(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 487 288 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
10.06.2015 Bulletin 2015/24

(51) Int Cl.:
D06F 39/08 *(2006.01)*

(21) Application number: **12153792.2**

(22) Date of filing: **03.02.2012**

(54) **Method for charging a washing liquid in a laundry washing machine**

Verfahren zum Zuführen der Waschflüssigkeit in einer Wäschewaschmaschine

Méthode pour charger un liquide de lavage dans une machine à laver le linge

(84) Designated Contracting States:
AL 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 RS SE SI SK SM TR

(30) Priority: **11.02.2011 IT RN20110008**

(43) Date of publication of application:
15.08.2012 Bulletin 2012/33

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EP 2 487 288 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a method for charging a washing liquid in a laundry washing machine.

[0002] In washing machines of the known type, a step for charging water is performed before starting the wash cycle proper. The water charging step involves feeding mains supply water into a washing compartment.

[0003] In this charging step, the water level reaches and partially floods a drum located in the washing compartment, in which there is the laundry to be washed.

[0004] At this point, the drum starts turning and the water is absorbed by the laundry. To ensure complete soaking of the laundry, other water is requested from the mains water supply and this is fed into the drum.

[0005] This solution has drawbacks. A first drawback is associated with the waste of water, on account of the quantity of water charged being largely in excess of that required to completely soak the laundry and determines the presence of excess water in the bottom part of the washing compartment (indicated in technical jargon as "dead volume" of water). A further drawback is that all the water present in the washing compartment is heated by a heating element, but only a small amount of this water is actually in contact with the laundry. This results in a waste of electric power. Secondly, the rotation of the drum partly submerged in the "dead volume" requires a greater force on account of the braking action of the water.

[0006] Document DE4431654A1 discloses a method for charging a liquid in a laundry washing machine wherein several filling phases are executed until a liquid level condition is achieved.

[0007] The aim of the present invention is to provide a method for charging a washing liquid which permits water and energy to be saved while still ensuring optimal soaking of the laundry.

[0008] The technical task explained and the objects specified are substantially achieved by a method comprising the technical features detailed in one or more of the appended claims.

[0009] Further features and advantages of the present invention will become more apparent by the approximate, and thus non-limiting, description of a preferred, but not exclusive, embodiment of a washing machine, as shown in the accompanying drawings, in which figure 1 shows a schematic view of a washing machine implementing a method according to the present invention.

[0010] The object of the present invention is a method for charging a washing liquid in a laundry washing machine 1. The laundry washing machine is indicated with reference number 1 in the accompanying figure. It could be a washing machine or a washer-drier. The washing machine 1 comprises a washing compartment 2 housing a rotatable drum 3, intended to contain the laundry to be washed. The drum 3 comprises:

- a front frame delimiting an opening 32 for loading/removing laundry; in figure 1, this frame 31 is shown by a dashed line to indicate it has been removed to better show the sections behind it (this frame 31 could be a front flange of the drum 3, but if necessary, it could also simply consist of a front edge of the drum 3);
- a rear end wall 33 opposite to the opening 32;
- a perforated side wall 34 extending between the rear end wall 33 and the frame 31.

[0011] The perforated side wall 34 comprises a plurality of holes. These holes are located all along the side wall 34. Said holes in the perforated side wall 34 place the inner drum 3 and a zone 20 of the washing compartment 2 outside the drum 3, in fluid communication. Advantageously, the drum 3 may rotate about an axis of rotation which is horizontal. Preferably, when moving from the rear end wall 33 towards the frame 31, the perforated side wall 34 does not have a convergent or divergent shape.

[0012] The method also comprises the step of implementing a first iterative procedure comprising, in the following temporal order, at least the following steps:

- charging a washing liquid into the drum 3; the washing liquid charged into the drum 3 is at least partly absorbed by laundry in the drum 3; any washing liquid charged inside the drum 3 and not absorbed by the laundry flows into the zone 20 (part of the washing compartment 2) outside the drum 3 through the at least one hole in the perforated side wall 34; the washing liquid charged inside the drum 3 and not absorbed by the laundry is liquid substantially in excess of that needed to completely soak the laundry; the condition of maximum soaking is a condition in which the laundry to be washed has absorbed the maximum quantity of washing liquid that can be absorbed;
- checking with a level gauge 5 that a first configuration has been reached where, compared to a predetermined reference level, there is a predetermined increment of the level of the liquid in the washing compartment 2 on account of the outflow from the drum 3 of the liquid not absorbed by the laundry, that is, the excess liquid; a negative result for this check will cause the first procedure to be repeated until the check returns a positive result.

[0013] Advantageously, the level gauge 5 comprises a pressure switch. This pressure switch is opportunely located below the washing compartment 2 and is in fluid communication with the compartment 2.

[0014] The step of charging a washing liquid into the drum 3 comprises the following steps:

- feeding the washing liquid into the zone 20 until the level in the compartment 2 reaches a first predetermined level 41; the washing liquid fed into the zone

20 will be placed in a lower portion 21 (as seen when viewed on the vertical) of the compartment 2;

- pumping the washing liquid from the zone 20 (in particular, from the lower portion 21 of the compartment 2) to the drum 3 until the washing liquid in the zone 20 (in particular, in the lower portion 21) reaches a second predetermined level 42 which is less than the first predetermined level 41. Advantageously, the predetermined reference level coincides with the second predetermined level 42. Advantageously the predetermined reference level conveniently coincides with the level of the liquid at the end of the step of charging the washing liquid into the drum 3. The step of pumping the washing liquid from the zone 20 to the drum 3 involves spraying the washing liquid into the drum 3 by making it transit through the opening 32. The step of spraying the washing liquid into the drum 3 is performed by a nozzle 70 outside the drum 3 which guides the jet towards the opening 32. The step of pumping the washing liquid from the zone 20 to the drum 3 is performed by a lifting pump 7 in fluid communication with a bottom of the washing compartment 2. In a specific constructional embodiment, the pump 7 could be flanged directly onto the delimiting wall of the washing compartment 2. Alternatively, the pump 7 could be in fluid communication with the washing compartment 2 by means of an intermediate pipe. Advantageously this pipe could be closed off when required by a valve.

[0015] The step of checking that the first configuration has been reached returns a positive result if the level of the liquid in the washing compartment 2 is greater than or equal to a third predetermined level 43, which is greater than the second predetermined level 42 by a predetermined quantity. The third predetermined level 43 could also coincide with the first predetermined level 41. Preferably, the third predetermined level 43 is less than the first predetermined level 41. In the preferred embodiment, the first, the second and the third predetermined levels 41, 42, 43 strictly remain fixed.

[0016] In a non-preferred embodiment, at all iterations of the first procedure, the first predetermined level 41 may also take on a different value (a similar thing may be said for the second and/or third predetermined levels 42, 43). In this case, there is a control logic which manages this variability; this embodiment is not the preferred one in light of these complications.

[0017] The predetermined increment indicated above is equal to the interval which becomes necessary to reach the third predetermined level 43 from the level 42 reached at the end of the step for charging the washing liquid into the drum 3.

[0018] As indicated above, in the preferred embodiment, the first configuration is reached when the washing liquid in the compartment 2 exceeds the third predetermined level 43. At all iterations of the first procedure, the level of the liquid in the zone 20 of the compartment 2 is advantageously equal to a second predetermined level 42 at the end of the step of charging the washing liquid into the drum 3.

[0019] Preferably the difference between the third predetermined level 43 and the second predetermined level 42 is equal to the predetermined increment.

[0020] Advantageously this predetermined increment could also be equal to the lowest value of the sensitivity of the level gauge (or better, to the minimum increment of the level as compared to the second predetermined level 42 which can be detected by the gauge 5).

[0021] In a non-limiting, example embodiment this increment could be between 0 and 20 millimetres of column of water.

[0022] The step of checking with a level gauge 5 that the first configuration has been reached occurs after a predetermined time period at the end of the step of charging a washing liquid into the drum 3. Advantageously but without constituting a limited factor, this predetermined time period is between 30 and 120 seconds.

[0023] Advantageously the washing liquid charged into the drum 3 and not absorbed by the laundry flows into the zone 20 alone under the force of gravity while the drum 3 is stationary. Hence, during the aforementioned time period, the drum 3 remains stationary. This permits the use of traditional drums 3 of the type mounted on most washing machines. Moreover, keeping the drum 3 stationary, minimises the risk of the water flowing out into the zone 20 through the perforated side wall 34 being excess liquid, it rather being liquid which outflows on account of the wringing effect caused by the centrifuge force acting on the laundry.

[0024] The first predetermined level 41 is conveniently located completely under the drum 3. Consequently, the second and the third predetermined levels 42, 43 are completely located under the drum 3.

[0025] The step of charging a washing liquid into the drum 3 comprises the step of heating the liquid present in the zone 20 of the washing compartment 2. The step of heating the washing liquid is at least partly between the step of feeding the washing liquid into the zone 20 of the compartment 2 and the step of pumping the washing liquid from the zone 20 of the washing compartment 2 to the drum 3. The step of heating the washing liquid involves activating a heating element 6 located in the zone 20, in particular located in the lower portion 21 of the washing compartment 2. The heating element 6 is advantageously located in the washing compartment 2 located between the first and the second predetermined levels 41, 42. The activation of the heating element 6 is subordinate to the detection by the level gauge 5 of a level of washing liquid which is greater than a level 46 for activating the element. This prevents overheating of the element 6 which might otherwise damage the element 6 or components of the washing machine 1 located close to the element 6.

[0026] The method also involves interrupting the step of heating the liquid present in the washing compartment

2 when a measurement of the temperature of the liquid present in the washing compartment 2 detects a temperature greater than a predetermined temperature value (preferably this predetermined temperature value is equal to a first value between 15 and 60°C, advantageously between 30 and 45°C).

[0027] The step of pumping the washing liquid from the zone 20 to the drum 3 starts after a measurement of the temperature of the liquid present in the zone 20 detects a temperature greater than a predetermined temperature value. This latter predetermined temperature value may or may not coincide with the first value. This permits the liquid which was already heated to be fed into the drum 3. A first advantage of this characteristic is associated with the fact that the heating allows the detergent to be activated should the washing liquid be a mixture of water and detergent. A further advantage is associated with the fact that this method improves soaking. Advantageously, the step of charging the washing liquid in the washing compartment 2 involves feeding a mixture of water and at least one chemical washing detergent.

[0028] For this purpose, the step of feeding the washing liquid into the zone 20 until the level in the zone 20 of the compartment 2 reaches a first predetermined level 41, comprises the following steps:

- requesting water from the mains water supply (for example, by opening a solenoid valve 71);
- causing it to transit through a tray 72 for feeding the detergent and causing the water-detergent mixture to outflow into the washing compartment 2. The mixture will be arrive in the lower portion 21 of the compartment 2 under the force of gravity.

[0029] The step of implementing the first procedure is advantageously preceded by the step of:

- feeding water into the zone 20 of the washing compartment 2 until the level in the zone 20 of the compartment 2 reaches a fourth predetermined level 44, the fourth level 44 being located completely under the drum 3. The fourth level 44 may coincide with the first predetermined level 41 (in particular, the first and the fourth levels 41, 44 coincide in the preferred embodiment; see also figure 1);
- pumping the washing liquid from the zone 20 of the washing compartment 2 into the drum 3 at least until the washing liquid in the zone 20 reaches a fifth predetermined level 45 which is less than the fourth predetermined level 44. The fifth predetermined level 45 may coincide with the second predetermined level 42 (for example, see figure 1).

[0030] The method also comprises the step of transferring into the drum 3 part of the liquid present in the zone 20 of the washing compartment 2 if the step of checking that the first configuration has been reached returns a positive result.

[0031] The step of transferring into the drum 3 part of the liquid present in the washing compartment 2 ends when the step of transferring into the drum 3 part of the liquid determines a decrease of the level in the zone 20 equal to the predetermined increment (in particular, it ends following a reduction of the level which compensates for the increment on account of the excess washing liquid which flowed from the drum 3 into the zone 20 during the implementation of the last iteration of the first procedure).

[0032] In a specific constructional example embodiment, at the end of the step of charging the washing liquid into the drum 3 and before the step of checking that the first configuration has been reached, the first procedure involves the following steps:

- using the gauge 5 to determine the specific level of liquid in the zone 20 of the compartment 2;
- assuming the predetermined reference level coinciding with the specific level. The predetermined reference level could also vary (non-preferred embodiment) at all iterations of the first procedure.

[0033] The object of the present invention is also a method for washing laundry implementing at least:

- the charging method having one or more of the technical features described above;
- a successive step of performing a wash cycle in which each time that the level of liquid in the washing compartment 2 exceeds a predetermined threshold, the liquid is pumped from the washing compartment into the drum 3, the predetermined threshold of the level of liquid being completely under the drum 3. The predetermined threshold advantageously coincides with the third predetermined level 43.

[0034] The object of the present invention (in addition to that already disclosed above) is also a method for washing laundry comprising the steps of:

- performing a cycle 2 for charging washing liquid in the washing compartment 2; the washing compartment 2 comprising a drum 3 in which there is laundry to be washed;
- performing a wash cycle successive to the cycle of charging the washing liquid.

[0035] The step of performing a wash cycle is as follows. Each time that the level of liquid located in a lower portion 21 of the washing compartment 2 exceeds a higher predetermined level 43, the washing liquid is pumped from the lower portion 21 of the compartment 2 into the drum 3 until the level of the liquid in the lower portion 21 of the compartment 2 reaches a lower level which is less than or equal to a lower predetermined level 42; the lower predetermined level 42 being below (as seen when

viewed on the vertical) the higher predetermined level 43, which in turn is entirely under the drum 3.

[0036] The invention described above enables the achievement of multiple advantages.

[0037] Firstly, it allows only the quantity of water required to be charged, thus allowing savings in water consumption; moreover, it avoids heating an unused volume of water and moving the drum in contact with the volume of water present in the bottom of the compartment (thus generating dissipation on account of friction).

[0038] All the details may be replaced by other technically equivalent elements. In practice, any materials and dimensions may be employed, according to needs.

Claims

1. A method for charging a washing liquid in a laundry washing machine (1) comprising a washing compartment (2) housing a rotatable drum (3), the drum (3) being designed to contain the laundry and comprising: a front frame (31) which delimits an opening (32) for loading/removing the laundry, a rear end wall (33) opposite the opening (32), a perforated side wall (34) extending between the rear end wall (33) and the frame (31), a plurality of holes in the perforated side wall (34) placing the inside of the drum (3) in fluid communication with a zone (20) of the washing compartment (2), outside the drum (3); the method comprising the step of implementing a first iterative procedure comprising, in the following temporal order, at least the following steps:

   - charging a washing liquid into the drum (3), the washing liquid charged into the drum (3) being at least partly absorbed by the laundry inside the drum (3), while washing liquid, if any, charged into the drum (3) and not absorbed by the laundry flows through said plurality of holes in the perforated side wall (34) into the zone (20) of the washing compartment (2) outside the drum (3);
   - checking with a level gauge (5) that a first configuration has been reached where, compared to a predetermined reference level, there is a predetermined increase of the level of liquid in the washing compartment (2) on account of the outflow from the drum (3) of the liquid not absorbed by the laundry; a negative result for this check causing the first procedure to be repeated until the check returns a positive result;

   wherein the step of charging a washing liquid into the drum (3) comprises the following steps:

   - feeding the washing liquid into said zone (20) of the washing compartment outside the drum (3), until the level in said zone (20) reaches a first predetermined level (41), located completely under the drum (3);
   - pumping the washing liquid from said zone (20) of the washing compartment outside the drum (3), to the drum (3) until the washing liquid in said zone (20) of the compartment (2) outside the drum (3) reaches a second predetermined level (42) less than the first predetermined level (41);

   the step of checking that the first configuration has been reached returning a positive result if the level of the liquid in said zone (20) of the washing compartment (2) outside the drum (3) is greater than or equal to a third predetermined level (43) which is greater than the second predetermined level (42) by a preset quantity.

2. The method according to claim 1, wherein the washing liquid charged into the drum (3) and not absorbed by the laundry flows spontaneously into the washing compartment (2) by the effect of gravity alone and while the drum (3) is stationary.

3. The method according to claim 1 or 2, wherein the method comprises the step of transferring into the drum (3) part of the liquid present in said zone (20) of the washing compartment (2) outside the drum (3) if the step of checking that the first configuration has been reached returns a positive result.

4. The method according to any of the preceding claims, wherein it being possible for the first, the second and the third predetermined level (41, 42, 43) to have a different value each time the first procedure is iterated.

5. The method according to claim 4, wherein the predetermined reference level coincides with the second predetermined level (42).

6. The method according to claim 4 or 5, wherein it being possible for the first predetermined level (41) to coincide with the third predetermined level (43).

7. The method according to claim 4, 5 or 6, wherein the step of charging a washing liquid into the drum (3) comprises the step of heating the liquid present in said zone (20) of the washing compartment (2) outside the drum (3), the step of heating the washing liquid being performed at least in part between the step of feeding the washing liquid into said zone (20) and the step of pumping into the drum (3) the washing liquid from said zone (20) of the washing compartment (2) outside the drum (3).

8. The method according to any of the claims from 4 to 7, wherein the step of pumping into the drum (3) the

washing liquid from said zone (20) of the washing compartment (2) outside the drum (3) starts when the value of the liquid temperature measured in said zone (20) of the washing compartment (2) outside the drum (3) exceeds a predetermined temperature value.

9. The method according to any of the foregoing claims, wherein the step of charging the washing liquid into the washing compartment (2) comprises feeding a mixture of water and at least one chemical washing detergent.

10. The method according to claim 9 when it depends directly or indirectly on claim 4, wherein the step of implementing the first procedure is preceded by the step of:

- feeding water into the washing compartment (2) until the level in the washing compartment (2) reaches a fourth predetermined level (44), the fourth predetermined level (44) being completely under the drum (3) and it being possible for it to coincide with the first predetermined level (41);
- pumping the washing liquid from the washing compartment (2) into the drum (3) at least until the washing liquid in the drum (3) reaches a fifth predetermined level (45) less than the fourth predetermined level (44), it being possible for the fifth predetermined level (45) to coincide with the second predetermined level (42).

11. The method according to any of the preceding claims, wherein the step of checking with a level gauge (5) that the first configuration has been reached occurs after a predetermined time interval from the end of the step of charging a washing liquid into the drum (3).

12. A method for washing laundry implementing at least:

- the charging method according to any of the claims from 1 to 11;
- a subsequent step of performing a washing cycle where the washing liquid is pumped from the washing compartment into the drum (3) each time the level of liquid in the washing compartment (2) exceeds a predetermined threshold, the predetermined threshold being completely under the drum (3).

Patentansprüche

1. Verfahren zum Einfüllen einer Waschflüssigkeit in eine Waschmaschine (1), umfassend einen Waschbehälter (2), welcher eine rotierbare Trommel (3) beherbergt, wobei die Trommel (3) dazu eingerichtet ist, die Wäsche aufzunehmen und umfasst: einen vorderen Rahmen (31), welcher eine Öffnung (32) zum Eingeben/Entnehmen der Wäsche begrenzt, eine hintere Endwand (33) gegenüber der Öffnung (32), eine perforierte Seitenwand (34), welche sich zwischen der hinteren Endwand (33) und dem Rahmen (31) erstreckt, wobei eine Mehrzahl von Löchern in der perforierten Seitenwand (34) das Innere der Trommel (3) mit einer Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) in Fluidverbindung bringen; wobei das Verfahren den Schritt eines Durchführens eines ersten iterativen Ablaufs umfasst, welcher in der folgenden zeitlichen Reihenfolge wenigstens die folgenden Schritte umfasst:

- Einfüllen einer Waschflüssigkeit in die Trommel (3), wobei die in die Trommel (3) eingefüllte Waschflüssigkeit wenigstens teilweise von der Wäsche innerhalb der Trommel (3) aufgenommen wird, während Waschflüssigkeit, sofern vorhanden, welche in die Trommel (3) eingefüllt wird und nicht von der Wäsche aufgenommen wird, durch die Mehrzahl von Löchern in der perforierten Seitenwand (34) in die Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) strömt;
- Überprüfen mittels eines Füllstand-Erfassungselements (5), dass ein erster Zustand erreicht worden ist, in welchem, verglichen mit einem vorbestimmten Referenz-Füllstand, eine vorbestimmte Zunahme des Füllstands von Flüssigkeit in dem Waschbehälter (2) aufgrund des Ausströmens von nicht von der Wäsche aufgenommener Flüssigkeit aus der Trommel (3) vorliegt; wobei ein negatives Ergebnis dieser Überprüfung dafür sorgt, dass der erste Ablauf wiederholt wird, bis die Überprüfung ein positives Ergebnis zurück liefert;

wobei der Schritt des Einfüllens einer Waschflüssigkeit in die Trommel (3) die folgenden Schritte umfasst:

- Zuführen der Waschflüssigkeit in die Zone (20) des Waschbehälters außerhalb der Trommel (3) bis der Füllstand in der Zone (20) einen ersten vorbestimmten Füllstand (41) erreicht, welcher vollständig unter der Trommel (3) angeordnet ist;
- Pumpen der Waschflüssigkeit aus der Zone (20) des Waschbehälters außerhalb der Trommel (3) zu der Trommel (3), bis die Waschflüssigkeit in der Zone (20) des Behälters (2) außerhalb der Trommel (3) einen zweiten vorbestimmten Füllstand (42) erreicht, welcher kleiner ist als der erste vorbestimmte Füllstand (41);

wobei der Schritt des Überprüfens, dass der erste Zustand erreicht worden ist, ein positives Ergebnis zurück liefert, wenn der Füllstand der Flüssigkeit in der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) größer oder gleich einem dritten vorbestimmten Füllstand (43) ist, welcher um eine vorgegebene Menge größer als der zweite vorbestimmte Füllstand (42) ist.

2. Verfahren nach Anspruch 1, wobei die in die Trommel (3) eingefüllte und nicht von der Wäsche aufgenommene Waschflüssigkeit alleine durch die Wirkung der Schwerkraft und während die Trommel (3) in Ruhe ist, spontan in den Waschbehälter (2) strömt.

3. Verfahren nach Anspruch 1 oder 2, wobei das Verfahren den Schritt eines Übertragens eines Teils der in der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) vorhandenen Flüssigkeit in die Trommel (3) umfasst, wenn der Schritt des Überprüfens, dass der erste Zustand erreicht worden ist, ein positives Ergebnis zurück liefert.

4. Verfahren nach einem der vorhergehenden Ansprüche, wobei es für den ersten, den zweiten und den dritten vorbestimmten Füllstand (41, 42, 43) möglich ist, bei jeder Wiederholung des ersten Ablaufs einen unterschiedlichen Wert aufzuweisen.

5. Verfahren nach Anspruch 4, wobei der vorbestimmte Referenz-Füllstand mit dem zweiten vorbestimmten Füllstand (42) zusammenfällt.

6. Verfahren nach Anspruch 4 oder 5, wobei es für den ersten vorbestimmten Füllstand (41) möglich ist, mit dem dritten vorbestimmten Füllstand (43) zusammenzufallen.

7. Verfahren nach Anspruch 4, 5 oder 6, wobei der Schritt des Einfüllens einer Waschflüssigkeit in die Trommel (3) den Schritt eines Erhitzens der in der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) vorhandenen Flüssigkeit umfasst, wobei der Schritt des Erhitzens der Waschflüssigkeit wenigstens teilweise zwischen dem Schritt des Einfüllens der Waschflüssigkeit in die Zone (20) und dem Schritt des Pumpens der Waschflüssigkeit von der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) in die Trommel (3) ausgeführt wird.

8. Verfahren nach einem der Ansprüche 4 bis 7, wobei der Schritt des Pumpens der Waschflüssigkeit von der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) in die Trommel (3) beginnt, wenn der Wert der in der Zone (20) des Waschbehälters (2) außerhalb der Trommel (3) gemessenen Flüssigkeits-Temperatur einen vorbestimmten Temperaturwert überschreitet.

9. Verfahren nach einem der vorhergehenden Ansprüche, wobei der Schritt des Einfüllens der Waschflüssigkeit in den Waschbehälter (2) ein Zuführen einer Mischung von Wasser und wenigstens einem chemischen Waschmittel umfasst.

10. Verfahren nach Anspruch 9, wenn dieser direkt oder indirekt von Anspruch 4 abhängt, wobei dem Schritt des Durchführens des ersten Ablaufs der Schritt vorhergeht:

- Zuführen von Wasser in den Waschbehälter (2), bis der Füllstand in dem Waschbehälter (2) einen vierten vorbestimmten Füllstand (44) erreicht, wobei der vierte vorbestimmte Füllstand (44) vollständig unter der Trommel (3) liegt und es für ihn möglich ist, mit dem ersten vorbestimmten Füllstand (41) zusammenzufallen;
- Pumpen der Waschflüssigkeit von dem Waschbehälter (2) in die Trommel (3) wenigstens bis die Waschflüssigkeit in der Trommel (3) einen fünften vorbestimmten Füllstand (45) erreicht, welcher kleiner als der vierte vorbestimmte Füllstand (44) ist, wobei es für der fünften vorbestimmten Füllstand (45) möglich ist, mit dem zweiten vorbestimmten Füllstand (42) zusammenzufallen.

11. Verfahren nach einem der vorhergehenden Ansprüche, wobei der Schritt des Überprüfens mittels eines Füllstand-Erfassungselements (5), dass der erste Zustand erreicht worden ist, nach einem vorbestimmten Zeitintervall ab dem Ende des Schritts des Einfüllens einer Waschflüssigkeit in die Trommel (3) stattfindet.

12. Verfahren zum Waschen von Wäsche, wobei wenigstens durchgeführt wird:

- das Verfahren zum Einfüllen nach einem der Ansprüche 1 bis 11;
- ein nachfolgender Schritt eines Ausführens eines Waschzyklus, wobei die Waschflüssigkeit jedes Mal, wenn der Füllstand von Flüssigkeit in dem Waschbehälter (2) einen vorbestimmten Schwellenwert übersteigt, von dem Waschbehälter in die Trommel (3) gepumpt wird, wobei der vorbestimmte Schwellenwert vollständig unter der Trommel (3) liegt.

Revendications

1. Procédé de chargement d'un liquide de lavage dans une machine à laver le linge (1) comprenant un compartiment de lavage (2) logeant un tambour rotatif (3), le tambour (3) étant conçu pour contenir le linge et comprenant . une structure avant (31) qui délimite

une ouverture (32) pour charger ou retirer le linge, une paroi d'extrémité arrière (33) opposée à l'ouverture (32), une paroi latérale perforée (34) s'étendant entre la paroi d'extrémité arrière (33) et la structure (31), une pluralité de trous dans la paroi latérale perforée (34) plaçant l'intérieur du tambour (3) en communication de fluide avec une zone (20) du compartiment de lavage (2), à l'extérieur au tambour (3) ; le procédé comprenant l'étape de mettre en oeuvre une première procédure itérative comprenant, dans l'ordre chronologique suivant, au moins les étapes suivantes :

- charger un liquide de lavage dans le tambour (3), le liquide lavage chargé dans le tambour (3) étant au moins partiellement absorbé par le linge à l'intérieur du tambour (3), tandis que le liquide de lavage, si il y en a, chargé dans le tambour (3) et non absorbé par le linge circule à travers ladite pluralité de trous situés dans la paroi latérale perforée (34) dans la zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3) ;
- vérifier avec une jauge de niveau (5) qu'une première configuration a été atteinte selon laquelle, en comparaison à un niveau de référence prédéterminée, il y a une augmentation prédéterminée du niveau de liquide dans le compartiment de lavage (2) à cause de l'écoulement à partir du tambour (3) du liquide non absorbé par le linge ; un résultat négatif pour cette vérification entraînant la première procédure à être répétée jusqu'à ce que la vérification revienne à un résultat positif ;

dans lequel l'étape consistant à charger le liquide de lavage dans le tambour (3) comprend les étapes suivantes :

- fournir le liquide de lavage dans ladite zone (20) du compartiment de lavage à l'extérieur du tambour (3) jusqu'à ce que le niveau dans ladite zone (20) atteigne un premier niveau prédéterminé (41) situé complètement au-dessous du tambour (3) ;
- pomper le liquide de lavage depuis ladite zone (20) du compartiment de lavage à l'extérieur du tambour (3), vers le tambour (3) jusqu'à ce que le liquide de lavage dans ladite zone (20) du compartiment (2) à l'extérieur du tambour (3) atteigne un deuxième niveau prédéterminé (42) inférieur au premier niveau prédéterminé (41) ;

l'étape consistant à vérifier que la première configuration a été atteinte revenant à un résultat positif si le niveau du liquide dans ladite zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3) est plus élevé que le, ou égal au, troisième niveau prédéterminé (43), lequel est plus élevé que le deuxième niveau prédéterminé (42) d'une quantité préétablie.

2. Procédé selon la revendication 1, dans lequel le liquide de lavage chargé dans le tambour (3) et non absorbé par le linge s'écoule spontanément dans le compartiment de lavage (2) sous l'effet de la seule gravité et tandis que le tambour (3) est stationnaire.

3. Procédé selon la revendication 1 ou 2, dans lequel le procédé comprend l'étape comportant de transférer dans le tambour (3) une partie du liquide présent dans ladite zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3) si l'étape comportant de vérifier que la première configuration a été atteinte revient à un résultat positif.

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel il est possible pour le premier, le deuxième et le troisième niveau prédéterminé (41, 42, 43) d'avoir une valeur différente chaque fois que la première procédure est répétée.

5. Procédé selon la revendication 4, dans lequel le niveau de référence prédéterminé coïncide avec le deuxième niveau prédéterminé (42).

6. Procédé selon la revendication 4 ou 5, dans lequel il est possible pour le premier niveau prédéterminé (41) de coïncider avec le troisième niveau prédéterminé (43).

7. Procédé selon la revendication 4, 5 ou 6, dans lequel l'étape comportant de charger un liquide de lavage dans le tambour (3) comprend l'étape comportant de chauffer le liquide présent dans ladite zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3), l'étape comportant de chauffer le liquide de lavage étant exécutée au moins en partie entre l'étape de fourniture du liquide de lavage dans ladite zone (20) et l'étape comportant de pomper vers le tambour (3) le liquide de lavage à partir de ladite zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3).

8. Procédé selon l'une quelconque des revendications 4 à 7, dans lequel l'étape comportant de pomper vers le tambour (3) le liquide de lavage à partir de ladite zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3) commence lorsque la valeur de la température du liquide mesurée dans la zone (20) du compartiment de lavage (2) à l'extérieur du tambour (3) dépasse une valeur de température prédéterminée.

9. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'étape comportant de

charger le liquide de lavage dans le compartiment de lavage (2) comprend le fait de fournir un mélange d'eau et d'au moins un détergent chimique de lavage.

10. Procédé selon la revendication 9 lorsqu'elle dépend directement ou indirectement de la revendication 4, dans lequel l'étape comporte de mettre en oeuvre la première procédure est précédée par l'étape comprenant le fait de :

- fournir de l'eau dans le compartiment de lavage (2) jusqu'à ce que le niveau dans le compartiment de lavage (2) atteigne un quatrième niveau prédéterminé (44), le quatrième niveau prédéterminé (44) se trouvant complètement sous le tambour (3) et ce niveau pouvant coïncider avec le premier niveau prédéterminé (41) ;
- pomper le liquide de lavage à partir du compartiment de lavage (2) vers le tambour (3) au moins jusqu'à ce que le liquide de lavage du tambour (3) atteigne un cinquième niveau prédéterminé (45) inférieur au quatrième niveau prédéterminé (44), le cinquième niveau prédéterminé (45) pouvant coïncider avec le second niveau prédéterminé (42).

11. Procédé selon l'une quelconque des revendications précédentes, dans lequel l'étape comportant de vérifier avec une jauge de niveau (5) que la première configuration a été atteinte se produit après un laps de temps prédéterminé à partir de la fin de l'étape comportant de charger le liquide de lavage dans le tambour (3).

12. Procédé pour laver du linge mettant en oeuvre au moins :

- le procédé de chargement selon l'une quelconque des revendications 1 à 11 ;
- une étape ultérieure comportant d'exécuter un cycle de lavage dans lequel le liquide de lavage est pompé à partir du compartiment de lavage vers le tambour (3) chaque fois que le niveau du liquide dans le compartiment de lavage (2) dépasse un seuil prédéterminé, le seuil prédéterminé se trouvant complètement sous le tambour (3).

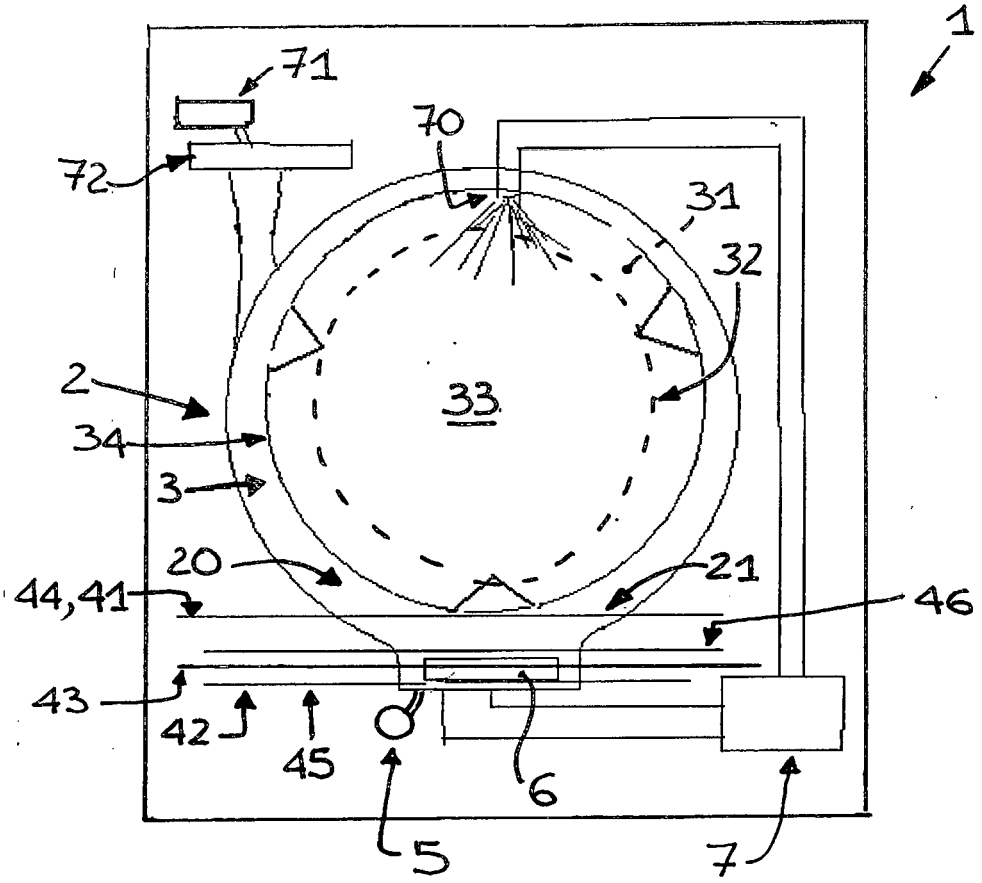

Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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