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(54) **Washing cycle profile included laundry repartition and laundry release**

Waschzyklusprofil in der Wäschereiaufteilung und Wäschereifreigabe

Profil de cycle de nettoyage comportant une répartition de blanchisserie et relâchement de blanchisserie

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EP-A- 1 526 209 DE-A1- 4 009 046
US-A- 3 388 410

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Description

[0001] The present invention concerns a method of washing for washing machine, known, for instance, from EP-A-1 526 209.

[0002] The washing machines constructors engage constant research to move that, their machines offer the best performances with allowing savings to be made in running cost, with reduction in consumption of energy, water and detergents. For example, US patent n° 3.388.410 describes a washing method which provides during the whole washing time, as also during the rinsing time, an alternation of cycles in which the drum containing the clothes to be washed, is made to rotate at high speed, with cycles during which the drum is made to rotate at a lower speed. The high speed being sufficient to make the centrifugal force acting on the clothes overcome the force of gravity and maintain the ones against the drum wall, while during the cycles in which the drum is made to rotate a lower speed, the clothes fall back into the drum base itself. The soapy washing solution or the rinsing water is taken from the base of the washing tub and is continuously fed again by spraying, by means of recirculation pump, into the drum. During drum rotation at the higher speed, there is the formation of a ring of solution or of rinsing water wherein the clothes are constantly immersed. The washing and rinsing at high speed with clothes adhering to the wall drum and sprayed by the soapy solution or recycled rinsing water improve the efficiency of washing and rinsing phases. Moreover that recirculation allows liquid quantity used to be reduced to a certain extent.

[0003] EP 0.726.349 describes a method of washing machine comprises at least one washing phase which includes a cycle of work at high speed and recirculation of water during which a drum containing the laundry to be washed and rotatory housed in a washing tub, is made to rotate at a first speed, sufficiently high to generate a centrifugal force which causes arrangement of the laundry along the periphery of the drum and, simultaneously, the water in the washing tub is taken from said tub and is returned therein by spraying at a central part of the drum. A subsequent work cycle at low speed then takes place, during which the drum is made to rotate at a second speed, lower than said first speed and such as to allow remixing of the laundry, while the recirculation of water is substantially interrupted. The cycle of work at high speed and recirculation of water has a duration limited to the time necessary for the complete removal of detergent from a detergent container and during its performance part of the water taken from the tub is made to pass through the container of detergent and subsequently re-introduced into the tub.

[0004] In the two cases, the quantity of water fed into the washing tub must be sufficient to ensure that, during the recirculation, a quantity of water remains always in the tub so as to prevent the cavitation of the recirculation pump. This is more likely to occur during the cycles of

drum rotation at low speed.

[0005] In US patent 3 388 410, this problem is solved in making the tub very deep, and in feeding therein an abundant quantity of water because during the years to which this patent dates back the problem of water and energy consumption was not less felt than the actual epoch.

[0006] The problem subsists actually in case of relation drum volume clothes quantity, small.

[0007] EP1526209 discloses a drum type washing machine including a rotary drum installed in a water tub such that a rotational axis thereof is declined toward a rear portion of the washing machine with respect to a horizontal direction. An agitation control is executed for a predetermined time in at least one of a washing process and a rinsing process. The agitation control repeatedly performs a control process of rotating the rotary drum at a first rotational speed for a first preset period of time and then stopping the rotary drum for a second preset period of time, and a rotational force due to the first rotational speed allows laundry articles to be lifted up in the rotational direction of the rotary drum and dropped when reaching a height where the weight of the laundry articles is greater than a centrifugal force of the rotary drum exerted on the laundry articles.

[0008] In view of the state of the art described above, the object of the present invention, as characterised in the claims, is to permit a good clothes distribution in the drum and performances improvement for washing in particular in case of relation drum volume, clothes quantity small ; in order to adapt the drum volume for the same machine nominal garment to reduce consequently the energy and the water consumption to optimize the power of the washing machine motor.

[0009] These and others features of the present invention will be made clearer from the detailed description of some of its embodiments, illustrated by way of a non limiting example in accompanying with the drawings on which :

- figure 1 shows a diagram on which all the phases of the washing are represented, including rinsing and drying phases ,
- figure 2 shows an enlargement of the part of the diagram corresponding only at the washing phase.

[0010] Regarding fig 1., we can see on the diagram showing water level **1** and drum speed **2** that after a first wash period of about 57 minutes, the drum is subject to two brief impulses **11,12** in order to obtain laundry detachment. The phase impulses **11,12** being followed by a washing phase **10** strictly speaking of about one hour duration until the rinsing phase.

[0011] Regarding fig. 2, we see on this diagram that the impulses **11,12** for better laundry speed detachment correspond to brief drum increasing of about 220 to 300 RPM separate by a short pause **13** and followed by a

longer pause **14**, before the standard washing phase continuation **17**. We can remark that these impulses **11,12** are accompanied with water higher level **15,16** with picks corresponding to the drum speed impulses **11,12**. **[0012]** It results of this application method that the using of small impulses **11,12** of speed motor highest during the clothes washing phase permits a drum acceleration able to redistribute the clothes inside the drum, particularly in the case of the relation "drum volume / clothes quantity" low. These impulses being activated automatically, only in the case of nominal loading of the machine, in view to make optimal the drum volume and to reduce the required energy, the water consumption and motor power ; the loading being determined by the washing machine itself. The using of the process staying however possible in the case of volume drum more important to accelerate the clothes distribution in the drum.

Claims

1. Method of washing for washing machine comprising a washing which includes:

- a work cycle at high speed during which a drum containing the laundry to be washed, said drum being rotatory housed in a washing tub fed with clean water, is made to rotate at a first speed, sufficiently high to generate a centrifugal force which forms and maintains an annular layer of clothes against the drum peripheral wall with cleaning solution, and
 - a subsequent work cycle during which the drum is made to rotate at a second speed lower than said first speed and such as to allow remixing of the laundry while the recirculation of the water is interrupted, the work cycle at high speed being realized in the form of brief impulses (**11,12**) in the rotation speed of said drum, said impulses being separated each other by a short drum stopping sequence (**13**)

characterized in that

said work cycle at high speed is followed by a last drum stopping sequence (**14**) longer than those separating the impulses (**11,12**) and in that this last drum stopping sequence (**14**) is accompanied with the maintaining of the water at a level (**16**) higher than the level in said subsequent work cycle during which the drum is made to rotate at a second speed lower than said first speed.

2. Method according to claim 1 **characterized in that**, the work cycle at high speed is automatically carried out when relation drum volume/clothes quantity has predetermined values.
3. Method according to claim 2 **characterized in that**,

the work cycle at high speed is carried out upon determining drum loading by the washing machine itself.

4. Method according to claim 1 **characterized in that**, the work cycle at high speed can be carried out, by the user of the machine.
5. Method according to claim 1 **characterized in that**, the work cycle at high speed is effected at about 220 to 300 RPM depending to the washing machine type.
6. Method according to claim 1, **characterized in that**, the work cycle at high speed comprises two impulses (**11,12**) or more.
7. Method according to claim 1 or 6, **characterized in that**, the impulses (**11,12**) could be repeated at any time during the work cycle at high speed.

Patentansprüche

1. Waschverfahren für eine Waschmaschine, das einen Waschvorgang umfasst, der aus folgenden Elementen zusammengesetzt ist:

- einem Arbeitszyklus mit hoher Geschwindigkeit, während dessen eine Trommel, welche die zu waschende Wäsche enthält und welche rotationsfähig in einem mit sauberem Wasser gespeisten Laugenbehälter untergebracht ist, mit einer ersten Geschwindigkeit in Rotation versetzt wird, die ausreichend hoch ist, um eine Zentrifugalkraft zu erzeugen, die eine ringförmige Wäschelage gegen die Außenwand der Trommel mit der Reinigungslösung bildet und aufrecht hält, und
 - einem anschließenden Arbeitszyklus, während dessen die Trommel mit einer zweiten Geschwindigkeit in Rotation versetzt wird, die geringer ist als die erste Geschwindigkeit, um eine neue Durchmischung der Wäsche zu erlauben, während die Rückführung des Wassers unterbrochen ist, wobei der Arbeitszyklus mit hoher Geschwindigkeit in Form kurzer Impulse (**11, 12**) in der Rotationsgeschwindigkeit der Trommel erreicht wird, wobei diese Impulse voneinander durch eine kurze Trommelstoppsequenz (**13**) getrennt sind,

dadurch gekennzeichnet, dass

dem Arbeitszyklus bei hoher Geschwindigkeit eine letzte Trommelstoppsequenz (**14**) folgt, die länger ist als jene, die die Impulse (**11, 12**) trennen, und dass diese letzte Trommelstoppsequenz (**14**) davon begleitet wird, dass das Wasser auf einem Pegel (**16**)

gehalten wird, der höher ist als der Pegel in dem anschließenden Arbeitszyklus, während dem die Trommel mit einer zweiten Geschwindigkeit in Rotation versetzt wird, die geringer ist als die erste Geschwindigkeit.

2. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Arbeitszyklus bei hoher Geschwindigkeit automatisch ausgeführt führt, wenn das Verhältnis Trommelvolumen/Kleidermenge bestimmte Werte erreicht.
3. Verfahren gemäß Anspruch 2, **dadurch gekennzeichnet, dass** der Arbeitszyklus bei hoher Geschwindigkeit nach der Feststellung der Trommelbeladung durch die Waschmaschine selbst durchgeführt wird.
4. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Arbeitszyklus bei hoher Geschwindigkeit vom Benutzer der Maschine durchgeführt werden kann.
5. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Arbeitszyklus bei hoher Geschwindigkeit bei etwa 220 bis 300 UpM durchgeführt wird, je nach dem Waschmaschinentyp.
6. Verfahren gemäß Anspruch 1, **dadurch gekennzeichnet, dass** der Arbeitszyklus bei hoher Geschwindigkeit zwei Impulse (11, 12) oder mehr umfasst.
7. Verfahren gemäß Anspruch 1 oder 6, **dadurch gekennzeichnet, dass** die Impulse (11, 12) jederzeit während des Arbeitszyklus bei hoher Geschwindigkeit wiederholt werden könnten.

Revendications

1. Procédé de lavage pour une machine à laver comprenant un lavage qui inclut :
 - un cycle de travail à vitesse élevée pendant lequel un tambour contenant le linge à nettoyer, ledit tambour étant logé de manière rotative dans une cuve de lavage alimentée en eau propre, est amené à tourner à une première vitesse, suffisamment élevée pour générer une force centrifuge qui forme et maintient une couche annulaire de vêtements contre la paroi périphérique du tambour avec la solution nettoyante, et
 - un cycle de travail ultérieur pendant lequel le tambour est amené à tourner à une seconde vitesse inférieure à ladite première vitesse et telle qu'elle permet le remélange du linge pendant que la recirculation de l'eau est interrompue, le

cycle de travail à vitesse élevée étant réalisé sous la forme de brèves impulsions (11, 12) dans la vitesse de rotation dudit tambour, lesdites impulsions étant séparées les unes des autres par une courte séquence d'arrêt du tambour (13)

caractérisé en ce que

ledit cycle de travail à vitesse élevée est suivi par une dernière séquence d'arrêt du tambour (14) plus longue que celle séparant les impulsions (11, 12), et en ce que cette dernière séquence d'arrêt du tambour (14) est accompagnée par le maintien de l'eau à un niveau (16) plus élevé que le niveau dans ledit cycle de travail ultérieur pendant lequel le tambour est amené à tourner à une seconde vitesse plus faible que ladite première vitesse.

- 5
 - 10
 - 15
 - 20
 - 25
 - 30
 - 35
 - 40
 - 45
 - 50
 - 55
2. Procédé selon la revendication 1, **caractérisé en ce que** le cycle de travail à vitesse élevée est réalisé automatiquement lorsque la relation volume du tambour/quantité de vêtements a des valeurs prédéterminées.
 3. Procédé selon la revendication 2, **caractérisé en ce que** le cycle de travail à vitesse élevée est réalisé lors de la détermination de la charge du tambour par la machine à laver elle-même.
 4. Procédé selon la revendication 1, **caractérisé en ce que** le cycle de travail à vitesse élevée peut être réalisé par l'utilisateur de la machine.
 5. Procédé selon la revendication 1, **caractérisé en ce que** le cycle de travail à vitesse élevée est effectué à environ 220 à 300 tours/min en fonction du type de machine à laver.
 6. Procédé selon la revendication 1, **caractérisé en ce que** le cycle de travail à vitesse élevée comprend deux impulsions (11, 12) ou plus.
 7. Procédé selon la revendication 1 ou 6, **caractérisé en ce que** les impulsions (11, 12) pourraient être répétées à tout instant pendant le cycle de travail à vitesse élevée.

FIG.1

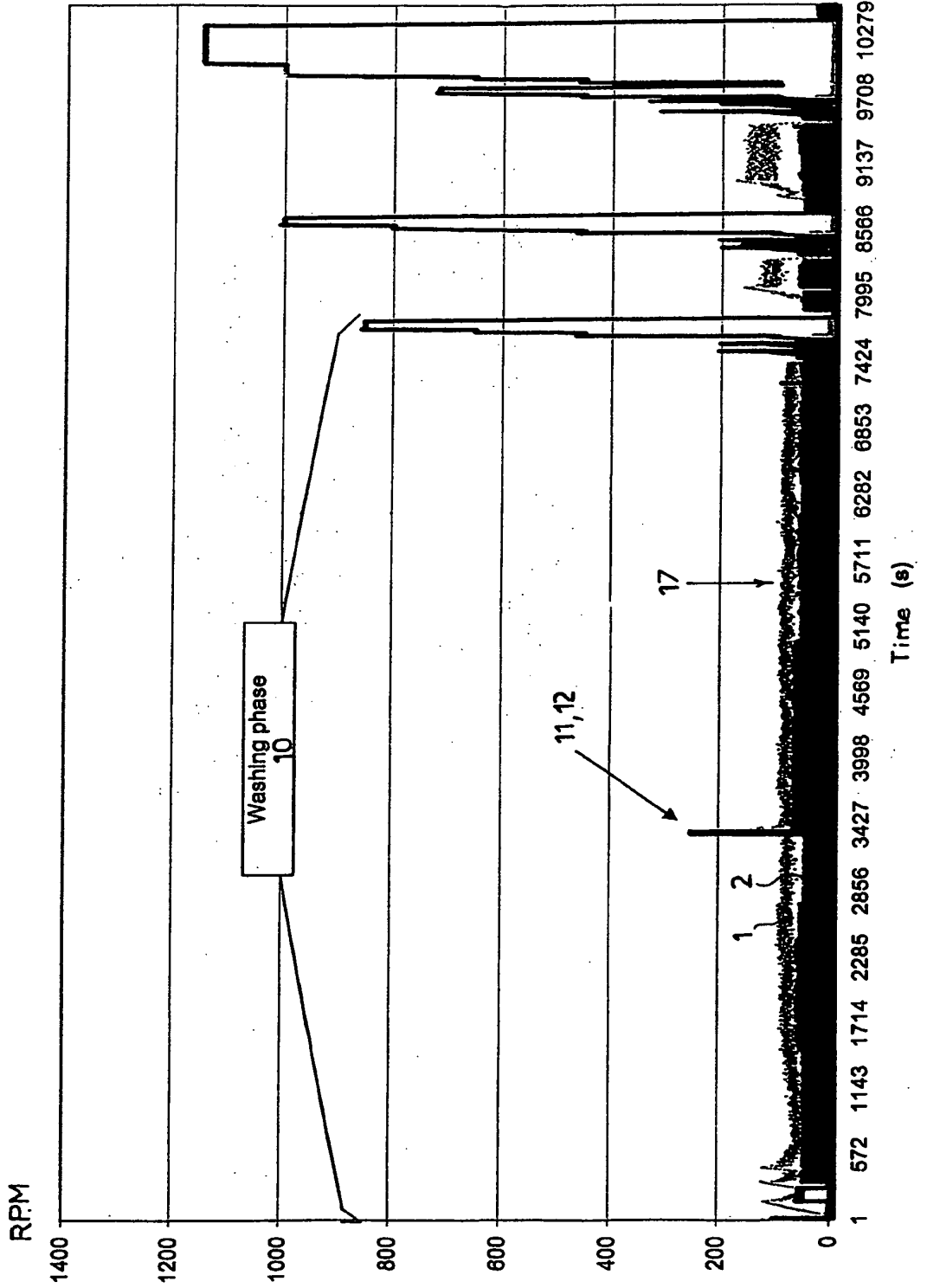
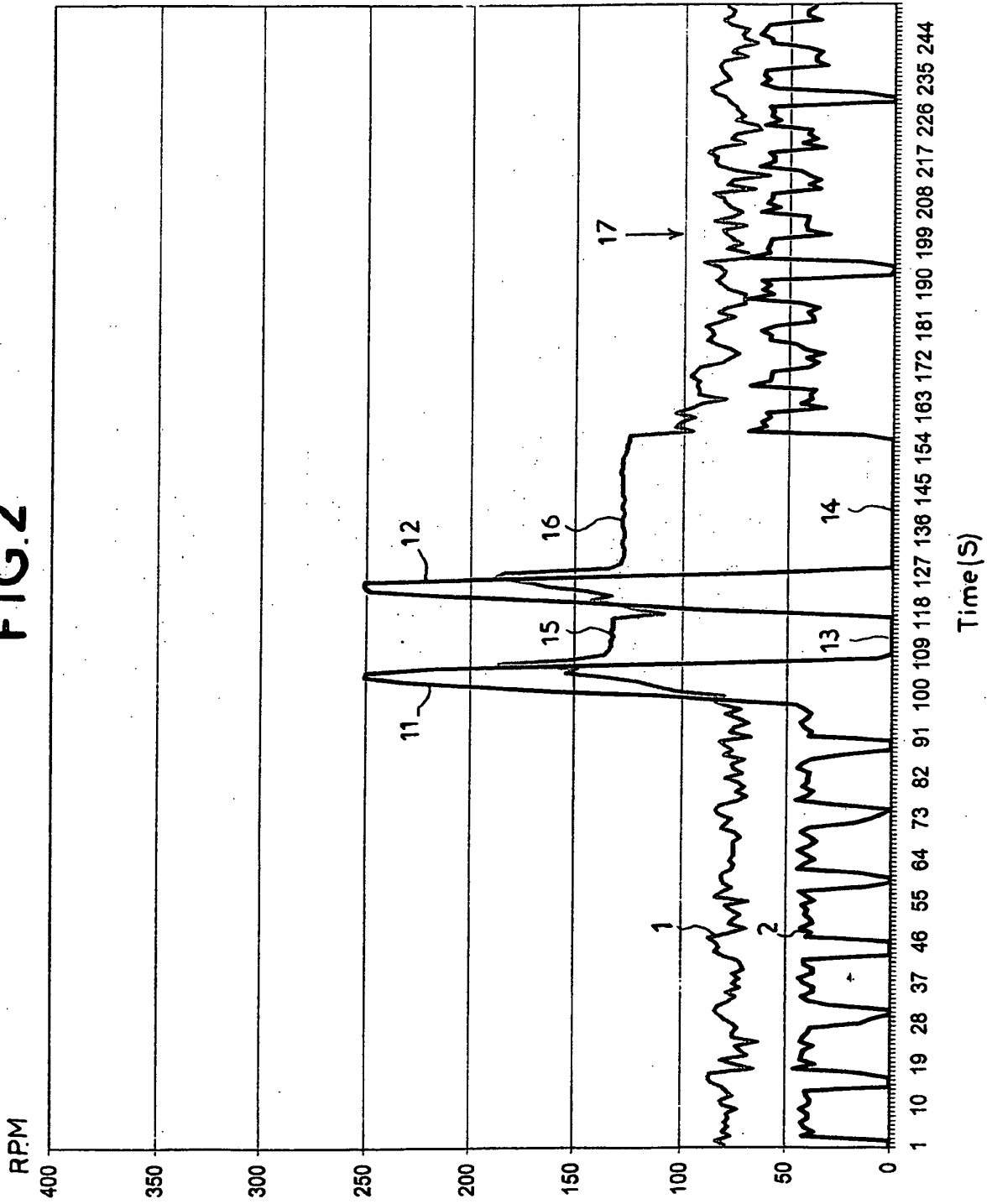


FIG. 2



REFERENCES CITED IN THE DESCRIPTION

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