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

(11) **EP 1 975 303 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.10.2008 Bulletin 2008/40

(51) Int Cl.:
D06F 58/28 *(2006.01)*

(21) Application number: **07105292.2**

(22) Date of filing: **30.03.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Improvement in a clothes drying machine and related clothes drying method

(57) A method is disclosed for drying clothes in a clothes drying machine of the so-called tumbler type provided with a rotating drum, wherein, during the drying cycle, the rotation speed of the drum is variable from a first pre-defined speed value (V1) to a sequence of successive speeds, each one of which has a respective discrete and different value, wherein the values of such successive speeds are progressively decreasing. The first rpm or rotational speed value is adapted to cause the drum to rotate so that the clothes with a high moisture content is adequately tumbled, i.e. lifted and allowed to fall inside the drum, and is thus higher than the rpm or rotational speed value at which the clothes tend to substantially roll up into a clot on the bottom of the drum. During at least one of said successive rotational speeds of the drum, the respective rotational speed undergoes at least one temporary reduction to at least a lower speed value for a respective short period of time.

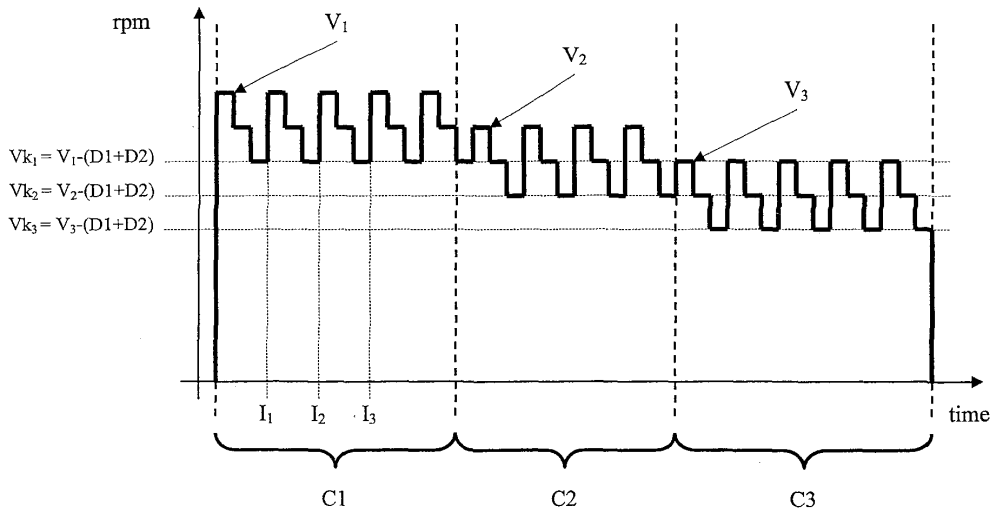

FIG. 6

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Description

[0001] The present invention refers to an improved clothes drying method and related clothes drying machine, preferably a tumble dryer of the type intended for use in households, adapted to perform drying cycles in which the drying process is carried out by having the rotational speed of the drum adjusted in accordance with a simplified function that takes into account the just estimated, but not measured value of the moisture content of the clothes being handled.

[0002] The present invention may furthermore be applied to both condenser-type and exhaust-type clothes drying machines, wherein the both construction-related and method-related adaptations, as they are in particular necessary for the different trend patterns followed by the moisture content of the clothes inside the drum depending on the type of machine involved to be duly taken into account, are well within the capabilities of and thus readily conceivable, implementable and verifiable by all those skilled in the art.

[0003] The fact should first of all be stressed here that, when a drying cycle is performed in a clothes drying machine, the clothes being introduced in the drum have a moisture content that is quite high initially and decreases then gradually as the clothes are being dried. This practically means that the overall weight of the load of clothes, i.e. the weight of the clothes including the residual moisture content thereof, tends to progressively decrease in quite sensible a manner.

[0004] This particular behaviour of the drying load, therefore, has a distinct effect in altering the rotational speeds of the drum to quite sensible an extent during the drying cycle. In particular, in the initial phases of the drying process, the drying load, owing to its being sodden with water, i.e. having a high moisture content, is very heavy; when it is lifted from the bottom of the drum, it therefore weighs to a much heavier extent on the clothes lifters provided in the drum, so that it ultimately causes the rotational speed of the drum to slow down, wherein the drum, although usually considered as being driven at a constant speed, is only rotated to deliver a constant torque, actually.

[0005] Owing to such reduction in the actual rotational speed of the drum, the load of clothes inside the same drum therefore tends to fail to rise following the movement of the drum, while rather falling down onto the bottom thereof, where it tends to remain.

[0006] Under the circumstances, the largely known rolling-up effect tends to occur, in which - as shown symbolically in Figure 1 - the clothes tend to roll up into a clot. This rolling-up effect - as it will be referred to hereinafter to exactly signify this particular occurrence - is largely known to all those skilled in the art and does not, therefore, require any further explanation.

[0007] It is in all cases an occurrence that causes the general drying performance capabilities of a drying machine to suffer most serious - and again largely known as such in the art - drawbacks, mainly in terms of a significantly longer drying time, a higher energy usage, and hindrance to a smooth progress of the drying process itself, since - as it can be readily appreciated, actually - the clothes situated inside the clot forming in this way on the bottom of the drum is practically not accessible to the flow of hot drying air being blown into and through the drum to such purpose, with the ultimate result that - upon conclusion of the drying process - said load of clothes turns generally out as being still packed together or seriously wrinkles and creased and, anyway, showing a fully inadequate evenness in the drying effect.

[0008] Such rolling-up effect tends to occur in particular when loads of clothes are being handled, which include such broad items as bedclothes, bath-towels, and the like, where the likeliness for the clothes to roll up into a clot is increased by the large size of the item that wraps up around the other ones, or even sheets and other similar pieces of clothes that are so large-sized as to spontaneously tend to twist up.

[0009] In view of preventing such rolling-up effect of the clothes from occurring, drying programmes have been developed, and are being carried out, actually, which call for the direction of rotation of the drum to be alternately reversed. On the other hand, these programmes also comprise phases that call for the heating element used to heat up the drying air to be switched off during the short periods in which the direction of rotation of the drum is reversed, thereby causing the duration of the drying cycle itself to be significantly extended, of course.

[0010] Moreover, it should be noticed that the component parts used to perform such function of switching on and off the heating element are unavoidably subject to marked, very quick wear-out, due to the high power ratings being handled and governed.

[0011] On the other hand, during the final phases of a drying cycle, the load of clothes being dried becomes of course much lighter and this inversely causes the resistance to lifting of the clothes themselves to decrease and, as a result, favours a corresponding increase in the rotational speed of the drum, given the afore-reminded constancy in the torque output of the drive motor. As a result, the rotational speed of the drum increases accordingly, and this occurrence causes the clothes in the drum to more or less evenly distribute against and along the cylindrical wall of the drum.

[0012] Therefore, if such rotational speed of the drum increases to an excessive extent, when referred to the final moisture level, another particular effect - again largely known as such in the art - tend to occur. This effect namely depends on the fact that the centrifugal force, which the load of clothes is subject to, becomes just too great, so that the by now half-dried, i.e. much less damp clothes tend to distribute under an ever increasing force along the cylindrical wall of the drum, thereby "sticking" thereagainst.

[0013] Such occurrence has an adverse effect, as well,

since the clothes being so distributed, i.e. sticking in this way against the peripheral wall of the drum, fails practically to be directly hit by the flow of hot air being blown through the drum to pass through the centre thereof following an axial direction.

[0014] In view of at least partially obviate this undesired effect, the European patent publication EP 1 103 648 B1 discloses a clothes drying machine with a rotating drum provided to hold the clothes to be dried, wherein the teaching is given that the rotational speed of the drum is continuously adjusted so as to have the drum rotating at a speed that decreases as the drying cycle progresses and, in particular, is inversely proportional to the instant moisture content of the clothes being dried.

[0015] Such solution, however, is far from being the optimum one, since moisture conditions may actually occur in the load of clothes being handled, which cannot simply be brought into any mutual relation, i.e. are in no clear relation with the cycle time and, therefore, the moisture still contained in the clothes on an instant-by-instant basis.

[0016] As a result, the progressive and rigidly controlled reduction in the rotational speed of the drum alone is far from being effective in ensuring that both the afore-cited rolling-up effect of the clothes during the initial period of the drying cycle and the "sticking" problem during the final period of the same cycle are automatically and effectively eliminated, actually.

[0017] It would therefore be desirable, and it is actually a main object of the present invention, to provide a clothes drying method and a clothes drying machine of the tumbling kind, i.e. using a rotating drum, which is provided with means that are adapted to take the actual moisture content in the clothes into due account, and which is therefore adapted to from time to time operate at such rotational speed of the drum as needed in view of doing away with, or at least significantly reduce, the risk for the load of clothes to both roll up into a clot on the bottom of the drum and - inversely - to distribute and stick against the cylindrical wall of the drum, thereby avoiding occurrences that would definitely impair the general performance of the machine.

[0018] According to the present invention, these aims, along with further ones that shall be described further on, are reached in a clothes drying method and a related clothes drying machine incorporating the features as recited in the appended claims, wherein features and advantages of the present invention will be more readily understood from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1A is a symbolical view showing the improvement, over the situation shown in Figure 1 as referred to the prior art, in the initial distribution of the clothes in the drum of a clothes dryer according to the present invention, as obtained with a clothes drying method according to the present invention;
- Figure 2A is a symbolical view showing the improvement, over the situation shown in Figure 2 as referred to the prior art, in the final distribution of the clothes in the drum of a clothes dryer according to the present invention, as obtained with a clothes drying method according to the present invention;
- Figure 3 is a diagrammatical, symbolical view of the rotational speeds of the drum as adjusted throughout the drying cycle when using a clothes drying method according to the present invention;
- Figure 4 is a diagrammatical, symbolical view of the rotational speeds of the drum as adjusted throughout the drying cycle when using a first improved embodiment of the clothes drying method according to the present invention;
- Figure 5 is an enlarged view of a portion - as referred to a limited length of time - of the diagram of the rotational speed of the drum according to a further improved embodiment of the clothes drying method according to the present invention;
- Figure 6 is a symbolical representation of a complete drying cycle as performed according to the improved embodiment of the inventive drying method shown in Figure 5.

[0019] With particular reference to Figure 3, a clothes drying method according to the present invention is based on the fact that the drum of the clothes drying machine is driven to rotate at a certain discrete number of different rotational speeds, which must be pre-defined, and which are activated, i.e. adjusted depending on the particular moment or phase which the drying cycle is each time going through. The value of such pre-defined rotational speeds of the drum must therefore be so selected as to ensure that - with a high probability with reference to a most common type of drying load - the clothes are distributed evenly within the drum owing to them being tumbled in such manner as to prevent them from both remaining, i.e. rolling up and clotting on the bottom of the drum and being thrown by the centrifugal force to stick against the cylindrical side wall of the drum, thereby eliminating the uncertainty introduced by and inherent to prior-art clothes drying machines and methods exemplified by the afore-cited European patent publication no. 1 103 648 B1, as explained above.

[0020] To do away with such uncertainty, the drying cycle is thus subdivided into a certain number of sub-cycles C1, C2, C3 ..., wherein during each one of these sub-cycles the rotational speed of the drum is adjusted to and kept at a respective constant value V_{c1}, V_{c2}, V_{c3} ..., which is pre-defined and different for each one of said sub-cycles (Figure 3).

[0021] All such sub-cycles are activated at pre-defined moments throughout the drying cycle, and they have a

pre-defined duration. However, it shall at this point be specially pointed out that these pre-defined moments along a drying cycle are not necessarily moments that are merely selected or due to occur at pre-defined time intervals from each other, but are rather moments at which particular specified conditions come into being in the drying load, as described in greater detail below.

[0022] In addition, in each one of said distinct sub-cycles the respective rotational speed of the drum is kept at a lower value than the one of the speed used in the preceding sub-cycle, so that the afore-cited effect of a rotational speed of the drum substantially decreasing in some way as the drying cycle progresses, is obtained also in this case.

[0023] A twofold result, and advantage, is practically obtained with the present invention, i.e.:

a) the control means used to adjust and control the rotational speed of the drum are much simpler and more reliable;

b) the uncertainty is done away with, which normally derives from the possibility that the rotational speed of the drum may in certain moments be inadequate in view of the actual conditions of the drying load, i.e. may for example be too high for a drying load that is being handled at a higher speed than required or expected (in which case the clothes would tend to stick against the wall of the drum), or, as this may occur during the final phases of the drying cycle, may inversely decrease to an excessively low value for a drying load that is on the contrary still too damp (in which case the clothes would tend to again roll up into a clot on the bottom of the drum).

[0024] While it is true - at least theoretically - that the same thing may still occur in a drying cycle of the kind described and disclosed in this specification, the present invention is nonetheless effective in providing the possibility for such uncertainty to be avoided by setting said constant values V_{c1}, V_{c2}, V_{c3} ... of the rotational speed of the drum in such manner as to ensure that - on a statistical basis - most drying loads with a high initial moisture content are in all cases tumbled, at the beginning of the cycle, at a rotational speed of the drum V_{c1} that is effective in preventing the clothes from clotting on the bottom of the drum (i.e. at a sufficiently high rotational speed), as this is shown schematically in Figure 1A.

[0025] Moreover, in the final portion of the drying cycle, the rotational speed V_{c3}, at which the drum is driven to rotate during the sub-cycle C3, may be kept at a value that is sufficiently low as to ensure that - when handling most types of drying loads - the clothes being dried are prevented from sticking against the cylindrical side wall of the drum due to the centrifugal force, as this is shown schematically in Figure 2A.

[0026] Figure 3 illustrates, by mere way of example, how the three sub-cycles C1, C2, C3, into which the drying cycle has been divided in this case, are associated to respective rotational speeds V_{c1}, V_{c2} and V_{c3}, wherein the actual values of such speeds will of course be in each case duly adapted and sized so as to best suit the particular machine (diameter of the drum, height and number of the laundry lifters in the drum, and the like) in which they have to be implemented, based on exhaustive experiments to be carried out to this purpose, all those skilled in the art being in fact fully aware that for each type of machine, i.e. each machine design, the need arises for rotational speeds to be experimented, found and implemented, which will enable the desired results to be eventually achieved.

[0027] And it is exactly in the course of such experiments that it has been found that, even if the rotational speed selected for each sub-cycle turns out as being the correct one, actually, it is anyway impossible for the clothes in the drying load to be fully prevented from taking a substantially stable disposition within the drum, even if they do not really stick against the wall of the drum.

[0028] This occurrence is of course such as to impair the overall performance of both the drying machine and the drying process being carried out, since the ideal condition for a drying process is generally known to require that the drying load be constantly stirred and agitated and, alternatively, be disposed in front of the direction of flow of the drying air, which moves in a back-to-forth or - although more seldom - the opposite direction.

[0029] Therefore, for the drying load to be adequately agitated, an advantageous improvement in the way in which the drying method according to the present invention is carried out has been identified experimentally: with reference to Figure 4, such improvement lies in having the instant rotational speed of the drum reduced at predetermined instants and for very short periods of time $T_{1(1)}$, $T_{1(2)}$, $T_{1(3)}$.

[0030] At the end of each such short period of time, the rotational speed of the drum is then resumed to the initial value thereof or is slowed further down for a further short period of time.

[0031] At the end of such further short period (or periods, as the case may be) of time, the rotational speed of the drum is automatically returned to the initial value thereof.

[0032] The favourable effect deriving in this way lies in the fact that the sudden change in the rotational speed of the drum causes the clothes within the drum to undergo an increased stirring effect, since - if the clothes are regularly distributed towards (but not sticking against) the cylindrical side wall of the drum, as this has to be so with the present invention - the abrupt slowdown in the rotational speed causes the clothes themselves to temporarily fall back onto the bottom or, at least, towards the centre of the drum.

[0033] In this case, the heat exchange effect between the hot drying air and the clothes in the drying load is generally known to be enhanced, even to quite considerable an extent.

[0034] When the drum is then restored to the initial rotational speed thereof, the drying load tends to of course rearrange into a disposition that is geometrically, but not materially or physically similar to the original one, in the sense that the originally outermost parts of the drying load turn now out as being the innermost ones, and vice-versa: hence the aforenoted enhanced stir-up effect.

[0035] In addition, it can be readily appreciated that such effect is still further amplified if there are each time provided two such above-noted short speed-reduction periods following each other and carried out at respective reduced speeds D1 and D2 as compared with the preceding initial constant speed V1.

[0036] Figure 5 provides an easy-to-follow, simple schematic representation of this process, where it is in fact exemplified how during the sub-cycle C1 some speed reductions are determined, i.e. caused to occur, wherein the resulting reduced speeds have values of D 1 (relative to the original speed V1) and D2 (relative to the preceding speed V1 - D1), respectively.

[0037] At the end of the second speed-reduction step D2, the rotational speed of the drum is resumed - at the instants I_1, I_2, I_3, ... - to the original value V1 thereof.

[0038] Such procedure can of course be carried out in the same way also during the other sub-cycles C2, C3, etc.

[0039] A simple schematization of such procedure is illustrated in Figure 6; for reasons of greater simplicity, no detailed description will however be given here of the process involved, since fully obvious and apparent to those skilled in the art.

[0040] In this connection, it should solely be noticed that, since the drum is driven to rotate at speeds that are progressively lower, i.e. decrease in a sequence during the various sub-cycles C1, C2, C3, even the resulting final speeds V_{k1}, V_{k2}, V_{k3} of said short slow-down, i.e. speed-reduction periods, in which the value of the rotational speed of the drum is reduced by a definite amount D1 and D2, respectively, relative to the value of the speed at which each such sub-cycle including said short periods is regularly performed, will of course turn out as being progressively lower, correspondingly.

[0041] Anyway, the present invention allows for a yet further advantageous improvement: in fact, the instant selected for the above-mentioned sub-cycles C1, C2, C3 ... to start within the drying cycle being performed can be made independent of the length of a pre-established time interval from the beginning of the drying cycle itself, as this has considered as being the case up to this point, to make it dependent on the actual level of the moisture reached in the clothes, instead.

[0042] To this purpose, a moisture sensor is connected - in a manner largely known as such in the art - to the control means used to govern the rotational speed of the drum, and the operation of such means is programmed so that, following the activation of the first sub-cycle C1, the second sub-cycle C2 is caused to solely begin upon a pre-defined moisture content has been sensed as having been reached in the clothes, wherein said pre-defined moisture content shall of course be sufficiently low as to ensure that the respective speed V_{c2}, at which the drum is going to be rotated now, will be effective in enabling the clothes in the drying load to adequately distribute in the central region of the drum, i.e. without rolling up and clotting on the bottom of the drum again.

[0043] The same procedure may of course be followed also in the subsequent phases, i.e. sub-cycles; in other words, when the moisture level in the clothes is sensed to have further decreased to another adequately lower value, then the subsequent sub-cycle C3 is started, and the drum driven to rotate at the respective speed V_{c3}, and so on.

[0044] It might at this point be easily objected that the above-described process is ultimately quite similar to the one described in the afore-cited publication EP 1 103 648 B1; such objection, however, will appear as being practically groundless if only the pure and simple fact is considered that, in the process according to inventive method, the result is in all cases achieved of fully - or at least to quite considerable an extent - preventing the clothes from rolling up and clotting on the bottom of the drum and, on the other side, distributing along and sticking against the cylindrical side wall of the drum, as this is only ensured by the drum being driven to rotate at speeds depending on given moisture levels reached in the clothes that are only sensed, assessed or estimated, however, when going through the individual sub-cycles, actually.

[0045] The substantial difference existing from the disclosure in the above-cited patent lies in the fact that, although the moisture level is measured in a continuous manner in such disclosure, automatically controlling a rotational speed that is inversely proportional to the instant moisture level measured does not by itself ensure that such adjusted speed is adequate to prevent the clothes in the drum from both rolling up and clotting on the bottom of the drum, and distributing along and sticking against the wall of the same drum.

[0046] In other words, the fact of associating in an inversely proportional manner the instant rotational speed of the drum to the instant moisture content measured in the clothes is not by itself such as to fully reliably ensure that the drying load will be handled in an optimum manner throughout the drying cycle.

[0047] Conversely, during a drying cycle performed in accordance with the inventive method as described above, kind of moisture measurement "check points" are established throughout the same cycle, which enable a more accurate knowledge of the actual trend of the moisture level versus time to be gained and - based thereupon - the rotational speed of the drum to be from time to time adjusted in a more precise manner to really optimize the way in which the drying cycle is performed.

Claims

1. Method for drying clothes in a clothes drying machine of the socalled tumbler type provided with a rotating drum, in which the rotational speed of the drum is variable during the drying cycle, **characterized in that** said method calls for the drying cycle to be subdivided into a plurality of successive sub-cycles (C1, C2, C3 ...), wherein in each one of these sub-cycles the rotational speed of the drum is adjusted to and kept at a respective different and constant value (V_{c1}, V_{c2}, V_{c3} ...), wherein the value of the speed in each one of said successive sub-cycles is lower than the value of the speed in the preceding sub-cycle.

2. Method according to claim 1, **characterized in that** the first value (V_{c1}) of the rotational speed of the drum is a value that is adapted to cause said drum to rotate so as to ensure that the still very damp clothes are able to be lifted and fall down again inside the drum by substantially passing through the inner central region of the same drum, said value being higher than the value of the speed at which said clothes would tend to substantially roll up into a clot on the bottom of the drum.

3. Method according to claim 1 or 2, **characterized in that** the rotational speed (V_{c3}) of the drum in the last one (C3) of said sub-cycles (C1, C2, C3 ...) is reduced to such value as to prevent the clothes in the drum from disposing stably, i.e. adhering against the inner peripheral surface of the drum, so that they are able to be lifted and fall down again inside the drum by substantially passing through the inner central region of the same drum.

4. Method according to any of the preceding claims, **characterized in that** during at least one (C1) of said sub-cycles (C1, C2, C3 ...), the respective rotational speed of the drum undergoes at least one temporary reduction to a lower value (D1) for a respective short period of time ($T_{1(1)}$, $T_{1(2)}$, $T_{1(3)}$).

5. Method according to claim 4, **characterized in that** after said temporary reduction of the rotational speed to a lower value (D1), the drum is again driven to rotate at the preceding rotational speed.

6. Method according to claim 4, **characterized in that** said temporary speed-reduction periods (D1, D2) are provided to occur in a continuous sequence, i.e. one directly after the other, and **in that**, after the last one of said speed-reduction periods, the same speed is resumed to the speed value (V_{c1}, V_{c2}, V_{c3} ...) corresponding to the respective one of said sub-cycles (C1, C2, C3 ...).

7. Method according to claim 1, **characterized in that** said successive rotational speeds (V_{c1}, V_{c2}, V_{c3} ...) of the drum are activated at pre-determined instants during a definite drying cycle.

8. Method according to claim 1 or 7, **characterized in that** said successive rotational speeds (V_{c1}, V_{c2}, V_{c3} ...) of the drum are activated for periods of time having a pre-determined length.

9. Method according to claim 1 or 7, **characterized in that** said successive rotational speeds (V_{c1}, V_{c2}, V_{c3} ...) of the drum are activated depending on the actual moisture content in the clothes being dried.

10. Clothes drying machine provided with a rotating drum adapted to hold the clothes due to be dried, an air circulation system adapted to circulate a flow of hot air through said drum, and control means for controlling the operation of the various actuation and functional devices, **characterized in that** it is adapted to operate in accordance with the method according to any of the preceding claims 1 to 8.

11. Clothes drying machine according to the preamble of claim 10, and further provided with means adapted to detect the level of the moisture still residing in the clothes, **characterized in that** it is adapted to operate in accordance with the method according to claim 9.

Amended claims in accordance with Rule 137(2) EPC.

1. Method for drying clothes in a clothes drying machine of the socalled tumbler type provided with a rotating drum, in which the rotational speed of the drum is variable during the drying cycle, said method calling for the drying cycle to be subdivided into a plurality of successive sub-cycles (C1, C2, C3 ...), wherein in each one of these sub-cycles the rotational speed of the drum is adjusted to and kept at a respective different and constant value (V_{c1}, V_{c2}, V_{c3} ...), wherein the value of the speed in each one of said successive sub-cycles is lower than the value of the speed in the preceding sub-cycle, wherein during at least one (C1) of said sub-cycles (C1, C2, C3 ...), the respective rotational speed of the drum undergoes at least one temporary reduction to a lower value (D1) for a respective short period of time ($T_{1(1)}$, $T_{1(2)}$, $T_1(_3)$), **characterized in that** said temporary speed-reduction periods (D1, D2) are provided to occur in a continuous sequence, i.e. one directly after the other, and **in that**, after the last one of said speed-reduction periods, the same speed is resumed to said initial constant speed value (V_{c1}, V_{c2}, V_{c3} ...) corresponding to the respective one of said sub-cycles (C1, C2, C3 ...).

2. Method according to claim 1, **characterized in that** the first value (V_{c1}) of the rotational speed of the drum is a value that is adapted to cause said drum to rotate so as to ensure that the still very damp clothes are able to be lifted and fall down again inside the drum by substantially passing through the inner central region of the same drum, said value being higher than the value of the speed at which said clothes would tend to substantially roll up into a clot on the bottom of the drum.

3. Method according to claim 1 or 2, **characterized in that** the rotational speed (V_{c3}) of the drum in the last one (C3) of said sub-cycles (C1, C2, C3 ...) is reduced to such value as to prevent the clothes in the drum from disposing stably, i.e, adhering against the inner peripheral surface of the drum, so that they are able to be lifted and fall down again inside the drum by substantially passing through the inner central region of the same drum.

4. Method according to claim 1, **characterized in that** after said temporary reduction of the rotational speed to a lower value (D1), the drum is again driven to rotate at the preceding rotational speed.

5. Method according to claim 1, **characterized in that** said successive rotational speeds (V_{c1}, V_{c2}, V_{c3} ...) of the drum are activated at pre-determined instants during a definite drying cycle.

6. Method according to claim 1 or 5, **characterized in that** said successive rotational speeds (V_{c1}, V_{c2}, V_{c3} ...) of the drum are activated for periods of time having a pre-determined length,

7. Method according to claim 1 or 5, **characterized in that** said successive rotational speeds (v_{c1}, V_{c2}, V_{c3} ...) of the drum are activated depending on the actual moisture content in the clothes being dried.

8. Clothes drying machine provided with a rotating drum adapted to hold the clothes due to be dried, an air circulation system adapted to circulate a flow of hot air through said drum, and control means for controlling the operation of the various actuation and functional devices, **characterized in that** it is adapted to operate in accordance with the method according to any of the preceding claims 1 to 6.

9. Clothes drying machine according to the preamble of claim 8, and further provided with means adapted to detect the level of the moisture still residing in the clothes, **characterized in that** it is adapted to operate in accordance with the method according to claim 7.

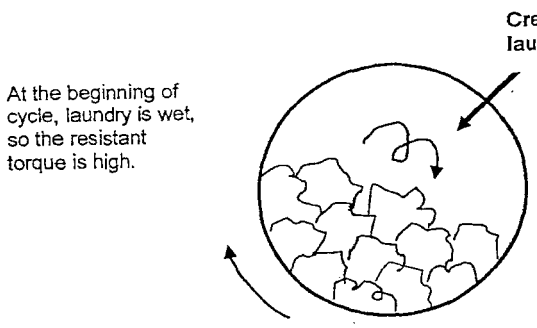

FIG. 1

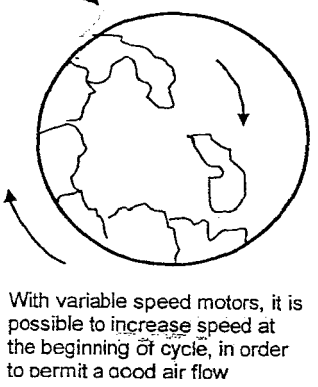

FIG. 1A

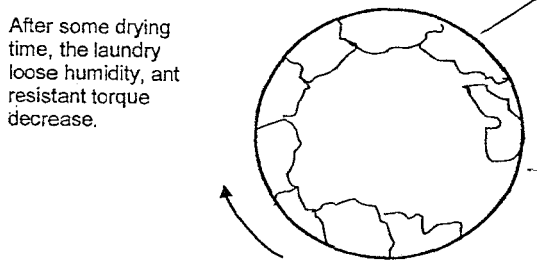

FIG. 2

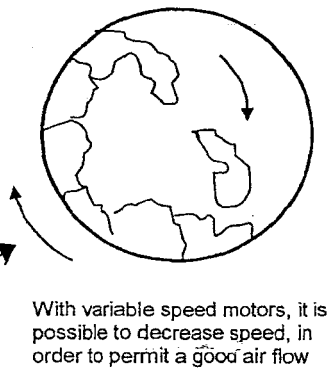

FIG. 2A

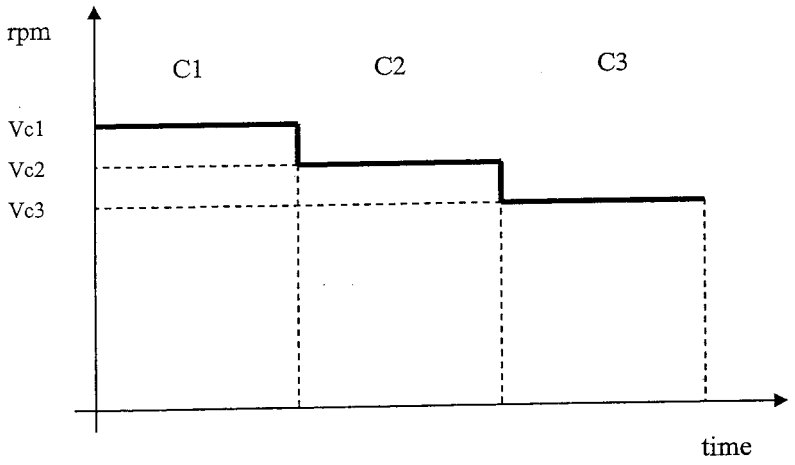
rpm
C1
C2
C3
Vc1
Vc2
Vc3
time

FIG. 3

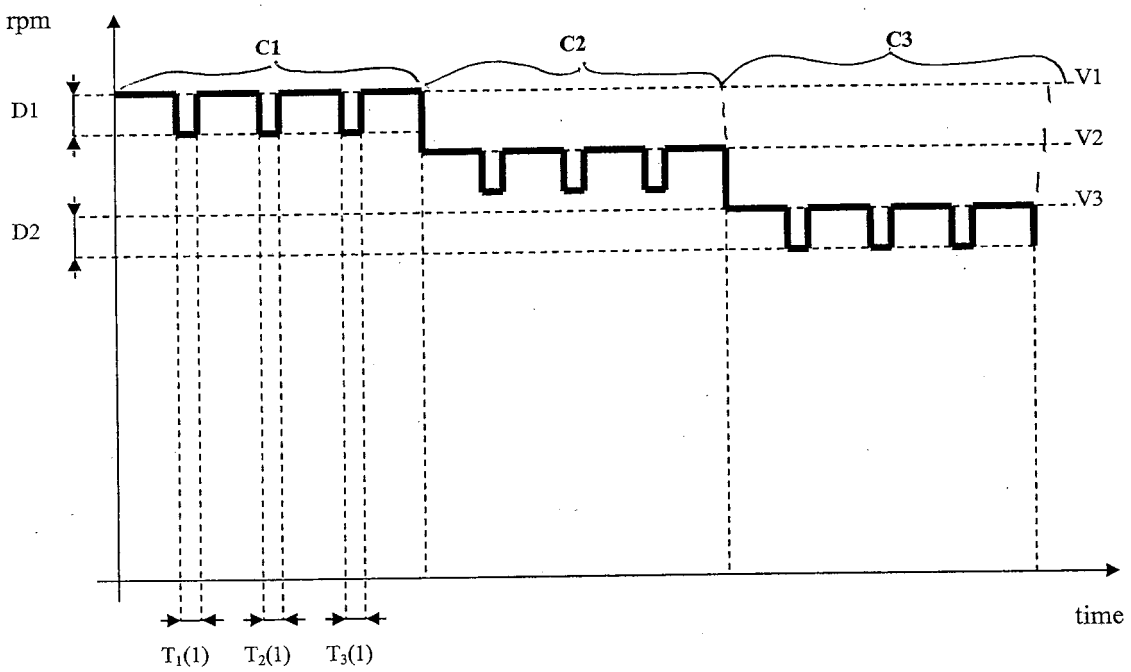
rpm
C1
C2
C3
V1
V2
V3
D1
D2
time
T1(1)
T2(1)
T3(1)

FIG. 4

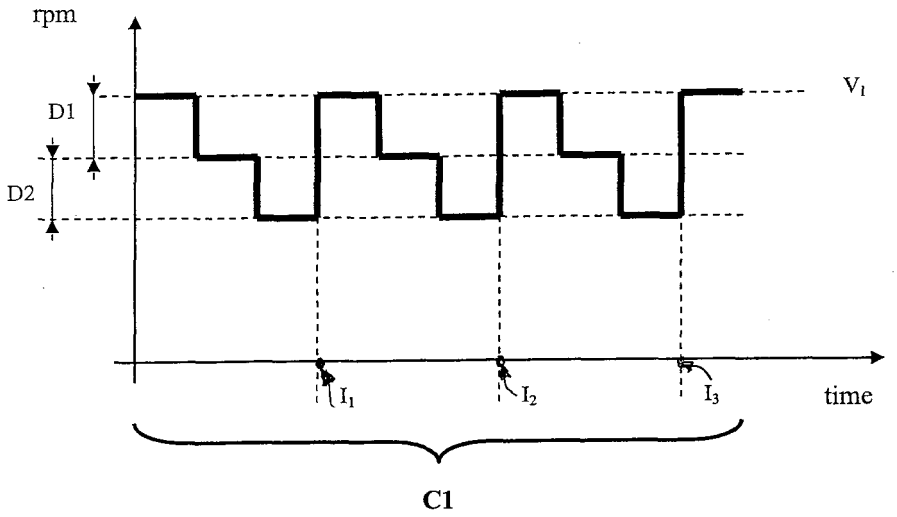
rpm
D1
D2
V_1
I_1
I_2
I_3
time
C1

FIG. 5

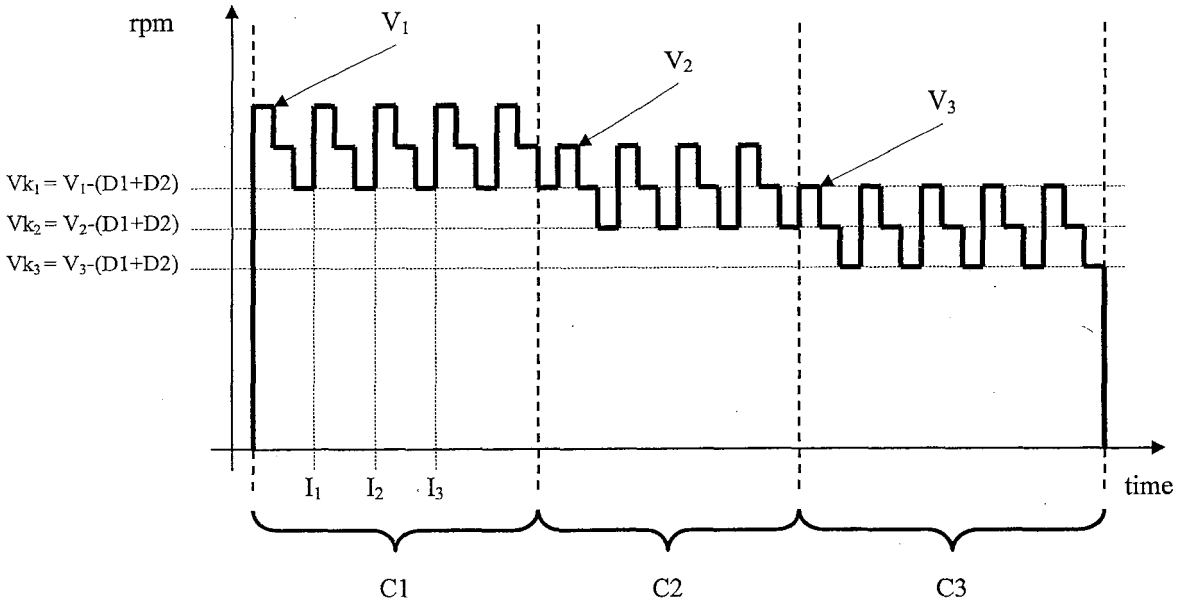
rpm
V_1
V_2
V_3
$Vk_1 = V_1-(D1+D2)$
$Vk_2 = V_2-(D1+D2)$
$Vk_3 = V_3-(D1+D2)$
I_1
I_2
I_3
time
C1
C2
C3

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 5292

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 05 337292 A (SANYO ELECTRIC CO) 21 December 1993 (1993-12-21) * abstract; figures 1,3,5,7 *	1-5	INV. D06F58/28
A,D	EP 1 103 648 B1 (ELECTROLUX ZANUSSI ELETTRODOME [IT] ELECTROLUX HOME PRODUCTS ITALY [IT) 21 December 2005 (2005-12-21) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	5 October 2007	Jezierski, Krzysztof

CATEGORY OF CITED DOCUMENTS

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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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European Patent Office

Application Number
EP 07 10 5292

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 10 5292

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6, 10 (part)

A method and a corresponding clothes drying machine wherein after the last one of speed-reduction periods, the rotational speed of the drum is resumed to the initial constant speed value.

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2. claims: 7-9, 10 (part), 11

A method and a corresponding clothes drying machine wherein the clothes drying machine is provided with means adapted to detect the level of moisture still residing in the clothes.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 5292

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-10-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 5337292 A	21-12-1993	NONE	
EP 1103648 B1	21-12-2005	DE 60024955 T2	13-07-2006
		EP 1103648 A2	30-05-2001
		ES 2250060 T3	16-04-2006
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1103648 B1 **[0014] [0019] [0044]**