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(54) **Dishwashing machine with nebuliser and dish treatment method**

Geschirrspülmaschine mit Vernebler und Geschirrbehandlungsverfahren

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(73) Proprietor: **Candy S.p.A.**
20052 Monza (MB) (IT)

(72) Inventor: **Fumagalli, Silvano**
20052 Monza, Monza Brianza (IT)

(74) Representative: **Leihkauf, Steffen Falk et al**
Jacobacci & Partners S.p.A.
Via Senato 8
20121 Milano (IT)

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Description

[0001] The present invention relates to a dishwashing machine of the type comprising a washing container to receive dishes to be washed, a spraying device adapted to spray a non-nebulised washing liquid on the dishes arranged in the washing container, and a heating device (10) adapted to heat the washing liquid. Particularly, the present invention relates to a dishwashing machine provided with washing liquid nebulisation means.

[0002] The present invention further relates to a dish treatment method by means of a dishwashing machine.

[0003] During the washing cycles, the washing liquid is usually introduced in the washing container by means of spraying devices and, after the last washing cycle, a final rinsing step is performed, in which a brightener substance can be added to the washing liquid.

[0004] To the purposes of the washing result, it resulted to be advantageous to evenly spread a washing liquid containing detergent substances on the dish surfaces still before the washing cycle, and to make such washing liquid acting on the incrustations and impurities for a given period of time.

[0005] Therefore, in some known washing programs, at the beginning of the washing cycle, the dishes are wetted by a spraying device through a washing liquid previously mixed with a detergent.

[0006] Dishwashing machines with spraying devices are known, in which the washing liquid is distributed in the washing container by means of rotating sprayer arms. Due to the usually rectangular shape of the washing container, and the circular spray zone of the rotating sprayer arms, the washing liquid does not result to be evenly distributed in all the zones of the washing container.

[0007] Stationary spraying devices or nozzles are further known, the invariable spray directions of which cannot however ensure an even washing of all the dishes arranged in the washing container.

[0008] In other fields of the art, for example in medicine, in the chemistry, and environmental air conditioning, further auxiliary means for the nebulisation of liquids have been developed, for example aerosol mechanical generators, and particularly piezoelectric aerosol generators.

[0009] A use of these mechanical means to nebulise liquids is also known in relation to dishwashing machines. The very limited dimension of the single aerosol drops which can be generated by piezoelectric nebulisators allows a better penetration thereof in the incrustations and impurities, thus increasing the detergent effect of detergent substances dissolved in the nebulised washing liquid.

[0010] The publication EP 0 487 474 A1 discloses, for example, a dishwashing machine in which the washing liquid containing a detergent substance is nebulised in the washing container via an ultrasound generator.

[0011] With the aim of further improving an even distribution of the nebulised washing liquid, DE 10 2006 055 345 A1 proposes to combine the ultrasound nebuliser known from EP 0 487 474 A1 with a blower to forcedly convey the nebulised washing liquid in the washing container. Through this known solution, a better distribution of the liquid nebulised in the washing container is obtained. However, the provision of an electric blower involves high manufacturing costs, a reduction of the space available to contain the dishes to be washed, as well as an additional and undesired energy consumption. FR2717670 discloses a prior art dishwashing device which can be considered a closest state of the art for the present invention.

[0012] Therefore, object of the present invention is to improve the prior art dishwashing machines and the known washing methods for the dishes, so as to improve the washing efficacy thereof and to reduce the water and electric power consumption thereof.

[0013] These and other objects are achieved by means of a dishwashing machine according to claim 1 and by a method for washing dishes in a dishwashing machine according to claim 15.

[0014] Advantageous embodiments are the object of the dependant claims.

[0015] In order to better understand the invention, and appreciate the advantage thereof, some embodiments thereof will be described below by way of non-limitative example, with reference to the annexed Figures, in which:

- Fig. 1 is a schematic front view of a dishwashing machine according to an embodiment of the invention;
- Fig. 2 is a schematic front view of a dishwashing machine in according to a second embodiment of the invention.

[0016] With reference to the annexed Figure, a dishwashing machine is generally indicated with the reference numeral 1. The dishwashing machine 1 comprises at least one washing container 2 adapted to receive dishes 3 to be washed and closable through a port (not shown). Within the dishwashing machine 1 a spraying device 4 is provided, for example, a pump 5 with a delivery tube 6, and one or more spraying nozzles 7 and/or spraying rotors 8. The spraying device 4 is configured to spray a non-nebulised washing liquid onto the dishes 3 arranged in the washing container 2. A nebuliser device 9 is further provided to nebulise at least part of the washing liquid with the aim of producing an aerosol flow and to convey such nebulised washing liquid (aerosol flow) onto the dishes 3 contained in the washing container 2. The dishwashing machine 1 further comprises a heating device adapted to heat the washing liquid, for example, an electric resistance 10 arranged in a washing liquid collection tank 11. The collection tank 11, preferably formed in a lower zone of the washing container 2 or under the washing container 2, is connected to the spraying device 4 and, optionally, to the nebulisation device 9 to allow

that they withdraw the cold or heated washing liquid necessary for the treatment of the dishes.

[0017] The dishwashing machine 1 further comprises control means, for example, an electronic control unit 12, so configured as to allow the selection of a dish treatment program amongst a plurality of treatment programs.

[0018] The plurality of treatment programs comprises at least one washing program with at least one washing step in which the heating device 10 is actuated so as to heat the washing liquid, and in which the spraying device 4 is actuated so as to insert the heated washing liquid in the washing container 2, or in other words, so as to spray the heated washing liquid onto the dishes 3 arranged in the washing container 2.

[0019] According to an aspect of the present invention, the treatment programs also comprise at least one stand-by program with one or more nebulisation steps, in which the nebuliser device 9 is actuated so as to introduce nebulised washing liquid in the washing container 2 (applying it on the dishes 3), and in which during the entire stand-by program, the heating device 10 remains deactivated.

[0020] In accordance with an embodiment, the control means 12 are configured so as to perform the nebulisation steps of the stand-by program in a time-independent manner from the carrying out of the washing steps of the washing programs.

[0021] Advantageously, the control means 12 are configured so as to deactivate also the spraying device 14 during the carrying out of the stand-by program.

[0022] Thanks to the stand-by program, the dishes awaiting to be washed are treated with a washing liquid cold aerosol, and in this manner are prepared and kept ready for a successive actual washing with hot washing liquid. This allows always awaiting for the complete filling of the dishwashing machine, independently from the soils and incrustation type, before carrying out the washing program and subjecting the dishes awaiting to washing to an optionally repeated pre-treatment through washing liquid aerosol, so as to improve the washing program efficacy and to reduce the duration, the electric energy and water consumptions thereof.

[0023] According to an embodiment, the control means are configured so that, during the nebulisation steps of the stand-by program, the nebuliser device 9 is automatically deactivated when the port is opened, and the nebuliser device 9 is automatically reactivated when the previously opened port is closed. Advantageously, this allows carrying out the treatment through washing liquid aerosol with a closed container, increasing the treatment efficacy and minimizing the escape of washing liquid aerosol into the surrounding environment.

[0024] The control means 12 can further comprise signalling means, for example, LCD, LED display, or the like, which indicate to the user the carrying out of a nebulisation step during the stand-by program. In this manner, the user who wants to load further dishes in the dishwashing machine, can decide whether to wait for the end of the treatment with washing liquid aerosol or to temporarily discontinue such treatment by opening the port.

[0025] According to the invention, the control means 12 are so configured as to actuate the nebulisation device 9, during the carrying out of the stand-by program, when the port has remained closed for a predetermined period of time, preferably from 2 to 10 minutes, still more preferably from 5 to 10 minutes, after the last opening thereof. In this manner, once the stand-by program has been selected and carried out, the soiled dishes arranged in the washing machine 1 are almost immediately subjected to a treatment via washing liquid aerosol but, at the same time, a repeated opening and closure of the port do not compromise the proper functioning of the stand-by program.

[0026] Preferably, the control means 12 are so configured as to actuate the nebulisation device 9 in a discontinuous manner during the carrying out of the stand-by program. Particularly, the control means 12 deactivate the nebulisation device 9 during a rest step between two consecutive nebulisation steps, in which such rest step can have a duration of from 1 to 8 hours, preferably from 1 to 4 hours, still more preferably from 2 to 4 hours.

[0027] Experimental tests have shown that the treatment through washing liquid aerosol retains its action of incrustations desegregation and soils dissolution for the above-mentioned period of time. In this manner, a maximization of the effect of the treatment and a minimization of the energy consumptions necessary for the nebulisation can be obtained.

[0028] In fact, thanks to the characteristics hereto described, all the dishes arranged in the dishwashing machine, which are awaiting for the complete filling thereof are subjected to at least one treatment with washing liquid aerosol after the port closure, but between a first nebulisation step and a successive nebulisation step of the same dishes (in the absence of further apertures and closures of the port), a rest step is provided, having a duration essentially corresponding to the duration of the actions of the first nebulisation step.

[0029] In accordance with an embodiment, the nebulisation steps of the stand-by program have a duration of from 1 minute to 1 hour, preferably from 5 minutes to 30 minutes, still more preferably from 5 minutes to 10 minutes.

[0030] With the aim of carrying out the nebulisation steps during the stand-by program, it is particularly advantageous to provide the nebuliser device 9 with a piezoelectric aerosol generator 13.

[0031] Such piezoelectric aerosol generator 13 can be arranged within a nebulisation container 14 connected through a supply tube 15 to the delivery duct 6 of the spraying device 4 and through a dispensing duct or port 16 within the washing container 2 (Fig. 1).

[0032] Alternatively, the nebulisation container 14 is connected through the supply tube 15 to a duct with air head directly connectable to the water network by the interposition of an electrovalve, for example, the supply duct of a water softener device.

[0033] According to an embodiment, the nebulisation device 9 dispensing duct 16 is connected to a sprayer nozzle 7 of the spraying device 4 so that the same sprayer nozzle 7 introduces both the sprays of non-nebulised washing liquid during the washing steps of the washing programs and the aerosol flow of nebulised washing liquid during the nebulisation steps of the stand-by program.

[0034] For further increasing the efficiency of treatment of the dishes "awaiting" by means of the washing liquid aerosol, a device can be provided within the machine 1 to receive a detergent substance and to bring such detergent substance to the washing liquid intended to be nebulised during the nebulisation steps of the stand-by program.

[0035] By means of the dishwashing machine 1 hereto described, it is possible to carry out a dish treatment method aimed at a water, electric energy, and detergent saving, for a given amount of washed dishes, and to improve the result of washing in the sense of a more complete removal of the food residues from the dishes.

[0036] Particularly, the method contemplates to arrange the dishes to be washed in the dishwashing machine, to await for the essentially complete filling of the dishwashing machine with dishes to be washed, and to wash the dishes only when the dishwashing machine results to be essentially filled with dishes, through heating washing liquid and spraying the heated washing liquid onto the dishes. When awaiting for the dishwashing machine to be filled, the method provides for nebulisation of washing liquid and the conveyance of the nebulised washing liquid onto the dishes, without heating the washing liquid.

[0037] Advantageously, the nebulisation of the washing liquid when awaiting for the filling of the dishwashing machine occurs in a time-independent manner from the carrying out of the washing of the dishes.

[0038] In accordance with an embodiment of the treatment method, the nebulisation is discontinued when the port is opened during the awaiting for the complete filling of the dishwashing machine and is resumed only after the closure of the port.

[0039] As already described in relation to the control device 12 of the dishwashing machine 1, in order to obtain the desired water, energy, and detergent savings, it is further advantageous to nebulise the washing liquid and to apply the nebulised washing liquid onto the dishes in an discontinuous manner when awaiting for the complete filling of the dishwashing machine.

[0040] Further advantageous aspects of the method for treating dishes have already been described in association with the description of the dishwashing machine 1 which is to be intended as an integrant part of the description of the treatment method which is the object of the present invention.

[0041] It shall be appreciated that to the dishwashing machine and the dish treatment method hereto described, those skilled in the art, with the aim of meeting contingent and specific needs, will be able to make further modifications and variations, all anyhow contained in the protection scope of the invention, as defined by the following claims.

Claims

1. A dishwashing machine (1), comprising:

- at least one washing container (2) adapted to receive dishes (3) to be washed, and closable through a port;
- a spraying device (4) adapted to spray a non-nebulised washing liquid onto the dishes (3) arranged in the washing container (2);
- a nebuliser device (9) adapted to nebulise at least part of the washing liquid and to convey such nebulised washing liquid in the washing container (2);
- a heating device (10) adapted to heat the washing liquid;
- control means (12) so configured as to allow the selection of a dish treatment program amongst a plurality of treatment programs,

wherein said plurality of treatment programs comprises at least one washing program with at least one washing step, during which washing step said heating device (10) is actuated so as to heat the washing liquid, and said spraying device (4) is actuated so as to spray said heated washing liquid onto the dishes (3) in the washing container (2),
wherein said treatment programs comprise at least one stand-by program with one or more nebulisation steps, during which nebulisation steps said nebuliser device (9) is actuated so as to introduce nebulised washing liquid in the washing container (2), and wherein said heating device (10) is deactivated during the entire stand-by program,
characterized in that said control means (12) are configured so as to actuate said nebulisation device (9), during the carrying out of the stand-by program, if said port has remained closed for a predetermined period of time after the last opening thereof.

2. The dishwashing machine (1) according to claim 1, wherein said predetermined period of time is in the range of 2 to 10 minutes or in the range of 5 to 10 minutes.

3. The dishwashing machine (1) according to claim 1 or 2, wherein said control means (12) are configured so as to control the carrying out of said one or more nebulisation steps of the stand-by program in a manner time-independent from the carrying out of the washing steps in said washing programs.

4. The dishwashing machine (1) according to any one

of the preceding claims, wherein said control means (12) are configured so as to deactivate said spraying device (4) during the carrying out of said stand-by program.

5. The dishwashing machine (1) according to any one of the preceding claims, wherein said control means (12) are configured so that, during said nebulisation steps of the stand-by program,

- said nebuliser device (9) is automatically deactivated when said port is opened; and
- said nebuliser device (9) is automatically reactivated when the port is closed.

6. The dishwashing machine (1) according to any one of the preceding claims, wherein said control means (12) comprise signalling means which indicate to the user the carrying out of a nebulisation step during the stand-by program.

7. The dishwashing machine (1) according to any one of the preceding claims, wherein said control means (12) are so configured as to actuate said nebulisation device (9) in a discontinuous manner during the carrying out of the stand-by program.

8. The dishwashing machine (1) according to the preceding claim, wherein during the carrying out of the stand-by program, said control means (12) deactivate the nebulisation device (9) during a rest step between two consecutive nebulisation steps.

9. The dishwashing machine (1) according to the preceding claim, wherein said rest step has a duration of from 1 to 8 hours, preferably from 1 to 4 hours, still more preferably from 2 to 4 hours.

10. The dishwashing machine (1) according to any one of the preceding claims, wherein said nebulisation steps of the stand-by program have a duration of from 1 minute to 1 hour, preferably from 5 minutes to 30 minutes, still more preferably from 5 minutes to 10 minutes.

11. The dishwashing machine (1) according to any one of the preceding claims, wherein said nebuliser device (9) comprises a piezoelectric aerosol generator (13).

12. The dishwashing machine (1) according to the preceding claim, wherein said piezoelectric aerosol generator (13) is arranged within a nebulisation container (14) connected via a supply tube (15) to a delivery duct (6) of the spraying device (4) and via a dispensing duct or port (16) within the washing container (2) .

13. The dishwashing machine (1) according to the preceding claim, wherein said dispensing duct (16) of the nebulisation device (9) is connected to a sprayer nozzle (7) of the spraying device (4) so that the same sprayer nozzle (7) introduces both the sprays of non-nebulised washing liquid during the washing steps of the washing programs and the washing aerosol flow nebulised during the nebulisation steps of the stand-by program.

14. The dishwashing machine (1) according to any one of the preceding claims, comprising a device to receive a detergent substance, and means to add said detergent substance to the washing liquid intended to be nebulised during said nebulisation steps of said stand-by program.

15. A dish treatment method by means of a dishwashing machine,
the dishwashing machine comprising:

- at least one washing container (2) adapted to receive dishes (3) to be washed, and closable through a port;
- a spraying device (4) adapted to spray a non-nebulised washing liquid onto the dishes (3) arranged in the washing container (2);
- a nebuliser device (9) adapted to nebulise at least part of the washing liquid and to convey such nebulised washing liquid in the washing container (2);
- a heating device (10) adapted to heat the washing liquid;
- control means (12) so configured as to allow the selection of a dish treatment program amongst a plurality of treatment programs,

wherein said plurality of treatment programs comprises:

- at least one washing program with at least one washing step, during which washing step said heating device (10) is actuated so as to heat the washing liquid, and said spraying device (4) is actuated so as to spray said heated washing liquid onto the dishes (3) in the washing container (2),
- at least one stand-by program with one or more nebulisation steps, during which nebulisation steps said nebuliser device (9) is actuated so as to introduce nebulised washing liquid in the washing container (2), and wherein said heating device (10) is deactivated during the entire stand-by program,

the method comprising the steps of:

- arranging dishes to be washed in the dishwash-

ing machine;
- waiting until the essentially complete filling of the dishwashing machine with dishes to be washed;
- when the dishwashing machine is essentially filled with dishes, washing the dishes by means of heating washing liquid and spraying the heated washing liquid onto the dishes;
- during the step of waiting until the essentially complete filling of the dishwashing machine, actuating a nebuliser device (9) of the dishwashing machine to nebulising washing liquid and conveying the nebulised washing liquid onto the dishes, without heating the washing liquid during waiting for the washing, the method being **characterized by** using said control means (12) to actuate said nebulisation device (9), during the carrying out of the stand-by program, if said port has remained closed for a predetermined period of time after the last opening thereof.

16. The method according to claim 15, comprising the step of carrying out the washing liquid nebulisation when awaiting for the filling in a manner time-independent from the carrying out of the washing of the dishes.

Patentansprüche

1. Geschirrspülmaschine (1), welche aufweist:

- zumindest einen Spülbehälter (2), der dazu ausgelegt ist, zu spülendes Geschirr (3) aufzunehmen, und der durch eine Öffnung verschließbar ist;
- eine Sprühvorrichtung (4), die dazu ausgelegt ist, eine nicht vernebelte Spülflüssigkeit auf das in dem Geschirrbehälter (2) angeordnete Geschirr (3) zu sprühen;
- eine Verneblungsvorrichtung (9), die dazu ausgelegt ist, zumindest ein Teil der Spülflüssigkeit zu vernebeln und die so vernebelte Spülflüssigkeit in den Spülbehälter (2) zu fördern;
- eine Heizvorrichtung (10), die dazu ausgelegt ist, die Spülflüssigkeit zu heizen;
- Steuermittel (12), die konfiguriert sind, um zu erlauben, ein Geschirrbehandlungsprogramm unter einer Mehrzahl von Behandlungsprogrammen auszuwählen,

wobei die Mehrzahl von Behandlungsprogrammen zumindest ein Spülprogramm mit zumindest einem Spülschritt aufweist, wobei während diesem Spülschritt die Heizvorrichtung (10) aktiviert wird, um die Spülflüssigkeit zu heizen und die Sprühvorrichtung (4) aktiviert wird, um die erhitzte Spülflüssigkeit auf das Geschirr (3) in dem Geschirrbehälter (2) zu sprühen,
wobei die Behandlungsprogramme zumindest ein Warteprogramm mit einem oder mehreren Verneblungsschritten aufweisen, wobei während diesen Verneblungsschritten die Verneblungsvorrichtung (9) aktiviert wird, um vernebelte Spülflüssigkeit in den Spülbehälter (2) einzuführen, und wobei die Heizvorrichtung (10) während des gesamten Warteprogramms deaktiviert wird,
dadurch gekennzeichnet, dass die Steuermittel (12) konfiguriert sind, um die Verneblungsvorrichtung (9) während der Ausführung des Warteprogramms zu aktiveren, wenn die Öffnung für eine vorbestimmte Zeitspanne nach ihrem letzten Öffnen geschlossen geblieben ist.

2. Die Geschirrspülmaschine (1) nach Anspruch 1, wobei die vorbestimmte Zeitspanne im Bereich von 2 bis 10 Minuten oder im Bereich von 5 bis 10 Minuten ist.

3. Die Geschirrspülmaschine (1) nach Anspruch 1 oder 2, wobei die Steuermittel (12) konfiguriert sind, um die Ausführung des einen oder der mehreren Verneblungsschritte des Warteprogramms in einer Weise zu steuern, die zeitlich von der Ausführung der Spülschritte in den Spülprogrammen unabhängig ist.

4. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuermittel (12) konfiguriert sind, um die Sprühvorrichtung (4) während der Ausführung des Warteprogramms zu deaktivieren.

5. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuermittel (12) so konfiguriert sind, dass während der Verneblungsschritte des Warteprogramms,

- die Verneblungsvorrichtung (9) automatisch deaktiviert wird, wenn die Öffnung geöffnet wird; und
- die Verneblungsvorrichtung (9) automatisch reaktiviert wird, wenn die Öffnung geschlossen wird.

6. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuermittel (12) Signalmittel aufweisen, die dem Benutzer die Ausführung eines Verneblungsschritts während des Warteprogramms anzeigen.

7. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Steuermittel (12) konfiguriert sind, um während der Ausführung des Warteprogramms die Verneblungsvorrichtung (9) diskontinuierlich zu aktivieren.

8. Die Geschirrspülmaschine (1) nach dem vorhergehenden Anspruch, wobei während der Ausführung des Warteprogramms die Steuermittel (12) die Verneblungsvorrichtung (9) während eines Pauseschritts zwischen zwei aufeinanderfolgenden Verneblungsschritten deaktiveren.

9. Die Geschirrspülmaschine (1) nach dem vorhergehenden Anspruch, wobei der Pauseschritt eine Dauer von 1 bis 8 Stunden hat, bevorzugt von 1 bis 4 Stunden, noch weiter bevorzugt von 2 bis 4 Stunden.

10. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Verneblungsschritte des Warteprogramms eine Dauer von 1 Minute bis 1 Stunde haben, bevorzugt von 5 Minuten bis 30 Minuten, noch weiter bevorzugt von 5 Minuten bis 10 Minuten.

11. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, wobei die Verneblungsvorrichtung (9) einen piezoelektrischen Aerosolgenerator (13) aufweist.

12. Die Geschirrspülmaschine (1) nach dem vorhergehenden Anspruch, wobei der piezoelektrische Aerosolgenerator (13) in einem Verneblungsbehälter (14) angeordnet ist, der über ein Zuführrohr (15) mit einer Ausgabeleitung (6) der Sprühvorrichtung (4) und über eine Spendeleitung oder -Öffnung (16) in dem Spülbehälter (2) verbunden ist.

13. Die Geschirrspülmaschine (1) nach dem vorhergehenden Anspruch, wobei die Spendeleitung (16) der Verneblungsvorrichtung (9) mit einer Sprühdüse (7) der Sprühvorrichtung (4) verbunden ist, so dass diese Sprühdüse (7) sowohl Spritzer von nicht-vernebelter Spülflüssigkeit während der Spülschritte der Spülprogramme als auch den während der Verneblungsschritte des Warteprogramms vernebelten Spülaerosolfluss einführt.

14. Die Geschirrspülmaschine (1) nach einem der vorhergehenden Ansprüche, die eine Vorrichtung zur Aufnahme einer Detergenz-Substanz aufweist, sowie Mittel, um die Detergenz-Substanz der Spülflüssigkeit zuzufügen, die während der Verneblungsschritte des Warteprogramms vernebelt werden soll.

15. Geschirrbehandlungsverfahren mittels einer Geschirrspülmaschine, wobei die Geschirrspülmaschine aufweist:

- zumindest einen Spülbehälter (2), der dazu ausgelegt ist, zu spülendes Geschirr (3) aufzunehmen, und der durch eine Öffnung verschließbar ist;
- eine Sprühvorrichtung (4), die dazu ausgelegt ist, eine nicht vernebelte Spülflüssigkeit auf das in dem Geschirrbehälter (2) angeordnete Geschirr (3) zu sprühen;
- eine Verneblungsvorrichtung (9), die dazu ausgelegt ist, zumindest ein Teil der Spülflüssigkeit zu vernebeln und die so vernebelte Spülflüssigkeit in den Spülbehälter (2) zu fördern;
- eine Heizvorrichtung (10), die dazu ausgelegt ist, die Spülflüssigkeit zu heizen;
- Steuermittel (12), die konfiguriert sind, um zu erlauben, ein Geschirrbehandlungsprogramm unter einer Mehrzahl von Behandlungsprogrammen auszuwählen,

wobei die Mehrzahl von Behandlungsprogrammen aufweist:

- zumindest ein Spülprogramm mit zumindest einem Spülschritt, wobei während diesem Spülschritt die Heizvorrichtung (10) aktiviert wird, um die Spülflüssigkeit zu heizen, und die Sprühvorrichtung (4) aktiviert wird, um erhitzte Spülflüssigkeit auf das Geschirr (3) in dem Geschirrbehälter (2) zu sprühen,
- zumindest ein Warteprogramm mit einem oder mehreren Verneblungsschritten, wobei während diesen Verneblungsschritten die Verneblungsvorrichtung (9) aktiviert wird, um vernebelte Spülflüssigkeit in den Spülbehälter (2) einzuführen, und wobei die Heizvorrichtung (10) während des gesamten Warteprogramms deaktiviert wird,

wobei das Verfahren aufweist:

- Anordnen von zu spülendem Geschirr in der Geschirrspülmaschine;
- Abwarten, bis die Geschirrspülmaschine mit zu spülendem Geschirr im Wesentlichen vollständig gefüllt ist;
- wenn die Geschirrspülmaschine mit Geschirr im Wesentlichen gefüllt ist, Spülen des Geschirrs mittels erhitzter Waschflüssigkeit und Sprühen der erhitzten Waschflüssigkeit auf das Geschirr;
- während des Abwarteschritts, bis die Geschirrspülmaschine im Wesentlichen vollständig gefüllt ist, Aktivieren einer Verneblungsvorrichtung (9) der Geschirrspülmaschine, um Spülflüssigkeit zu vernebeln und die vernebelte Spülflüssigkeit auf das Geschirr zu fördern, ohne die Spülflüssigkeit zu erhitzen, während das Spülen abgewartet wird,

wobei das Verfahren **gekennzeichnet ist durch** die Verwendung der Steuermittel (12) zum Aktivieren der Verneblungsvorrichtung (9) während der Ausführung des Warteprogramms, wenn die Öffnung für

eine vorbestimmte Zeitspanne nach ihrem letzten Öffnen geschlossen geblieben ist.

16. Das Verfahren nach Anspruch 15, das den Schritt aufweist, die Spülflüssigkeitsverneblung auszuführen, wenn das Füllen abgewartet wird, in einer Weise, die von der Ausführung des Geschirrspülens zeitlich unabhängig ist.

Revendications

1. Lave-vaisselle (1), comprenant :

- au moins un compartiment de lavage (2) adapté pour recevoir de la vaisselle (3) à laver, et pouvant être fermé par l'intermédiaire d'un orifice ;
- un dispositif de pulvérisation (4) adapté pour pulvériser un liquide de lavage non nébulisé sur la vaisselle (3) disposée dans le compartiment de lavage (2) ;
- un dispositif de nébulisation (9) adapté pour nébuliser au moins une partie du liquide de lavage et pour acheminer ledit liquide de lavage nébulisé dans le compartiment de lavage (2) ;
- un dispositif de chauffage (10) adapté pour chauffer le liquide de lavage ;
- un organe de commande (12) configuré de façon à permettre la sélection d'un programme de traitement de la vaisselle parmi une pluralité de programmes de traitement,

dans lequel ladite pluralité de programmes de traitement comprend au moins un programme de lavage avec au moins une étape de lavage, durant laquelle ledit dispositif de chauffage (10) est activé de manière à chauffer le liquide de lavage, et ledit dispositif de pulvérisation (4) est activé de manière à pulvériser ledit liquide de lavage chauffé sur la vaisselle (3) dans le compartiment de lavage (2),
dans lequel lesdits programmes de traitement comprennent au moins un programme d'attente avec une ou plusieurs étapes de nébulisation, durant lesquelles ledit dispositif de nébulisation (9) est activé de manière à introduire le liquide de lavage nébulisé dans le compartiment de lavage (2), et dans lequel ledit dispositif de chauffage (10) est désactivé durant la totalité du programme d'attente,
caractérisé en ce que ledit organe de commande (12) est configuré de manière à activer ledit dispositif de nébulisation (9), durant l'exécution du programme d'attente, si ledit orifice est resté fermé pendant un laps de temps prédéterminé après sa dernière ouverture.

2. Lave-vaisselle (1) selon la revendication 1, dans lequel ledit laps de temps prédéterminé est compris entre 2 et 10 minutes ou est compris entre 5 et 10 minutes.

3. Lave-vaisselle (1) selon la revendication 1 ou 2, dans lequel ledit organe de commande (12) est configuré pour commander l'exécution de ladite ou desdites étapes de nébulisation du programme d'attente d'une manière indépendante, du point de vue du temps, de l'exécution des étapes de lavage dans lesdits programmes de lavage.

4. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel ledit organe de commande (12) est configuré de manière à désactiver ledit dispositif de pulvérisation (4) durant l'exécution dudit programme d'attente.

5. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel ledit organe de commande (12) est configuré de manière à ce que, durant lesdites étapes de nébulisation du programme d'attente,

- ledit dispositif de nébulisation (9) est automatiquement désactivé lorsque ledit orifice est ouvert ; et
- ledit dispositif de nébulisation (9) est automatiquement réactivé lorsque l'orifice est fermé.

6. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel l'organe de commande (12) comprend un moyen de signalisation qui indique à l'utilisateur l'exécution de l'étape de nébulisation durant le programme d'attente.

7. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel l'organe de commande (12) est configuré de manière à activer ledit dispositif de nébulisation (9) de manière discontinue durant l'exécution du programme d'attente.

8. Lave-vaisselle (1) selon la revendication précédente, dans lequel durant l'exécution du programme d'attente, ledit organe de commande (12) désactive le dispositif de nébulisation (9) durant une étape de repos entre deux étapes consécutives de nébulisation.

9. Lave-vaisselle (1) selon la revendication précédente, dans lequel ladite étape de repos a une durée comprise entre 1 et 8 heures, de manière préférée entre 1 et 4 heures, de manière davantage préférée entre 2 et 4 heures.

10. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel lesdites étapes de nébulisation du programme d'attente ont une durée comprise entre 1 minute et 1 heure, de manière

préférée entre 5 minutes et 30 minutes, de manière davantage préférée entre 5 minutes et 10 minutes.

11. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, dans lequel ledit dispositif de nébulisation (9) comprend un générateur d'aérosol piézoélectrique (13).

12. Lave-vaisselle (1) selon la revendication précédente, dans lequel ledit générateur d'aérosol piézoélectrique (13) est agencé dans un compartiment de nébulisation (14) connecté par l'intermédiaire d'un tube d'alimentation (15) à un conduit d'acheminement (6) du dispositif de pulvérisation (4) et par l'intermédiaire d'un orifice ou d'un conduit de distribution (16) à l'intérieur du compartiment de lavage (2).

13. Lave-vaisselle (1) selon la revendication précédente, dans lequel ledit conduit de distribution (16) du dispositif de nébulisation (9) est connecté à une buse de pulvérisation (7) du dispositif de pulvérisation (4) de sorte que la même buse de pulvérisation (7) introduit à la fois les jets de liquide de lavage non nébulisé durant les étapes de lavage des programmes de lavage et le flux d'aérosol de lavage nébulisé durant les étapes de nébulisation du programme d'attente.

14. Lave-vaisselle (1) selon l'une quelconque des revendications précédentes, comprenant un dispositif pour recevoir une substance détergente, et un organe pour ajouter ladite substance détergente au liquide de lavage devant être nébulisé durant lesdites étapes de nébulisation dudit programme d'attente.

15. Procédé de traitement de la vaisselle au moyen d'un lave-vaisselle,
le lave-vaisselle comprenant :

- au moins un compartiment de lavage (2) adapté pour recevoir de la vaisselle (3) à laver, et pouvant être fermé par l'intermédiaire d'un orifice ;
- un dispositif de pulvérisation (4) adapté pour pulvériser un liquide de lavage non nébulisé sur la vaisselle (3) disposée dans le compartiment de lavage (2) ;
- un dispositif de nébulisation (9) adapté pour nébuliser au moins une partie du liquide de lavage et pour acheminer ledit liquide de lavage nébulisé dans le compartiment de lavage (2) ;
- un dispositif de chauffage (10) adapté pour chauffer le liquide de lavage ;
- un organe de commande (12) configuré de manière à permettre la sélection d'un programme de traitement de la vaisselle parmi une pluralité de programmes de traitement,

dans lequel ladite pluralité de programmes de traitement comprend :

- au moins un programme de lavage avec au moins une étape de lavage, durant laquelle ledit dispositif de chauffage (10) est activé de manière à chauffer le liquide de lavage, et ledit dispositif de pulvérisation (4) est activé de manière à pulvériser ledit liquide de lavage chauffé sur la vaisselle (3) dans le compartiment de lavage (2),
- au moins un programme d'attente avec une ou plusieurs étapes de nébulisation, durant lesquelles ledit dispositif de nébulisation (9) est activé de manière à introduire le liquide de lavage nébulisé dans le compartiment de lavage (2), et dans lequel ledit dispositif de chauffage (10) est désactivé durant la totalité du programme d'attente,

le procédé comprenant les étapes consistant à :

- disposer de la vaisselle à laver dans le lave-vaisselle ;
- attendre que le lave-vaisselle soit sensiblement rempli de vaisselle à laver ;
- lorsque le lave-vaisselle est sensiblement rempli de vaisselle, laver la vaisselle en chauffant le liquide de lavage et en pulvérisant le liquide de lavage chauffé sur la vaisselle ;
- durant l'étape consistant à attendre que le lave-vaisselle soit sensiblement rempli, activer un dispositif de nébulisation (9) du lave-vaisselle afin de nébuliser du liquide de lavage et d'acheminer le liquide de lavage nébulisé sur la vaisselle, sans chauffer le liquide de lavage durant l'attente avant le lavage, le procédé étant **caractérisé en ce qu'**il utilise ledit organe de commande (12) pour activer ledit dispositif de nébulisation (9), durant l'exécution du programme d'attente, si ledit orifice est resté fermé pendant un laps de temps prédéterminé après sa dernière ouverture.

16. Procédé selon la revendication 15, comprenant l'étape consistant à exécuter la nébulisation du liquide de lavage en attendant le remplissage d'une manière indépendante, du point de vue du temps, de l'exécution du lavage de la vaisselle.

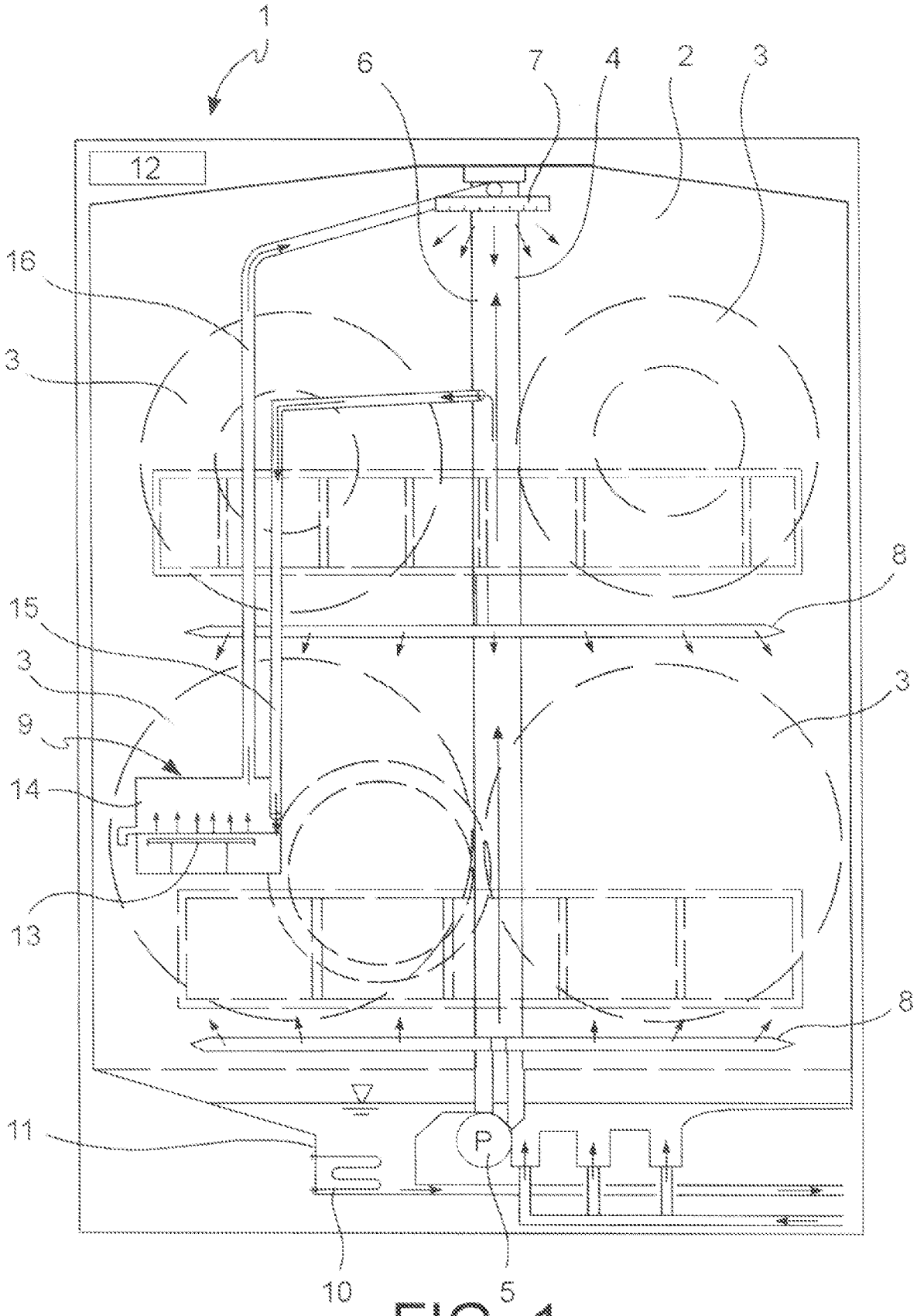

FIG. 1

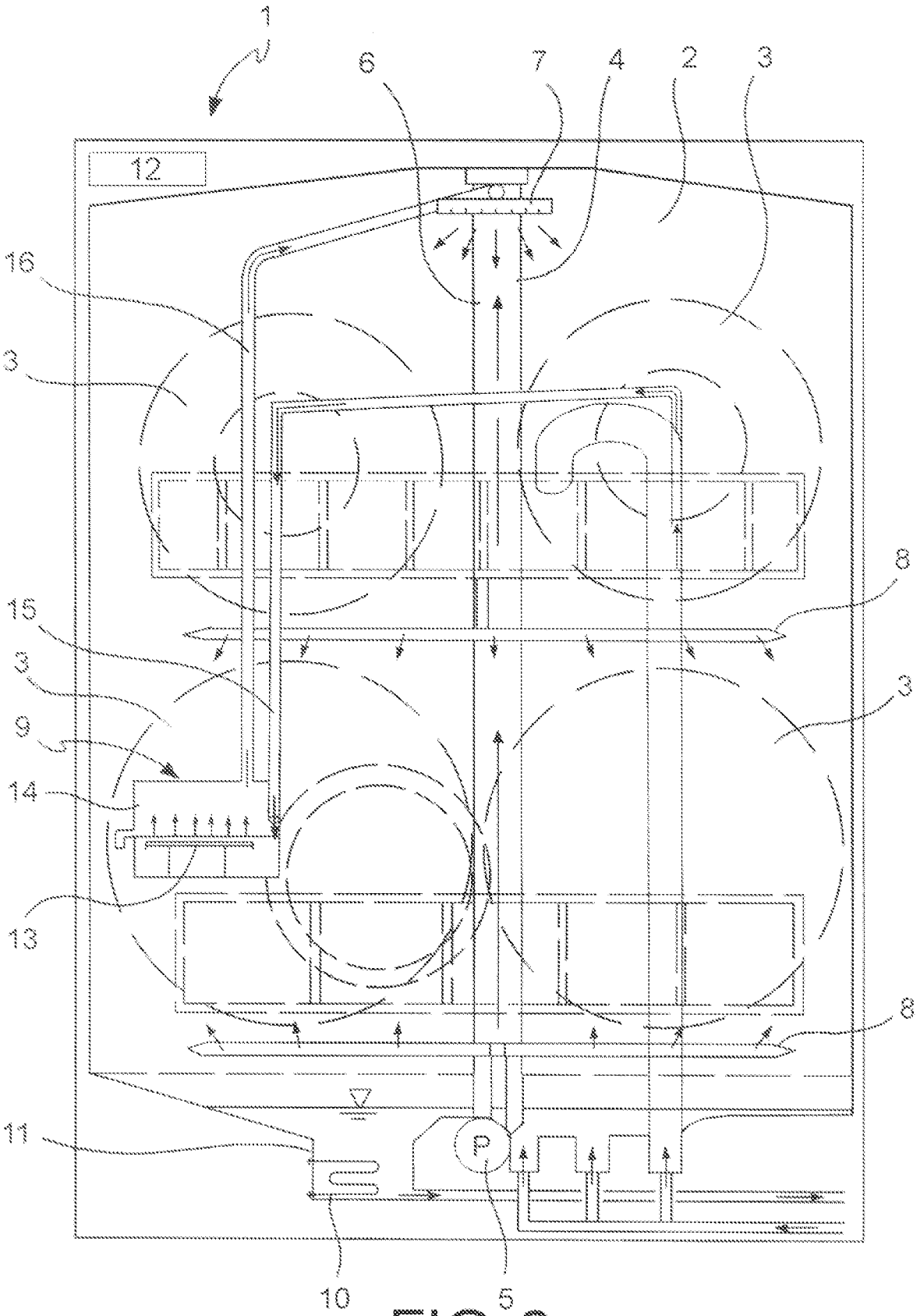

FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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