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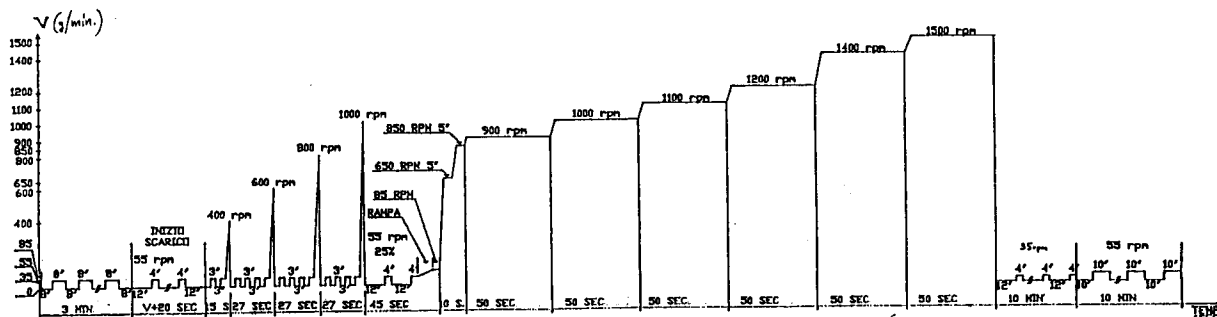
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W- 8000 München 22 (DE)(54) **Method for the treatment of laundry in a laundry washer/drier combination.**

(57) Described is a method for the treatment of laundry in a laundry washer/drier combination, effective to permit the laundry to be detached from the walls of the drum at the end of the laundering and rinsing operations to thereby avoid possible scorching or yellowing of the laundry. The method comprises the execution of five distinct operative steps after termination of the last rinsing operation and prior to the initiation of the laundry drying operation. In a first step, the drum of the machine is rotated at low speed in alternating directions, followed by a

short phase of rotation at the spin-drying speed to be progressively increased throughout this phase. In a second step, the drum is rotated at a given laundering speed in alternating directions. In a third step, the drum is rotated at the spin-drying speed for successive periods, with the rotary speed being progressively increased from one period to the next, and maintained constant during each such period. In a fourth and a fifth step, finally, the drum is rotated in alternating directions at a slow speed which in the fifth step is somewhat higher than in the fourth.

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The invention relates to a method for the treatment of laundry in a laundry washer/drier combination, to be executed subsequent to the laundering operation for preparing the laundry for the execution of an effective drying operation.

Known laundry washer/drier combinations are designed for the sequential execution of laundering and drying operations. During the laundering operation, the drum containing the laundry is rotated at a low laundering speed in alternating directions, and during the final rinsing operation, it is rotated at an increased spin-drying speed for effectively squeezing the laundry partly dry prior to its being dried in the conventional manner.

The rotation of the drum at the spin-drying speed may, particularly in the case of machines operating at very high spin-drying speeds of the order of 1200 to 1500 upm, lead to the undesirable result of the laundry adhering to the inner walls of the drum, giving rise to difficulties with regard to detaching the laundry from the drum walls at the end of the spin-drying operation.

As a result thereof, the laundry may exhibit the tendency to accumulate in separate areas of the drum's inner wall, rather than being evenly distributed over the entire area of the inner wall surface of the drum as would be desirable for permitting it to be rapidly and substantially uniformly dried. The uneven distribution of the laundry may again result in its being yellowed and/or partially scorched in the course of the subsequent drying operation.

It is an object of the present invention to guard against the occurrence of undesirable effects of the type explained above in a laundry washer/drier combination by the employ of a method for the treatment of the laundry effective to permit the latter to be detached from the inner walls of the drum prior to the drying operation.

This laundry treatment method is carried out in the manner to be described and as set forth in the appended claims.

The invention will be more fully understood from the following description, given by way of non-restrictive example with reference to the attached drawing, the only figure of which diagrammatically illustrates a time-chart of the variations of the rotary speed of the drum in a laundry washer/drier combination functioning in accordance with the present laundry treatment method.

This laundry treatment method is particularly applicable to laundry washer/drier combinations operating at elevated spin-drying speeds of the drum and includes the execution at the end of the various laundering operations of any selected laundering cycle of the operative steps to be described as follows:

In particular, the operative steps of the present laundry treatment method are initiated subsequent

to the charge of water for the final rinsing operation having been admitted to the tub enclosing the drum containing the laundry, by rotating the drum at a low speed in alternating directions.

In the diagram of the drawing figure, this final rinsing operation is indicated at A and has a duration of for example three minutes, during which the drum is rotated at a speed of 55 upm. with its direction of rotation being reversed at 8 sec. intervals. At the end of this operation, the rinsing water is completely discharged from the tub during a period indicated at B and having a maximum duration of for example 20 to 40 sec.. During this period, the drum continues to be alternately rotated at low speed, in the present example for 4 sec. in one direction and for 12 sec. in the opposite direction, at a speed of 55 upm..

Subsequently, in the first step of the present laundry treatment method, the drum is rotated in a series of short bursts of progressively increasing spin-drying speeds separated from one another by intervals during which the drum is rotated at low speed in alternating directions. In the present example, the present method provides the execution of four such spin-drying bursts at rotary speeds of 400, 600, 800 and 1000 upm.. In particular, during the first part of this step of the present method, indicated at C and having a duration of 15 sec., the drum is initially rotated at a low speed of in the present example 55 upm, with only a single rotation in each direction for a duration of 3 sec., followed by a short burst, in the present example of a duration of 4 sec., of rotation at the spin-drying speed rapidly attaining a maximum of 400 upm., whereupon the electric motor of the machine acting to rotate the drum is deenergized to permit the rotary speed of the drum to drop to the previous value. During the subsequent second, third and fourth periods of this step of the method, indicated respectively at D, E and F and having a duration each of 27 sec., the drum is initially rotated at the same low speed of in the present example 55 upm, the direction of rotation being reversed five times at 3 sec. intervals, followed by a short burst, with a uniform duration of 4 sec., of spin-drying rotation at maximum speeds of 600, 800 and 1000 upm, respectively, whereupon the rotary speed is again reduced to the previous value.

In the second step of the present treatment method, generally indicated at G and having a duration of 45 sec. in the present example, the drum is initially rotated at the low laundering speed of in the present example 55 upm, with the direction of rotation being reversed at intervals of 12 and 4 sec. respectively, followed by its rotary speed being gradually and linearly increased to a value of in the present example 85 upm, which is then maintained for the remainder of this second

step for permitting a uniform distribution of the laundry over the inner walls of the drum to be established.

Subsequently initiated is the third step of the present treatment method, in which the drum is exclusively rotated at the spin-drying speed which is progressively increased from an initial value to a final value, in the present example from 650 upm to 1500 upm.

To this purpose the third step is in the present case subdivided into seven consecutive periods designated by reference letters H, I, L, M, N, O, P, the first such period having a duration of 10 sec, while the duration of the remaining periods is 50 sec each.

In particular, during the first period H of this third step of the method, the rotary speed of the drum is rapidly increased from the previously attained value of 85 upm to a spin-drying speed of 650 upm, which is held for a short instance, to be subsequently again rapidly increased to the higher spin-drying speed of 850 upm, which is then again held for a short instance.

In the subsequent second period of this third step of the present method, the rotary speed of the drum is rapidly increased from the previously attained value to a faster spin-drying speed of in the present example 900 upm, which is then held constant for the remainder of this period of the third step. In all of the remaining periods of this third step, the rotary speed of the drum is rapidly increased from the previously attained value to a somewhat faster spin-drying speed of successively 1000, 1100, 1200, 1400 and 1500 upm, the respective rotary speeds thus attained being maintained constant throughout the respective periods of this step.

This sequence of spin-drying operations is conducive to obtaining an efficient squeeze-drainage of the laundry and a uniform distribution of the laundry on the inner walls of the drum rather than localized accumulations thereof. For permitting the thus treated laundry to become readily detached from the inner walls of the drum to thereby ensure uniform and effective drying of the laundry in the subsequent drying operation of the laundry washer/drier combination without the danger of scorching and/or yellowing, the present treatment method finally provides the execution of a fourth and a fifth step indicated respectively at Q and R and having a duration each of 10 min in the present example.

In particular, for the full duration of the fourth step the drum is rotated at a low speed of about 30 to 35 upm in alternating directions, in the present example for 4 sec in one direction and for 12 sec in the opposite direction, while during the fifth step, the drum is still rotated at a low, albeit somewhat

higher speed of 55 upm, the direction of rotation being reversed at regular 10 sec intervals.

By suitably adapting the program timer of machines of the type under consideration, it is thus possible to automatically control the execution of a particular cycle of relatively short duration in accordance with the present method and subsequent to the laundering cycle, to thereby establish the conditions for the efficient drying of the laundry and for safely avoiding the occurrence of the above described undesirable effects.

Claims

1. A method for the treatment of laundry in a laundry washer and drier combination comprising a laundering tub enclosing a laundry-containing drum adapted to be rotated at different speeds by an electric motor of the appliance for the execution of the laundering and rinsing operations and a subsequent laundry drying operation, characterized in that, subsequent to the end of the last rinsing operation and the ensuing complete discharge of the water from the laundering tub, and prior to the initiation of the laundry drying operation, the method provides the execution of a first, a second, a third, a fourth and a fifth operative step, wherein in said first step the drum is rotated during several periods, first at a low speed of preferably 55 upm and in alternating directions, and then for a short burst at a spin-drying speed the value of which is sequentially increased from preferably 400 upm to 1000 upm, in the second step the drum is rotated initially at a low speed of preferably 55 upm and in alternating directions, and then at another low speed faster than the previous speed, preferably at 85 upm, in the third step the drum is rotated exclusively at the spin-drying speed during several periods with the rotary speed being progressively increased from an initial value to a final value, preferably from 650 upm to 1500 upm, the actual spin-drying rotary speed of the drum being maintained constant for the duration of each period and rapidly increased between successive periods, and in the fourth and fifth steps, finally, the drum is rotated at a low speed for the full duration of each step, preferably at 30 to 35 upm and 55 upm, respectively, and in alternating directions of rotation.

2. A method according to claim 1, characterized in that the spin-drying rotation bursts of the drum in the first step are executed at speeds of 400, 600, 800 and 1000 upm, respectively, and for a duration of 4 sec.

3. A method according to claim 2, characterized in that during the high-speed rotation periods of the third step, the drum is rotated at speeds of 650, 850, 900, 1000, 1100, 1200, 1400 and 1500 upm, respectively. 5
4. A method according to claim 1, characterized in that during the fourth step, the drum is rotated for a period of 12 sec in one direction, and for a period of 4 sec in the opposite direction. 10
5. A method according to claim 1, characterized in that in the fifth step the drum is rotated for periods of 10 sec in each of its directions of rotation. 15

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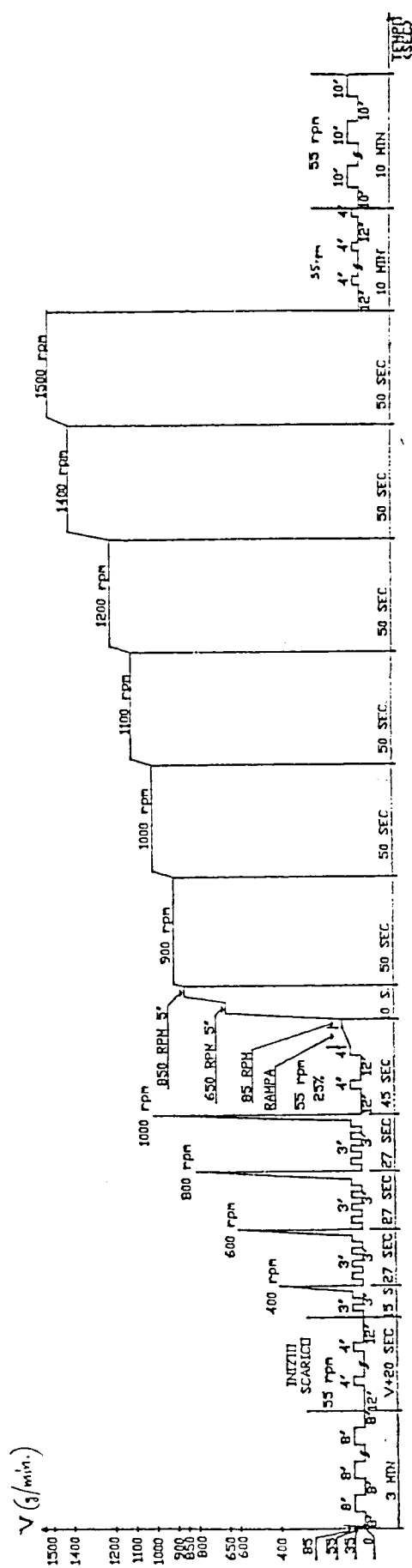
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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 8987

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 546 540 (THOMSON-BRANDT) * page 7, line 17 - line 33; figure 2 * ---	1-5	D06F35/00
A	FR-A-2 157 867 (SIEMENS AG.) * page 4, line 39 - page 5, line 20; figure 1 * ---	1,2	
A	FR-A-2 501 736 (THOMSON-BRANDT) * page 8, line 7 - line 25; figure 3 * ---	1,2	
A	EP-A-0 369 270 (LICENTIA PATENT-VERWALTUNGS-GMBH) * column 2, line 24 - line 41; figure 1 * ---	1,3	
A	FR-A-2 103 369 (SIEMENS-ELECTROGERÄTE GMBH) * claims; figure * -----	1,4,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 FEBRUARY 1993	Examiner COURRIER G.L.A.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			