the step of spraying at least a second part of the washing liquid in the washing compartment 2.

[0047] A particularly advantageous aspect is the fact that the heating step is performed during the mechanical washing step. That saves time and also permits heating to be performed by the customary hydraulic circuit 60 of any washing appliance 1 (in particular any dishwasher 10). As mentioned above, the washing liquid is heated by an electrical heating element 61. More specifically, this occurs while the washing liquid is being conveyed from the bottom of the washing compartment 2 to at least one nozzle which sprays the washing liquid at the dishes placed in the washing compartment 2. Advantageously, the at least one nozzle forms part of the washing means 3.

[0048] As stated above, nebulization comprises the step of creating an aerosol from the aqueous solution containing the chemical detergent (see for example, reference B, Figure 3). The aerosol shrouds the articles to be washed in a mist. Advantageously, the particles of chemical detergent in the aerosol diffuse into the washing compartment 2 without any forced convection. The nebulization step is accomplished by the nebulizing means 40 (in particular through the vibration actuator 400 as described below).

[0049] The step of creating an aerosol from the aqueous solution containing the chemical detergent does not temporally overlap the step of spraying a washing liquid under pressure against the articles to be washed.

[0050] The aqueous solution to be nebulized is obtained by placing a chemical detergent in a solid or liquid state in contact with water (in particular water from the main household water supply) in a single container 41. Preferably, the washing appliance 1 comprises, as a tank for feeding in the detergent, only the container 41.

[0051] The method comprises a step of a user placing a quantity of detergent in the container 41 before the washing cycle starts. During the washing cycle, before the detergent is nebulized, the method comprises feeding water into the container 41. As stated above, this may be done through the feed pipe 43. At the end of the step of creating the aerosol, a quantity of detergent may remain in the container 41. The step of creating the aerosol advantageously lasts for a time interval of between 5 and 10 minutes, with a quantity of solution to be nebulized of around 200-250ml. With larger quantities of solution, the duration of the step of creating an aerosol may advantageously be increased.

[0052] After the end of the step of creating the aerosol, the method comprises a further mechanical wash which comprises spraying the washing compartment 2 with at least one jet of liquid in which is dissolved the residual chemical detergent remaining in the container 41 (after the step of creating the aerosol). In this regard, see for example the steps denoted by the reference characters D and E in Figure 3. During the further mechanical wash, first the liquid jet is heated by the heating element 61

(see reference D, Figure 3), then the heating means are switched off (see reference E, Figure 3). For the further mechanical wash, again the washing means 3, more specifically, the first and second sprayers 30, 300, are used.

[0053] The further mechanical wash is advantageously performed a few minutes after the end of the step of creating the aerosol, so as to allow the aerosol to apply its action on the articles to be washed (there is thus a waiting step, denoted by the reference character C in Figure 3; the waiting step "C" is an optional step during which the aerosol nebulized during the step labelled "B" is allowed to act and the mechanical components of the dishwasher 10, more specifically, the pump 6 and the vibration actuator 400, are off). The further mechanical wash avoids wasting the remaining detergent in the container 41. In this regard, the method according to the invention contemplates conveying the residual detergent (more specifically, the solid detergent) to the bottom of the washing compartment 2. Advantageously, the residual detergent on the bottom of the washing compartment 2 mixes with the washing liquid used during the mechanical wash and lying on the bottom of the washing compartment 2. To convey the residual detergent to the bottom of the washing compartment 2, a quantity of water is fed into the container 41 (advantageously through the pipe 43) and an outlet port 46 opens in the container 41. The quantity of water fed into the container 41 can flow out of the container 41 through the outlet port 46, carrying the residual chemical detergent with it. In an alternative embodiment not illustrated the dishwasher comprises a system of tipping the container 41. That way, the water and the residual chemical detergent fall out of the container 41 by gravity, advantageously through the at least one passage 421 made in the door 420. Once out of the container 41 the water and the residual chemical detergent are conveyed by gravity to the bottom of the washing compartment 2.

[0054] On completion of the further mechanical wash, the used washing liquid is drained out of the washing appliance 1.

[0055] In the method according to the invention, after implementing the first procedure, the washing appliance 1 might implement a second procedure. The second procedure is run when the washing appliance 1 is a dishwasher 10. The second procedure comprises the steps of:

- spraying a further heated liquid under pressure against the articles to be washed located in the washing compartment 2 (for example, see reference F, Figure 3);
- nebulizing an aqueous solution comprising a rinse aid inside the washing compartment 2 (for example, see reference G, Figure 3); During the second procedure, the step of nebulizing the aqueous solution comprising the rinse aid follows the step of spraying the further heated liquid under pressure.

[0056] During the second procedure, the step of spraying the further heated liquid under pressure makes it possible for the dishes to be heated. This facilitates evaporation of a thin film of liquid present on the dishes at the end of the step of nebulizing the aqueous solution comprising the rinse aid (in the second procedure, this liquid film is formed during the step of spraying the further heated liquid under pressure; during nebulization, particles of rinse aid settle on the film).

[0057] The step of spraying the further heated liquid during the second procedure causes heating of the washing compartment 2, at least in the part of it where the articles to be washed are located, to a temperature of between 40°C and 60°C, preferably 50°C.

[0058] Despite the lower temperature (in other dish-washers, hot rinsing is normally carried out at around 70°C) effective evaporation can take place more quickly than in a situation where the rinse aid is fed in the traditional manner, that is to say, mixed with water and sprayed through a sprayer. That is because the liquid film that settles on the dishes during nebulization is very thin (and can therefore evaporate quickly).

[0059] The step of nebulizing the aqueous solution comprising the rinse aid is preceded by the step of feeding the rinse aid into the container 41. In effect, the container 41 houses the vibration actuator 400 which permits nebulization of a liquid (in this case, the aqueous solution containing the rinse aid). In this regard, the step of feeding the rinse aid into the container 41 comprises placing the rinse aid tank 44 into fluid communication with the container 41. The tank 44 is placed in fluid communication with the container 41 by opening the valve 45 (described above).

[0060] This invention has important advantages. First of all, it allows uniform washing of the articles. Moreover, it minimizes consumption of energy and detergent.

[0061] It shall be understood that the invention described may be modified and adapted in several ways without departing from the scope of the inventive concept as defined by the appended claims. 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 dimensions, may be changed to meet specific needs.

Claims

1. A method for washing articles placed in a washing compartment of a washing appliance, the method involving the implementation by the washing appliance (1) of a first procedure comprising the steps of:

- subjecting the articles located in the washing compartment (2) to a mechanical wash, the mechanical wash comprising the step of spraying a washing liquid under pressure against the articles to be washed;

- applying a chemical detergent in aqueous solution in the form of a nebulized spray inside the washing compartment (2) so as to subject the articles to a chemical wash;

characterized in that:

- i) in the first procedure the nebulized spray of aqueous solution is applied in the washing compartment (2) after completing the mechanical wash;
- ii) the washing liquid under pressure does not contain any chemical detergents to aid washing and
- iii) application of the nebulized spray of aqueous solution containing the chemical detergent is preceded by a step of heating the washing compartment (2).

2. The method according to claim 1, **characterized in that** heating the washing compartment (2) comprises bringing the washing compartment (2), at least in a part of it where the articles to be washed are located, to a temperature in a range of between 30°C and 50°C.

3. The method according to claim 1 or 2, **characterized in that** heating the washing compartment (2) comprises heating at least a first part of the washing liquid before spraying said first part of the washing liquid against the articles to be washed.

4. The method according to claim 3, **characterized in that** the step of heating a first part of the washing liquid is at least partly simultaneous with the step of spraying at least a second part of the washing liquid in the washing compartment (2).

5. The method according to any of the foregoing claims, **characterized in that** application of the nebulized spray comprises the step of creating an aerosol from the aqueous solution containing the chemical detergent.

6. The method according to claim 5, **characterized in that** the step of creating an aerosol from the aqueous solution containing the chemical detergent does not temporally overlap the step of spraying a washing liquid under pressure against the articles to be washed.

7. The method according to claim 5 or 6, **characterized in that** the aqueous solution is obtained by placing water and the chemical detergent in the solid state in contact with each other in a single container (41); after the end of the step of creating the aerosol, the method comprising a further step of mechanically washing the articles, this further mechanical wash comprising spraying the washing compartment (2)

with at least one jet of liquid in which the residue of chemical detergent remaining in the container (41) after the step of creating the aerosol is dissolved.

8. The method according to any of the foregoing claims, **characterized in that** the washing appliance (1) comprises a dishwasher (10) which, after implementing the first procedure, implements a second procedure comprising the steps of:

- spraying a further heated liquid under pressure against the articles to be washed located in the washing compartment (2);
- nebulizing an aqueous solution comprising a rinse aid inside the washing compartment (2);

the nebulizing step following the step of spraying the further heated liquid under pressure in the second procedure;
the step of spraying the further heated liquid under pressure during the second procedure enabling the dishes to be heated, thereby facilitating the subsequent evaporation of a liquid film deposited on the dishes during nebulization of the aqueous solution comprising the rinse aid.

9. The method according to claim 8, **characterized in that** the step of spraying the further heated liquid during the second procedure causes heating of the washing compartment (2), at least in a part of it where the articles to be washed are located, to a temperature of between 40°C and 60°C.

Patentansprüche

1. Verfahren zum Waschen von Gegenständen, die in einem Waschraum eines Waschgeräts platziert sind, wobei das Verfahren die Durchführung eines ersten Vorgangs durch das Waschgerät (1) einschließt, welcher die Schritte umfasst:

- Unterziehen der sich in dem Waschraum (2) befindenden Gegenstände einer mechanischen Wäsche, wobei die mechanische Wäsche den Schritt eines Sprühens einer Waschflüssigkeit unter Druck gegen die zu waschenden Gegenstände umfasst;
 - Aufbringen eines chemischen Lösungsmittels in wässriger Lösung in der Form eines zerstäubten Sprays innerhalb des Waschraums (2) derart, dass die Gegenstände einer chemischen Wäsche unterzogen werden;
- dadurch gekennzeichnet, dass**

- i) das zerstäubte Spray von wässriger Lösung in dem ersten Vorgang in dem Waschraum (2) nach dem Vollenden der mecha-

nischen Wäsche aufgebracht wird;

ii) die Waschflüssigkeit unter Druck keine chemischen Lösungsmittel zur Waschlilfe enthält und

iii) dem Aufbringen des zerstäubten Sprays von wässriger Lösung, die das chemische Lösungsmittel enthält, ein Schritt des Beheizens des Waschraums (2) vorangeht.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** Beheizen des Waschraums (2) umfasst, dass der Waschraum (2), wenigstens in einem Teil von ihm, wo sich die zu waschenden Gegenstände befinden, auf eine Temperatur in einem Bereich von zwischen 30°C und 50°C gebracht wird.

3. Verfahren nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** Aufheizen des Waschraums (2) Aufheizen wenigstens eines ersten Teils der Waschflüssigkeit umfasst, bevor der erste Teil der Waschflüssigkeit gegen die zu waschenden Gegenstände gesprüht wird.

4. Verfahren nach Anspruch 3, **dadurch gekennzeichnet, dass** der Schritt des Aufheizens eines ersten Teils der Waschflüssigkeit wenigstens teilweise gleichzeitig mit dem Schritt des Sprühens wenigstens eines zweiten Teils der Waschflüssigkeit in dem Waschraum (2) erfolgt.

5. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Aufbringen des zerstäubten Sprays den Schritt des Erzeugens eines Aerosols aus der wässrigen Lösung, die das chemische Lösungsmittel enthält, umfasst.

6. Verfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** der Schritt des Erzeugens eines Aerosols aus der wässrigen Lösung, die das chemische Lösungsmittel enthält, den Schritt des Sprühens einer Waschflüssigkeit unter Druck gegen die zu waschenden Gegenstände zeitlich nicht überlappt.

7. Verfahren nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** die wässrige Lösung erhalten wird, indem Wasser und das chemische Lösungsmittel im festen Zustand in gegenseitigem Kontakt in einem einzelnen Behälter (41) platziert werden; wobei das Verfahren nach dem Ende des Schritts des Erzeugens des Aerosols einen weiteren mechanischen Waschschrift der Gegenstände umfasst, wobei dieses weitere mechanische Waschen das Besprühen des Waschraums (2) mit wenigstens einem Flüssigkeitsstrahl umfasst, in welchem der Rest des chemischen Lösungsmittels, das in dem Behälter (41) nach dem Aerosol-Erzeugungsschritt verbleibt, gelöst wird.

8. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Waschgerät (1) eine Spülmaschine (10) umfasst, welche nach Durchführen des ersten Vorgangs einen zweiten Vorgang durchführt, der die Schritte umfasst:

- Sprühen einer weiteren erhitzten Flüssigkeit unter Druck gegen die zu waschenden Gegenstände, die sich in dem Waschraum (2) befinden;
- Zerstäuben einer wässrigen Lösung, die einen Klarspüler umfasst, innerhalb des Waschraums (2);

wobei der Zerstäubungsschritt dem Schritt des Sprühens der weiteren erhitzten Flüssigkeit unter Druck in dem zweiten Vorgang nachfolgt; wobei der Schritt des Sprühens der weiteren erhitzten Flüssigkeit unter Druck während des zweiten Vorgangs es ermöglicht, das Geschirr zu erhitzen, womit die anschließende Verdampfung eines Flüssigkeitsfilms erleichtert wird, der auf dem Geschirr während der Zerstäubung der wässrigen Lösung, die den Klarspüler umfasst, abgelagert wird.

9. Verfahren nach Anspruch 8, **dadurch gekennzeichnet, dass** der Schritt des Sprühens der weiteren erhitzten Flüssigkeit während des zweiten Vorgangs das Erhitzen des Waschraums (2), wenigstens in einem Teil von ihm, wo sich die zu waschenden Gegenstände befinden, auf eine Temperatur von zwischen 40°C und 60°C bewirkt.

Revendications

1. Procédé permettant de laver des articles placés dans un compartiment de lavage d'une machine à laver, le procédé impliquant la mise en oeuvre par la machine à laver (1) d'une première procédure comportant les étapes comprenant de :

- soumettre les articles placés dans le compartiment de lavage (2) à un lavage mécanique, le lavage mécanique comportant l'étape consistant à pulvériser un liquide de lavage sous pression contre les articles à laver ;
- appliquer un détergent chimique en solution aqueuse sous la forme d'un spray nébulisé à l'intérieur du compartiment de lavage (2) de façon à soumettre les articles à un lavage chimique ;

caractérisé en ce que :

- i) dans la première procédure le spray nébulisé de la solution aqueuse est appliqué dans le compartiment de lavage (2) après la fin du lavage mécanique ;

ii) le liquide de lavage sous pression ne contient aucun détergent chimique pour aider au lavage et

iii) l'application du spray nébulisé de la solution aqueuse contenant le détergent chimique est précédée d'une étape de chauffage du compartiment de lavage (2).

2. Procédé selon la revendication 1, **caractérisé en ce que** le chauffage du compartiment de lavage (2) comprend de porter le compartiment de lavage (2), au moins dans la partie du compartiment dans laquelle les articles à laver sont placés, à une température se situant dans une plage comprise entre 30°C et 50°C.

3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** chauffer le compartiment de lavage (2) comprend de chauffer au moins une première partie du liquide de lavage avant de pulvériser ladite première partie du liquide de lavage contre les articles à laver.

4. Procédé selon la revendication 3, **caractérisé en ce que** l'étape consistant à chauffer une première partie du liquide de lavage est au moins, en partie, concomitante de l'étape de pulvérisation d'au moins une seconde partie du liquide de lavage dans le compartiment de lavage (2).

5. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'application du spray nébulisé comprend l'étape consistant à créer un aérosol à partir de la solution aqueuse contenant le détergent chimique.

6. Procédé selon la revendication 5, **caractérisé en ce que** l'étape de création d'un aérosol à partir de la solution aqueuse contenant le détergent chimique ne chevauche pas dans le temps l'étape de pulvérisation d'un liquide de lavage sous pression contre les articles à laver.

7. Procédé selon la revendication 5 ou 6, **caractérisé en ce que** la solution aqueuse est obtenue en plaçant de l'eau et le détergent chimique à l'état solide en contact l'un avec l'autre dans un conteneur unique (41) ; après la fin de l'étape de création de l'aérosol, le procédé comprenant une autre étape consistant à laver mécaniquement les articles, ce lavage mécanique supplémentaire comportant la pulvérisation sur le compartiment de lavage (2) d'un jet de liquide dans lequel le résidu de détergent chimique restant dans le conteneur (41) après l'étape de création de l'aérosol est dissous.

8. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la machine à

laver (1) comporte un lave-vaisselle (10) qui, après mise en oeuvre de la première procédure, met en oeuvre une seconde procédure comportant les étapes comprenant de :

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- pulvériser un autre liquide chauffé sous pression contre les articles à laver placés dans le compartiment de lavage (2) ; ;
- nébuliser une solution aqueuse comportant un produit de rinçage à l'intérieur du compartiment de lavage (2) ; l'étape de nébulisation suivant l'étape de pulvérisation du liquide chauffé supplémentaire sous pression dans la seconde procédure ;

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l'étape de pulvérisation du liquide chauffé supplémentaire sous pression pendant la seconde procédure permettant aux assiettes d'être chauffées, facilitant de ce fait l'évaporation ultérieure d'un film liquide déposé sur les assiettes pendant la nébulisation de la solution aqueuse comprenant le produit de rinçage.

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9. Procédé selon la revendication 8, **caractérisé en ce que** l'étape de pulvérisation du liquide chauffé supplémentaire pendant la seconde procédure entraîne le chauffage du compartiment de lavage (2), dans la partie au moins de ce compartiment dans laquelle les articles à laver sont placés, jusqu'à une température comprise entre 40°C et 60°C.

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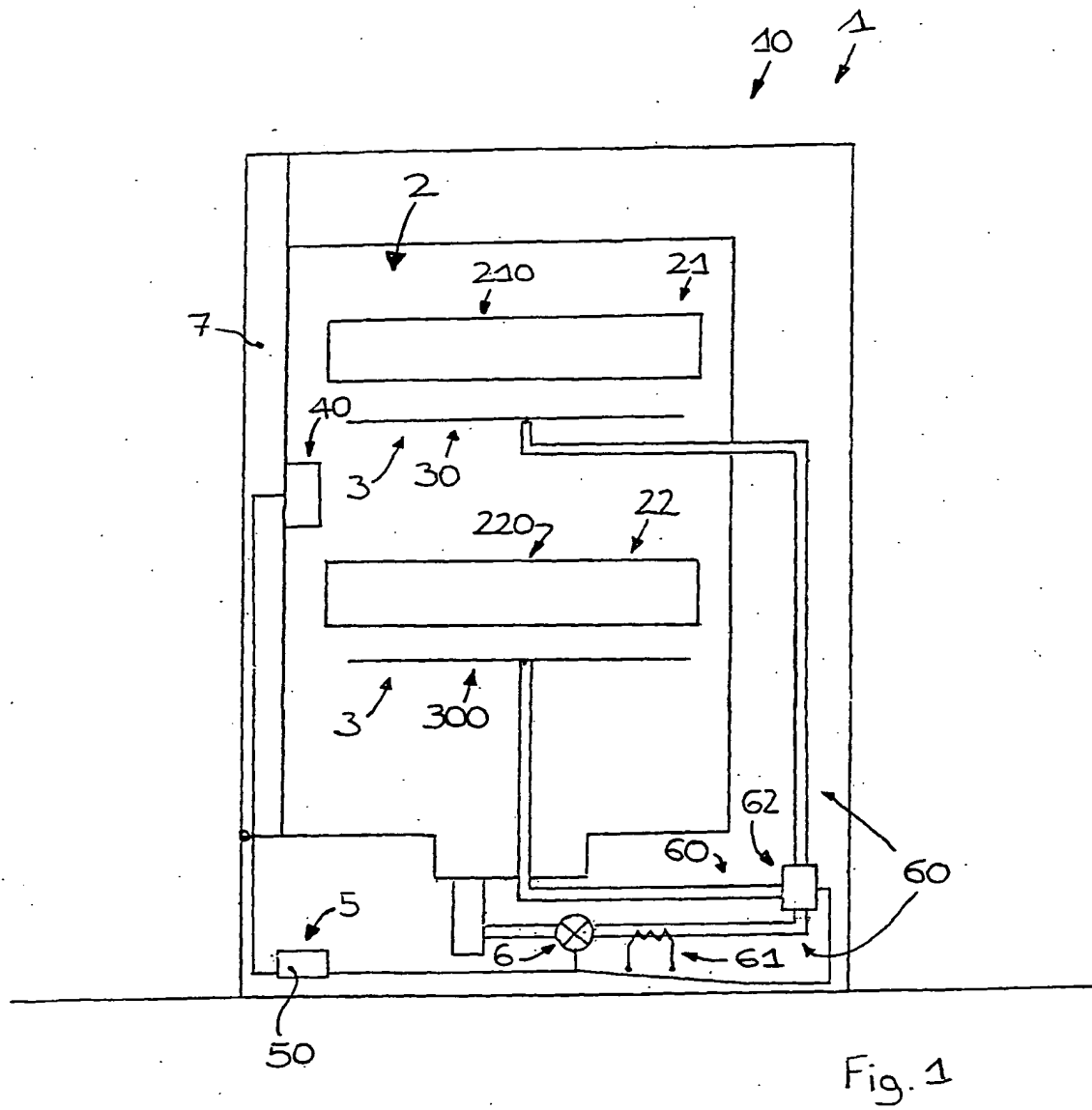
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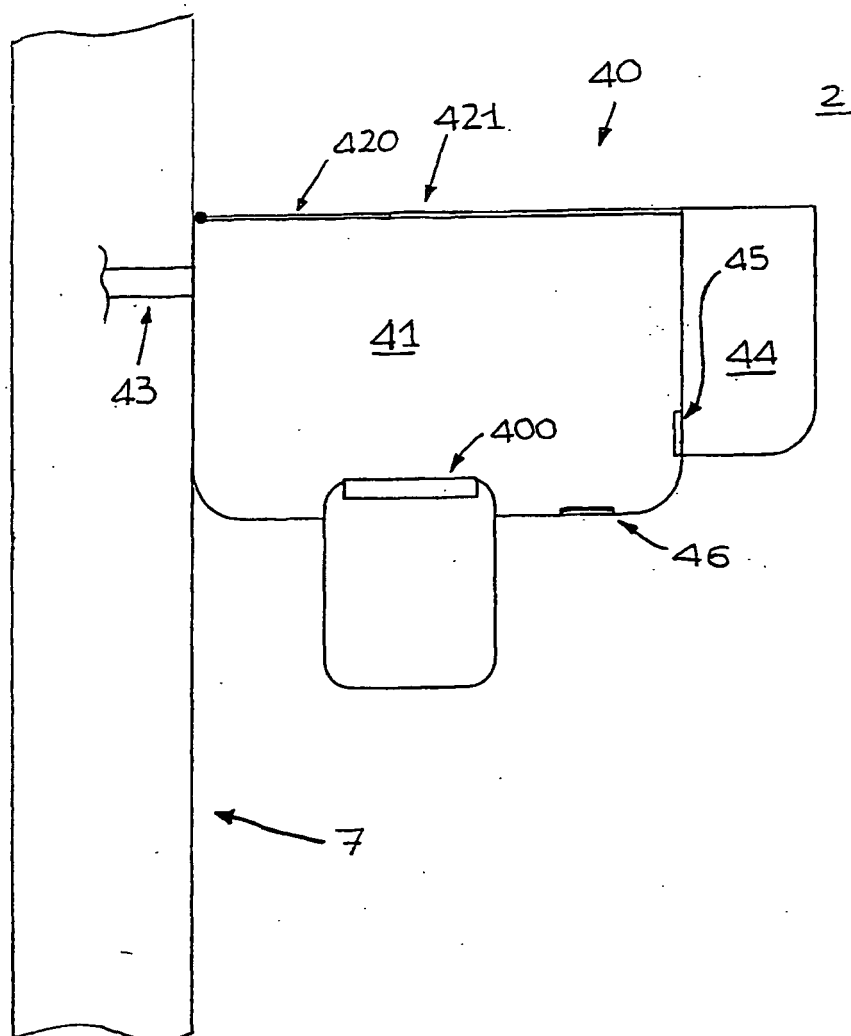


Fig. 2

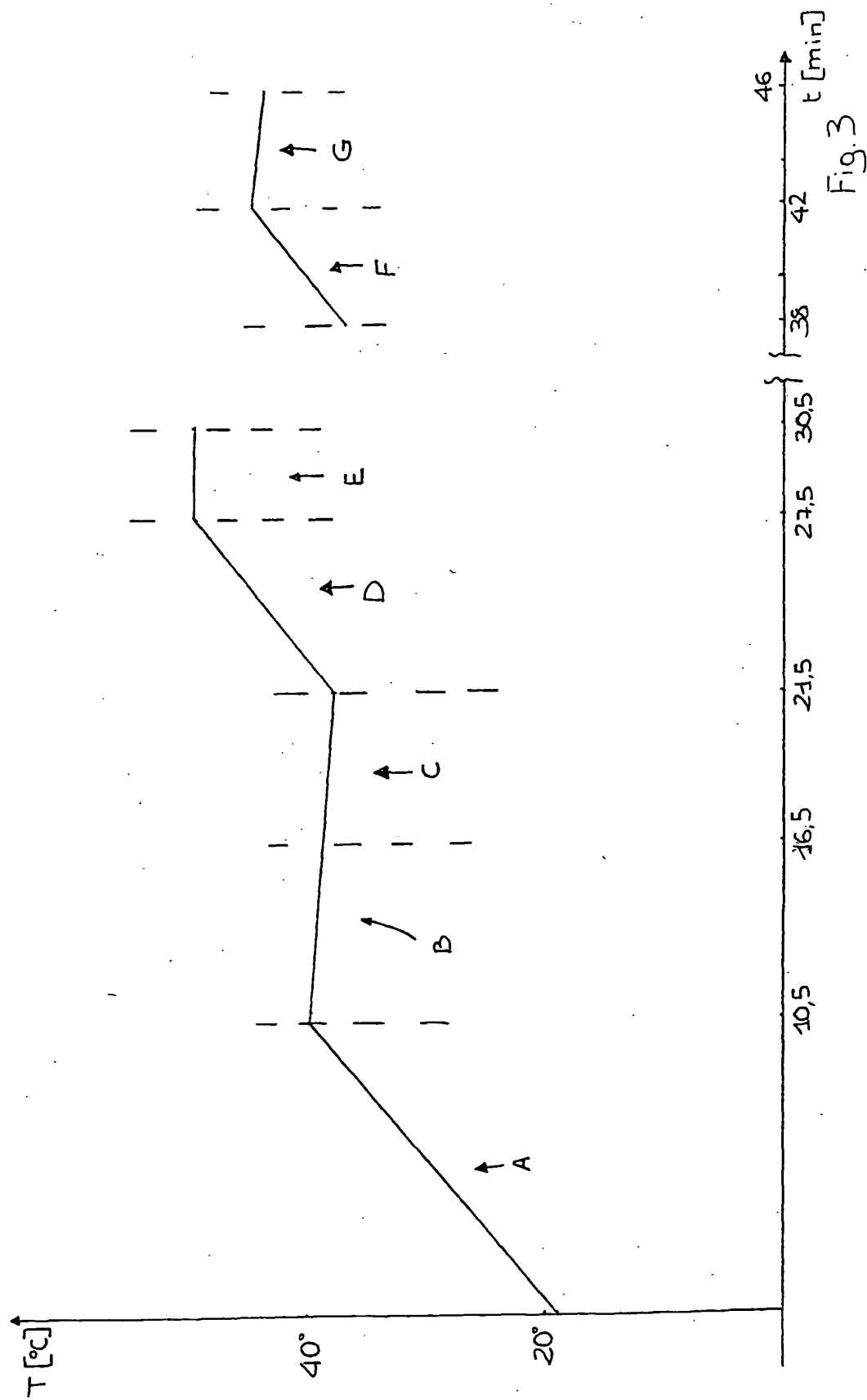


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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