

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 807 706 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.11.1997 Bulletin 1997/47

(51) Int Cl.6: **D06F 35/00**

(21) Application number: **97830225.5**

(22) Date of filing: **14.05.1997**

(84) Designated Contracting States:
AT BE DE DK ES FI FR GB GR IT NL PT SE

(72) Inventor: **Merloni, Antonio**
60044 Fabriano, (Ancona) (IT)

(30) Priority: **14.05.1996 IT BO960267**

(74) Representative: **Coppi, Cecilia**
c/o Studio Internazionale Dott. Coppi,
Via del Cane No. 8
40124 Bologna (IT)

(71) Applicant: **ANTONIO MERLONI S.p.A.**
I-60044 Fabriano (Ancona) (IT)

(54) **Method for washing laundry such that it does not adhere to the drum, in washing machine**

(57) A method for washing laundry such that it does not adhere to the drum, in washing machines with a horizontal or vertical axis drum, comprises one or more laundry centrifuging cycles at the end of the washing and/or rinsing cycles. According to the invention, the method envisages that, prior to the conventional high-

speed centrifuging cycle, at least one low-speed centrifuging cycle is performed. Moreover, between the low-speed centrifuging cycle and the following high-speed centrifuging cycle, there may be advantageously provided at least one intermediate separating remixing and airing cycle which is performed at the normal washing speed of the drum.

EP 0 807 706 A2

Description

The invention relates to a method for washing laundry such that it does not adhere to the drum, in washing machines with a horizontal or vertical axis drum, which method comprises one or more laundry centrifuging cycles at the end of the washing and/or rinsing cycles.

The purpose of laundry centrifuging cycles is to reduce as far as possible the moisture contained in the said laundry so as to ensure an easier, quicker and more complete subsequent drying cycle.

In order to obtain the maximum drying effect, the drum is made to rotate at a speed, on average, of about 100/1200 rpm and sometimes at even higher speeds. At this centrifuging speed, a reduction in the water-content of the laundry, up to a value equal to about 50% of the weight of the laundry itself, is obtained. At the same time, however, the high stresses during centrifuging and the large quantity of water present cause the laundry to adhere to the drum.

Said laundry remains attached thereto even after the centrifuging cycle has ended, so that one is obliged to separate manually the laundry from the walls of the drum. This drawback has severe repercussions on the operational performance of washing, centrifuging and drying machines. In fact, at the end of the washing, rinsing and centrifuging cycles, the machines must be stopped and opened so as to allow manual separation of the laundry from the walls of the drum.

The compression and resultant adhesion of the laundry to the walls of the drum are caused by the high centrifuging speed and the large quantity of water present. The laundry is compressed with a force which can reach values from 100 to 300 times the weight of the laundry itself, which, in addition to adhesion to the walls, also favours bunching and matting of the laundry.

The centrifugal compression of the laundry against the walls of the drum also causes compacting thereof and hence insufficient airing, which airing operation is also necessary for good drying results. Consequently, not only is it required to separate manually the laundry from the walls, but also loosening or manual spreading thereof is required.

The invention aims to provide a washing method which enables the abovementioned drawbacks to be overcome and which, by means of simple and inexpensive measures, helps render fully automatic the washing and drying processes, avoiding having to interrupt the automatic sequence of the cycles in order to carry out manual operations.

The invention achieves the abovementioned objects with a washing method of the type described at the start, in which prior to the conventional high-speed centrifuging cycle, at least one low-speed centrifuging cycle is performed.

For the low-speed centrifuging cycle it is possible to envisage drum rotation speeds which range between the washing speeds and the fast-centrifuging speeds

and in particular are comprised between 200 and 600 rpm, preferably between 300 and 500 rpm.

The high-speed centrifuging cycle may be carried out at speeds variable between 800 and 1200 rpm, preferably between 800 and 1000 rpm.

According to an improvement, between the low-speed centrifuging cycle and the following high-speed centrifuging cycle, there is provided at least one intermediate separating, remixing and airing cycle which is performed at the normal washing speed of the drum, in particular from 30 to 60 rpm.

The intermediate cycles of low-speed centrifuging and of separating, remixing and airing at washing speed which precede high-speed centrifuging may be more than one and may be performed in direct succession or alternating with one another in any desired combination.

Also the high-speed centrifuging cycle may be repeated several times directly in succession or intercalated in any desired combination with the low-speed centrifuging cycle(s) and the separating, remixing and airing cycle(s).

As a result of the above mentioned measures it has in fact been found that, with a first low-speed centrifuging operation, during which the laundry is pressed against the walls of the drum with lesser force, it is possible to eliminate a considerable quantity of water from the laundry itself. During a subsequent rotation of the drum at a speed substantially equivalent to the washing speed, i.e. between 30 and 60 rpm, the laundry thus treated is separated spontaneously from the walls of the drum without the need, therefore, for manual intervention and stoppage of the machine. The laundry, moreover, is less compacted and therefore during this separating cycle is remixed and aired automatically and spontaneously with rotation of the drum.

By repeating a centrifuging cycle, after the intermediate separating, remixing and airing cycle, this time at a high speed (800/1000 rpm), elimination of the water from the laundry is completed. In view of the lesser weight of the laundry due to a lower water content following partial elimination during the preceding low-speed centrifuging cycle - the effect of centrifugal compression against the walls of the drum is greatly reduced. Therefore, effective centrifugal elimination of the residual water in the laundry is obtained, avoiding the undesirable effect of compacting of the laundry and adhesion thereof to the walls of the drum. In fact, in a possible additional and subsequent separating, remixing and airing cycle, during which the drum is made to rotate at the normal washing speed (from 30 to 60 rpm), the laundry is separated spontaneously from the walls of the drum and is loosened or spread automatically, being remixed and aired automatically in an optimum manner for the following drying cycle.

The latter may be both manual, i. e. conventional hanging out and drying in the open air, and automatic, as in washer-drier machines.

The above advantages are particularly obvious and

significant in washing machines, centrifugal spin-driers and hot-air driers, both with a horizontal and vertical axis of rotation. In these machines, in fact, as a result of the method according to the invention, centrifuging and drying may be performed with a single completely automatic process, without interruptions and without requiring any intermediate manual operations for rearranging of the laundry, in particular between the centrifuging cycles and hot-air drying cycles.

The invention is not limited to the embodiments described here, but may be widely varied, in particular with regard to the particular speeds of rotation during the various centrifuging and remixing cycles, the number and duration thereof and their combination all of which without departing from the underlying principle described above and claimed below.

Claims

1. Method for washing laundry such that it does not adhere to the drum, in washing machines with a horizontal or vertical axis drum, which method comprises one or more laundry centrifuging cycles at the end of the washing and/or rinsing cycles, characterized in that, prior to the conventional high-speed centrifuging cycle, at least one low-speed centrifuging cycle is performed. 5
2. Method according to claim 1, characterized in that the speed of the drum during the low-speed centrifuging cycle may be an intermediate speed between the washing speed and the high-speed centrifuging speed and in particular the low-speed centrifuging cycle may be performed at a speed comprised between 200 and 600 rpm, preferably between 300 and 500 rpm. 10
3. Method according to claim 1 or 2, characterized in that the high-speed centrifuging cycle may be performed at speeds variable between 800 and 1200 rpm, preferably between 800 and 1000 rpm. 15
4. Method according to one or more of the preceding claims, characterized in that between the low-speed centrifuging cycle and the following high-speed centrifuging cycle there is advantageously provided at least one intermediate separating, remixing and airing cycle which is performed at the normal washing speed of the drum, in particular from 30 to 60 rpm. 20
5. Method according to one or more of the preceding claims, characterized in that the intermediate cycles of low-speed centrifuging and of separating, remixing and airing at washing speed which precede high-speed centrifuging may be more than one and may be performed in direct succession or alternating with one another in any desired combination, as also the high-speed centrifuging cycle may be repeated several times directly in succession or intercalated in any desired combination with the low-speed centrifuging cycle(s) and the separating, remixing and airing cycle(s). 25
6. Method according to one or more of the preceding claims, characterized in that, after the high-speed centrifuging cycle, there is provided a laundry separating, remixing and airing cycle at a speed of rotation of the drum substantially corresponding to the washing speed, whereas subsequently it is possible to effect stoppage of the machine for extraction of the laundry inside a washing machine without drying means and the hot-air drying cycle(s) in washing machines, centrifugal spin-driers and hot-air driers which automatically follows the preceding low-speed and high-speed centrifuging cycles and/or the laundry separating, remixing and airing cycles. 30