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(54) **Method for treating laundry and washing machine implementing such a method**

(57) A method for treating laundry comprise performing, through a machine, a washing cycle and a drying cycle of the entire load of washed laundry. The drying cycle is finalised to the subsequent ironing of the laundry;

to this purpose, the laundry is brought to a residual humidity between 12 and 15% relative to the entire washed load.

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Description

[0001] The present invention relates to a method for treating laundry in a domestic washing machine, and to a washing machine implementing such a method.

[0002] As is known, substantially three methods are used in the field of laundry washing and drying.

[0003] A first method envisages a washing cycle, which usually terminates with one or more spin drying phases, implemented by a laundry washing machine; at the end of the washing cycle, the laundry is unloaded from the machine and hung up to dry before being ironed.

[0004] A second method envisages performing a washing cycle in a laundry washing machine as in the previous case; at the end of the cycle, the washed laundry is unloaded from the washing machine and loaded into a drying machine, with which a drying cycle is performed.

[0005] A third method envisages a washing cycle of the above type and a subsequent drying cycle performed in a single machine, generally known as a washer-dryer.

[0006] In the second and third methods, the drying cycle consists in blowing hot air into the drum of the machine at a temperature above 100°C, for a duration of above two hours, in order to completely dry the laundry.

[0007] These methods and the machines that implement them, though being widely used and valued, are not without their drawbacks.

[0008] The first method presents the drawback of having to hang up the laundry once it has been washed. The second and third methods have the drawback that the laundry is frequently not uniformly dried. With such methods, indeed, during the drying phase the laundry that remains stuck to the drum of the machine is dried to a markedly lesser extent than the remainder of the laundry and, despite rotation of the drum, adequate rearrangement of the laundry does not occur. Furthermore, after the complete drying phase, the laundry may present numerous folds and creases that make the subsequent ironing very difficult.

[0009] The third method also has the significant drawback that it is not possible to implement the drying cycle on the washing-drying machine's full load. A normal washing-drying machine typically is able to wash a maximum load of laundry of about 5 kg, but the relative drying unit only enables a fraction of such maximum load to be treated, equal to approximately half (that is around 2.5 kg of laundry). Thus after having performed the washing cycle, a considerable part of the washed laundry must be removed from the drum of the machine, so as to enable the remainder of the load to undergo a complete drying cycle; the part of laundry that was removed must be dried in the machine at a second stage.

[0010] When drying machines are used, lastly, it is necessary to transfer the entire load of laundry to them, removing it from the machine in which it was washed.

[0011] A further drawback of the known methods is represented by the high consumption of electricity, which may be approximately 3.5 kWh for washing-drying ma-

chines, and as much as 4.6 kWh for drying machines; the installed power of the means to heat the air in such machines is usually high, typically between 2.2 and 2.5 kW.

[0012] The purpose of the present invention is to provide a method for the treatment of laundry and a relative machine such as to eliminate the drawbacks mentioned with regard to the known techniques.

[0013] According to the present invention, this and other goals, which will be clear in the following description, are achieved through a treatment method and a machine as defined in the attached claims, which constitute an integral part of the descriptive content of the present patent application.

[0014] The characteristics of the treatment method and of the machine subject of the present invention may be better understood in the description that follows, which is given solely as an illustration and example without any limiting intent.

[0015] The treatment method subject of the present invention, in the preferred embodiment, essentially provides for a laundry washing cycle, which includes a rinsing phase and a terminal phase of mild spin drying, at a limited speed of rotation, that is, a speed programmed so as to avoid the laundry's sticking to the walls of the drum of the machine. This is followed, in the same machine and without removing even a part of the load of laundry from the drum, by a specific gentle or limited drying cycle, having the purpose of bringing the laundry to a residual humidity of 12-15%, considered ideal for immediate and easy subsequent ironing.

[0016] Thus, in practice the machine according to the invention is equipped with a specific drying cycle, capable of being applied to the entire maximum load of the machine after it has been washed, and finalised to the subsequent ironing of the laundry.

[0017] The conception of the washing cycle is in the main of known type, and comprises phases of washing, soaking and rinsing in the most appropriate sequence and at the most appropriate temperatures for the type of laundry treated. The mild spin drying phase is such as to avoid the laundry sticking to the walls of the drum, so as to be constantly in the optimal condition both for the spin drying phase itself and for the subsequent gentle drying phase that takes place at full load, and thus without the need for partial removal of the laundry from the drum. The final spin drying phase may preferably be subdivided into a plurality of successive steps of rotation of the drum alternated with pauses during which the speed of rotation is drastically reduced.

[0018] The gentle drying cycle comprises blowing hot air through the drum of the laundry washing machine and through the laundry to be dried. The cycle of hot air blowing is programmed in a specific fashion such that the entire load of laundry contained in the drum reaches a residual humidity between 12 and 15%.

[0019] Preferably, the cycle of hot air blowing is associated to phases of rotation of the drum at a speed of

rotation between 35 and 75 revs per minute (rpm), preferably approximately 55 rpm, for a time between 3 and 30 seconds, preferably for approximately 15 seconds, and alternated with pauses even of minimum duration. Such rotation phases of the drum are repeated until the cycle of hot air blowing is completed; to advantage, successive rotation phases are in alternate directions of rotation.

[0020] The gentle drying cycle described above has been found to be particularly efficient, since it has enabled limited drying to be achieved, that is with residual humidity between 12 and 15%, but uniform throughout the entire load washed by the machine; in particular, the phases of rotation of the drum encourage the continual rearrangement of items of laundry, so that during the drying cycle all of them are in contact with the flow of hot air.

[0021] The dedicated drying cycle described above, furthermore, has been found to be particularly efficacious to leave the items of laundry in the optimal condition for subsequent immediate ironing, which has been found to be particularly easy. The treatment method of the present invention has been found to be particularly efficient in machines having a tank and a drum that are larger than those used traditionally, that is having an approximate volume between 54 and 60 litres rather than between 42 and 44 litres, for a load of laundry approximately between 6 and 8.5 Kg, instead of approximately 5 Kg.

[0022] The drying method of the present invention has also been found to be particularly efficient in energy consumption terms, enabling an entire drying cycle to be completed with a consumption of 1.8 kWh for approximately 6-7 kg of laundry. It must also be specified that in the machine according to the present invention, the installed power of the means of heating is reduced in comparison to normal machines, being comprised between approximately 1000 and approximately 1500 kW, preferably about 1100 kW.

[0023] As may be appreciated from the above description, the laundry treatment method of the present invention has been found to be particularly efficient and efficacious, enabling the goal to be achieved and the drawbacks mentioned in regard to known techniques to be overcome, and providing the user with the option of activating a specific gentle drying cycle, after the washing cycle, as an alternative to the traditional cycles currently in use. This gentle drying cycle, which may be activated after a normal washing cycle, is independent and has its own specific indication on the means of control of the machine (timer knob, keys or buttons). With regard to drying machines, furthermore, with the method of the present invention it is not necessary to remove the laundry from the machine in which it was washed. It should also be stressed that the machine may operate at full load, that is it may perform the gentle drying cycle on the entire load, including the maximum permitted load, and the laundry is left in an optimal condition for ironing, without its needing to be hung up; hence, unlike the normal washing-drying machines, it is not necessary to remove

part of the full load of the machine before operating the drying cycle.

[0024] It is clear that numerous variants may be made by the man skilled in the art to the method and to the machine described as examples. The present invention thus intends to embrace all the changes and variants that enter within the spirit and protective scope of the attached claims.

Claims

1. Method for treating laundry in a washing machine arranged to perform a plurality of treatment cycles that can be selected by a user, among which at least one washing cycle that includes at least one rinsing phase and at least one spin drying phase of a load of laundry contained in the washing drum of the machine, wherein the treatment method comprises activation on said machine, after said washing cycle and through control means of the machine provided with specific indications, of a cycle of limited drying of said load, said cycle of limited drying comprising blowing hot air into the laundry contained in the washing drum that, without being transferred or partially removed from the drum itself, is brought to a residual humidity between 12 and 15% relative to the entire washed load, such that it presents an optimal condition for ironing without requiring being hung up.
2. Method according to claim 1, wherein the load of laundry subjected to said washing cycle and to said drying cycle is above 3 kg of laundry, particularly above 5 kg.
3. Method according to claim 2, wherein the drying cycle comprises at least a plurality of phases of rotation of the drum at a speed of rotation of between 35 and 75 rpm, each of which has a duration of between 3 and 30 seconds.
4. Method according to claim 3, wherein a plurality of said phases of rotation are programmed in alternating directions of rotation, preferably having a duration of about 15 seconds.
5. Method according to claim 2, wherein said spin drying phase is performed at a speed of rotation of the washing drum such as to avoid the laundry sticking to the wall of the drum of the machine, the spin drying phase being subdivided into a plurality of successive steps of rotation of the drum alternated with periods during which the rotation ceases.
6. Method according to claim 2, wherein the washing drum has a maximum load capacity of between approximately 6 and approximately 8.5 kg of laundry,

said maximum load being subjected to said washing and drying cycles.

7. Method according to claim 1, wherein said drying cycle comprises the activation of air heating means having a power between approximately 1000 and 1500 kW, with an overall consumption for the entire drying cycle below 2 kWh for a quantity of laundry between approximately 6 and approximately 7 kg. 5 10
8. Laundry washing machine to implement the method according to one or more of the above claims, including means to select a washing cycle among a plurality of possible washing cycles, means to select a specific cycle of limited drying finalised to the subsequent ironing of the washed laundry, a drum to contain the laundry to be washed and dried, means to cause the drum to rotate, control means, means for heating and for circulating the air. 15 20
9. Machine according to claim 8, wherein said drum has a usable volume between approximately 54 and approximately 60 litres, for a maximum load of laundry between approximately 6 kg and approximately 8.5 kg. 25
10. Machine according to claims 7 and/or 8, in which said means for heating the air has power below 2000 kW, preferably between approximately 1000 and 1500 kW. 30

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