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(54) **DISHWASHING MACHINE WITH WASHING CYCLES AND SANITATION METHOD THEREOF**

GESCHIRRSPÜLMASCHINE MIT WASCHGÄNGE UND DESSEN HYGIENISIERUNGSMETHODE

MACHINE LAVE-VAISSELLE À CYCLES DE LAVAGE ET PROCÉDÉ POUR SA DÉSINFECTION

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Description

[0001] The present invention relates to a method of hygienization of a dishwashing machine according to the preamble of claim 1.

[0002] One problem common to dishwashing machines derives from the fact that users often do not load the machine with a quantity of crockery sufficient to carry out a full-load wash cycle, with the consequence that it is often uneconomical to carry out a wash program in such conditions, in that it would imply a waste of energy, water and washing agents (rinse aid and detergents).

[0003] However, if the user chooses to leave dirty crockery in the tub until the machine is fully loaded, other problems arise which are related to bacteria proliferation and bad smells.

[0004] In this regard, some solutions known in the art provide for carrying out rinse cycles on the crockery accumulated in the tub and staying there until the machine is full.

[0005] The situation can be improved by executing these rinse cycles, but this cannot completely stop the generation of bad smells, since not all microbes are eliminated by a simple water rinse cycle. The execution of such cycles may be uneconomical as well, because they require water and energy consumption without effectively washing the crockery.

[0006] In order to remove bacteria and odors from inside a dishwashing machine, it is known to use Ozone.

[0007] German patent publication DE 10 2008 024322 discloses generating an air/ozone mixture with rinse water, so as to improve the germ-killing effect without need of high temperature water.

[0008] International patent application WO2005/039377 discloses a ware washing process that is conducted in the presence of a biocide. This process includes the steps of (i) washing ware in a washing cavity of a ware washer with water and a ware washing detergent; (ii) rinsing the ware in the ware washer with water; and (iii) introducing a biocide into the washing cavity of the ware washer in order to provide a gaseous atmosphere thereof in the washing cavity, the biocide being introduced into the washing cavity prior to or contemporaneously with or subsequently to the washing or rinsing of the ware.

[0009] US patent application US2008/0011329 having title "DISH WASHING MACHINE EQUIPPED WITH AN OZONE STORAGE DEVICE" discloses a dishwashing machine provided with an ozone generator and with a storage device for storing ozone and/or hydroxyl radicals. Ozone is dispensed either during a washing cycle in order to increase the cleaning action or during a "drying" phase at the end of the washing cycle, or during a non-operating phase in order to remove odors. Dispensing of ozone during non-operating phase is made automatically in response to opening/closing of the door or periodically.

[0010] International patent application WO2007/099113 discloses a washing machine compris-

ing a washing program having ozone wash and detergent wash cycles, a tub, a drum. An ozone generator provides to produce the ozone gas mixed into the water delivered by the main water supply.

[0011] US patent 5,524,358 discloses a ventilation filtration kit for use with dishwashers. The kit may comprise a germicidal lamp to disinfect air being drawn and provide residual ozone to disinfect the dishes and eating utensils within the dishwasher.

[0012] US patent application US2010/0000577 further discloses use of a gaseous disinfectant, such as ozone, to be fed into a liquid circulating in a conduit to be disinfected.

[0013] The present invention aims at solving the problem of how to make the operation of sanitizing of the tub of the dishwasher more reliable, flexible and efficient. This is achieved by the method defined in appended claim 1.

[0014] Further advantageous features will be set out in the appended claims.

[0015] One idea at the basis of the present invention is to diffuse an oxidizing gas, such as ozone, only during operating cycles wherein no liquid is dispensed into the tub; said operating cycles, having a hygienization function, can be carried out, for example, when dirty crockery is placed into the tub awaiting the start of a wash program.

[0016] This gas is, in fact, a strong oxidizing agent, and as such, when used in a dishwashing machine, it sterilizes and oxidizes organic substances, thereby eliminating the bad smells originating from the proliferation of bacteria inside the tub of the machine. Other known properties of ozone in this field relate to its whitening action, which can easily eliminate any tea or coffee stains from white cups or dishes. In this regard, according to the present invention, the hygienization cycle is carried out without any liquid being dispensed into the tub during said operating program and in a condition wherein the degree of humidity in the tub is approximately equal to that in the outside environment.

In this way it is advantageously possible to obtain a simpler machine construction while effectively cleaning the tub and any crockery contained therein. These features as well as further advantages of the present invention will become more apparent from the following description of an embodiment thereof as shown in the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig. 1 is a schematic view of a dishwashing machine on which a method according to the present invention can be carried out.

[0017] Referring now to Fig. 1, there is shown a schematic view of a dishwashing machine according to the present invention.

[0018] It comprises a tub 2 in which crockery to be subjected to the machine's washing action is placed.

[0019] Usually the crockery is arranged in sliding racks

3 that can be extracted through the opening the tub 2, which is closed by the horizontally-pivoted door 3.

[0020] Below the racks, rotary sprayers 4 are installed which spray wash liquid (water, water and detergents and/or rinse aids or the like) onto the crockery during the wash cycles. The wash liquid is supplied to the sprayers 4 through the hydraulic circuit 5, which connects them to the pump 6.

[0021] During a wash cycle, after having lapped the crockery the wash liquid collects into the sump 7 at the bottom of the tub 2, from which it returns to the pump 6 through the duct 8 or is drained through the duct 9.

[0022] In this description, the term "wash cycle" refers to any operating step of the machine 1 wherein water or wash liquid is dispensed by the sprayers 4 or wherein, likewise, the pump 6 is on; during the wash cycles, the degree of humidity in the air inside the tub is normally higher than the degree of humidity in the air in the outside environment.

[0023] The machine 1 also comprises a cleaning circuit which comprises a duct 10 in fluidic communication with the sump 7, an ozone generator 11, an air pump 12 and an intake duct 13 that opens into the outside and takes in environmental air.

[0024] The duct 10 puts the sump (and therefore the inside of the tub 2) in fluidic communication with the ozone generator 11.

[0025] The latter is preferably of the so-called "corona discharge" type, such as those of the TCB-66, TCB-56 e TCB-115 series available from Trump Electronics.

[0026] The ozone generator 11 is supplied by the pump 12 with air taken from the environment through the intake duct 13.

[0027] The pump may likewise be a fan or the like.

[0028] On the duct 10 that connects the generator 11 and the sump 7 there is optionally a valve 15, e.g. a non-return valve for liquids, which prevents the wash liquid from reaching the generator 11.

[0029] As an alternative, a solenoid valve or even a simple gate valve may be used, which is kept closed as the sump 7 is filling with liquid or during a wash cycle.

[0030] The method of operation according to the present invention provides for the execution of a hygienization program comprising at least one hygienization cycle wherein ozone is dispensed into the tub prior to one or more wash cycles.

[0031] Thus, when the quantity of dirty crockery is not enough to justify the execution of a wash program or one or more wash cycles, the user can carry out the hygienization cycle to remove any bacteria, microbes and bad smells, and then wait until the machine can be completely filled.

[0032] The hygienization program is distinct from the wash cycles and is carried out prior to the latter, i.e. when the degree of humidity in the tub is substantially equal to the degree of humidity in the environment outside the tub. Such a hygienization program, therefore, dispenses no wash liquid or water, and the ozone diffusion medium

is air.

[0033] This improves the hygienic conditions of the crockery inside the tub; in fact, sometimes the presence of water in the tub (due, for example, to the execution of separate rinse cycles) might increase the diffusion of some types of bacteria or microbes, promoting the proliferation thereof and hence the onset of bad smells.

[0034] In this manner, a user having not enough dirty crockery to justify the start of a wash cycle can wait for other dirt crockery to fully load the dishwasher before executing a wash program.

[0035] It follows that any problems related to the presence of dirty crockery in the tub, which stays there until the machine can be fully loaded, are solved by starting a hygienization cycle according to the present invention, so that any bad smells caused by the crockery in the tub can be reduced or eliminated.

[0036] In this case, the hygienization cycle takes place before the execution of the wash cycles, in a condition wherein the degree of humidity in the air inside the tub is substantially equal to that in the environment outside the tub.

[0037] In this description and in the appended claims, the term "hygienization cycle" refers to an operating step of the machine 1 wherein the pump 12 and the generator 11 are on. According to a variant of this method of operation, which however does not belong to the present invention, the hygienization cycle is carried out between two successive wash cycles.

[0038] In yet another variant, also not falling within the scope of claim 1, a hygienization cycle is carried out during every interval between one wash cycle and the next.

[0039] This advantageously allows for the execution of a plurality of hygienization micro-cycles which do not extend the duration of the normal wash cycles, while frequently hygienizing the tub and the crockery.

[0040] It should be noted that in all these variants the ozone diffusion medium is environmental air, not a liquid, and this allows to overcome the above-described drawbacks.

[0041] The following will describe an exemplificative program according to this latter machine operation variant, with the corresponding commands to be given to the above-described water pump 6 and air pump 12.

[0042] In this case, the operating program includes an initial step wherein, with the crockery loaded in the racks 3, water taken from the water mains (not shown) is supplied into the tub.

[0043] The water pump 6 is then turned on, while the air pump 12 remains off.

[0044] In this manner, the water collected in the sump 7 inside the tub is delivered to the sprayers 4, to be sprayed onto the crockery.

[0045] Both the pump 12 and the generator 11 are kept off, and the selected wash cycle (in this case a prewash cycle) is started.

[0046] If present, the valve 15 is kept closed to prevent any water from reaching the ozone generator.

[0047] Subsequently, the water is drained from the tub through the drain duct 9.

[0048] A hygienization cycle is then carried out, during which, with no liquid in the tub, the water pump 6 is kept off and the air pump 12 is turned on.

[0049] At the same time, the ozone generator 11 is turned on as well and, if present, the valve 15 is opened.

[0050] The air taken in from the outside environment through the duct 13 flows past the pump 12 and reaches the ozone generator 11, where it is charged with ozone in accordance with a per se known method, which will not be described any further herein.

[0051] The air thus charged is the medium used for diffusing ozone in the tub: in fact, it is delivered into the latter through the duct 8 and through the sump 7, which in this operating condition contains no liquids.

[0052] Through the effect of the ozone, the crockery and the tub itself are thus hygienized.

[0053] Although in this example - which does not fall within the terms of claim 1 - the hygienization cycles have been carried out every two wash cycles, it can be easily understood that the number of the former and their distribution within the program of the machine 1 may be varied at will.

[0054] On the other hand, and according to the present invention, only one hygienization cycle is carried out before starting the wash cycles: in this latter case, it should be noted that this phase can be identified by measuring the degree of humidity in the air inside the tub, which is substantially equal to the degree of humidity in the outside environment.

[0055] Of course, ozone may be replaced with another gas or, more in general, with a fluid having the same effect, in particular an oxidizing gas, which will only require that the ozone generator 11 be replaced with a suitable generator of said gas or fluid.

[0056] A fan may also be used for improving ozone distribution in the tub.

[0057] Advantageously, in the case of a dishwashing machine equipped with a tub-mounted drying fan, said fan can be turned on to evenly distribute the ozone during the hygienization cycle.

[0058] Said fan is included in a closed circuit that takes air from the tub and recirculates it into the tub; it may be positioned, for example, in a duct external to the tub, so as to prevent any contact with the wash liquid.

Claims

1. A method of hygienization of a dishwashing machine, wherein said machine carries out at least one wash cycle in which a wash liquid is dispensed into a tub of said machine, wherein the method comprises a hygienization program comprising a hygienization cycle wherein an oxidizing fluid is dispensed into said tub, said wash cycle and said hygienization cycle being distinct from

each other

and wherein at least said hygienization program is carried out prior to said at least one wash cycle in a condition

wherein the degree of humidity in the tub is approximately equal to a degree of humidity in an environment outside the tub

characterized in that a user of the dishwashing machine carries out said hygienization cycle without the execution of a wash program or one or more wash cycles, whereby it is identified that the at least one wash cycle has not started yet by measuring the degree of humidity in the air inside the tub, which before the start of the wash cycle is substantially equal to the degree of humidity in the outside environment.

2. A method according to any one of the preceding claims, wherein said hygienization program comprises the step of dispensing ozone-containing gas into said tub.
3. A method according to any one of the preceding claims, wherein a medium of diffusion of ozone in said tub is air.
4. A method according to one or more of the preceding claims, wherein said machine comprises a pump (6) for dispensing said wash liquid and a pump (12) for directing air taken from the environment outside said machine to an ozone generator (11) and from there to said tub, and wherein during said hygienization cycle said pump (6) for dispensing said wash liquid is off and said pump (12) for air taken from the outside environment is on.

Patentansprüche

1. Hygienisierungsverfahren für eine Geschirrspülmaschine, wobei die Maschine wenigstens einen Spülzyklus durchführt, in welchem eine Spülflüssigkeit in einen Behälter der Maschine abgegeben wird, wobei das Verfahren ein Hygienisierungsprogramm umfasst, welches einen Hygienisierungszyklus umfasst, wobei eine oxidierende Flüssigkeit in den Behälter abgegeben wird, wobei der Spülzyklus und der Hygienisierungszyklus voneinander verschieden sind, und wobei wenigstens das Hygienisierungsprogramm vor dem wenigstens einen Spülzyklus in einem Zustand durchgeführt wird, in welchem der Feuchtigkeitsgrad in dem Behälter annähernd gleich einem Feuchtigkeitsgrad in einer Umgebung außerhalb des Behälters ist, **dadurch gekennzeichnet, dass** ein Benutzer der Geschirrspülmaschine den Hygienisierungszyklus ohne ein Ausführen eines Spülprogramms oder eines oder mehrerer Spülzyklen durchführt, wobei festgestellt wird, dass

der wenigstens eine Spülzyklus noch nicht begonnen hat, indem der Feuchtigkeitsgrad in der Luft innerhalb des Behälters gemessen wird, welcher vor dem Start des Spülzyklus im Wesentlichen gleich dem Feuchtigkeitsgrad in der äußeren Umgebung ist.

2. Verfahren nach einem der vorhergehenden Ansprüche, wobei das Hygienisierungsprogramm den Schritt eines Abgebens von ozonhaltigem Gas in den Behälter umfasst. 10
3. Verfahren nach einem der vorhergehenden Ansprüche, wobei ein Diffusionsmedium von Ozon in dem Behälter Luft ist. 15
4. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche, wobei die Maschine eine Pumpe (6) zum Abgeben der Spülflüssigkeit und eine Pumpe (12) zum Richten von aus der Umgebung außerhalb der Maschine entnommener Luft auf einen Ozongenerator (11) und von dort zu dem Behälter umfasst, und wobei während des Hygienisierungszyklus die Pumpe (6) zum Abgeben der Spülflüssigkeit ausgeschaltet ist, und die Pumpe (12) für aus der äußeren Umgebung entnommene Luft eingeschaltet ist. 20 25

Revendications 30

1. Procédé de désinfection d'une machine lave-vaisselle, dans lequel ladite machine réalise au moins un cycle de lavage dans lequel un liquide de lavage est délivré dans une cuve de ladite machine, dans lequel le procédé comporte un programme de désinfection comportant un cycle de désinfection dans lequel un fluide d'oxydation est délivré dans ladite cuve, ledit cycle de lavage et ledit cycle de désinfection étant distincts l'un de l'autre, et dans lequel au moins ledit programme de désinfection est réalisé avant ledit, au moins un, cycle de lavage, dans une situation dans laquelle le degré d'humidité dans la cuve est approximativement égal à un degré d'humidité dans un environnement extérieur à la cuve, 35 40 45
caractérisé en ce qu'un utilisateur de la machine lave-vaisselle exécute ledit cycle de désinfection sans l'exécution d'un programme de lavage ou d'un ou de plusieurs cycle(s) de lavage, de sorte qu'on reconnaît que le, au moins un, cycle de lavage n'a pas encore démarré en mesurant le degré d'humidité de l'air à l'intérieur de la cuve, lequel, avant le démarrage du cycle de lavage, est essentiellement égal au degré d'humidité de l'environnement extérieur. 50 55
2. Procédé selon l'une quelconque des revendications

précédentes, dans lequel ledit programme de désinfection comporte l'étape comportant l'étape de délivrer un gaz contenant de l'ozone dans ladite cuve.

3. Procédé selon l'une quelconque des revendications précédentes, dans lequel un milieu de diffusion de l'ozone dans ladite cuve est de l'air. 5
4. Procédé selon l'une ou plusieurs des revendications précédentes, dans lequel ladite machine comprend une pompe (6) destinée à dispenser ledit liquide de lavage et une pompe (12) pour orienter l'air prélevé à partir de l'environnement extérieur à ladite machine vers un générateur d'ozone (11) et, à partir de là, vers ladite cuve, et dans lequel, pendant le cycle de désinfection, ladite pompe (6) destinée à délivrer ledit liquide de lavage ne fonctionne pas et ladite pompe (12) destinée à l'air prélevé à partir de l'environnement extérieur fonctionne. 10 15 20 25

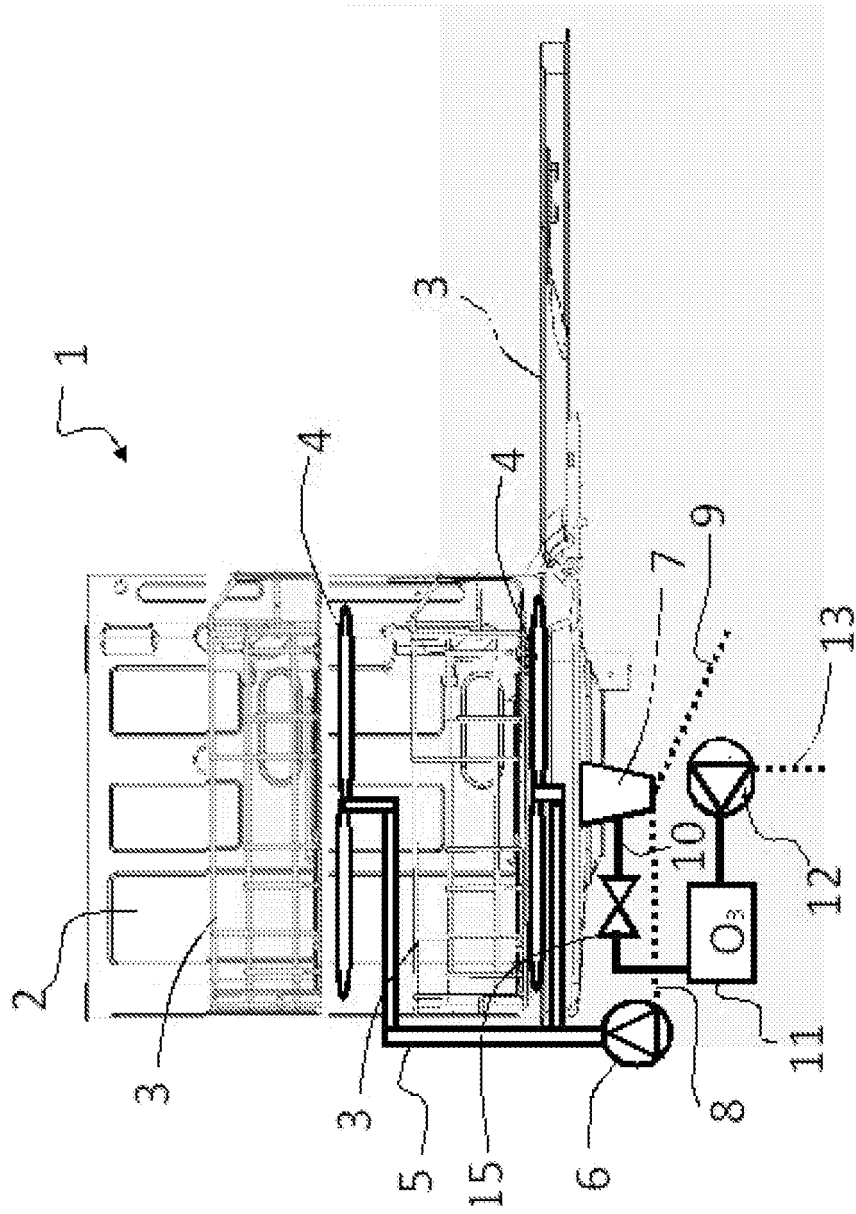


Fig.1

REFERENCES CITED IN THE DESCRIPTION

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