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(54) METHOD FOR ADJUSTING THE FORMULA PARAMETERS OF A DRUMMING CYCLE OF LEATHERS

VERFAHREN ZUR EINSTELLUNG DER FORMELPARAMETER EINES TROMMELZYKLUS FÜR LEDER

PROCÉDÉ DE RÉGLAGE DES PARAMÈTRES DE FORMULE D'UN CYCLE DE LUSTRAGE DE CUIRS

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(73) Proprietor: **Erretre S.p.A.**
36071 Arzignano (Vicenza) (IT)

(72) Inventor: **GALIOTTO, Antonio**
36072 Chiampo (IT)

(74) Representative: **Contadin, Giorgio**
Notarbartolo & Gervasi S.p.A.
Viale Achille Papa, 30
20149 Milano (IT)

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Description

[0001] The present invention relates to a method for adjusting the formula parameters of a drumming cycle of tannery leathers, or similar special laminar surfaces.

[0002] It should be noted that the term "drumming" refers, in the tanning industry, to the treatment of leathers in a machine, known as drum, both for the purpose of preparing them for tanning and for tanning, dyeing or greasing them.

[0003] Prior patent documents published with GB2081303 A and DE97243 C disclose examples of drums for the drumming treatment of leathers.

[0004] Typically, the aforesaid formula parameters of a drumming cycle include:

- temperature inside the drum and
- in return, relative humidity,

which represent those parameters to which the present invention is specifically directed, although a formula for a drumming cycle includes, as well known, also other parameters such as, for example, operating (in particular, rotation) speed of the drum, total time of the drumming cycle, chemical products introduced into the drum and type of leathers treated in the drum.

[0005] More in detail, the drumming is a mechanical process that is carried out on any type of special fabric - generally, animal leathers - to give the product the appearance of aging or wrinkling, to make it softer and to eliminate possible folds present and then to prepare it for the subsequent processing stages.

[0006] The material is, indeed, subjected to mechanical action due to its rolling inside the cylindrical (often punched) barrel or basket which constitutes the main part of the machine (or drum) and which works by rotating around a generally horizontal transversal axis.

[0007] Simultaneously with the mechanical action, it is possible to have a conditioning of the material present inside the cylindrical barrel (or basket) by means of air subjected to prefixed temperature and humidity conditions.

[0008] Finally, the product is cooled by means of circulation of cold air inside the cylindrical barrel which constitutes the main component of the drum. By varying the processing time it is possible to get more or less intense effects on the leather.

[0009] Basically, therefore, the drumming cycle to which the leathers are subjected inside the cylindrical barrel of a tannery rotating drum is made according to a given "formula" which is essentially composed of prefixed temperature and relative humidity conditions, rotation speed of the cylindrical barrel imparted by suitable motorization means operatively connected with it, type and quantity of leathers treated inside the drum and time duration of the drumming cycle.

[0010] Such a "formula" thus allows to get, in theory, the desired and expected level of softness for dry leathers processed in a drumming cycle.

[0011] Specifically, the time duration (or treatment time) of a drumming cycle is left to the operator who preliminarily sets its value, relying on the processing history for that given type of leather from time to time to be treated and/or on his own professional experience.

[0012] During the drumming cycle, the operator checks more or less frequently the softness status of the leathers being processed - based on his own experience and operating sensitivity, therefore evidently, empirically and arbitrarily and not in so rational and scientific way -, and especially near the expiry of the scheduled treatment time (which may vary from a few minutes to several hours, depending on the type of leathers processed and the expected softness effect), at the end of which the desired quality should be achieved, in terms of softness, of the leathers themselves.

[0013] This is done by the operator by manually opening the door which the cylindrical barrel is provided with and which allows access inside of it and, therefore, to the leathers being processed.

[0014] If, according to the operator, the expected and programmed softness level has been reached, the operation of the drum is interrupted and the leathers removed from the cylindrical barrel, otherwise the operator decides to continue the drumming cycle according to a time set always on the basis of his experience.

[0015] Moreover, at present the operator also sets the temperature at which the drumming cycle begins (indicated in the following with Ti, for simplicity and exhibition convenience), as well as the relative humidity (often abbreviated to URi in the following). In particular, the initial temperature Ti can - depending on the operative choices and the type of leather to be treated in the drum - be kept constant during the whole drumming cycle, thus becoming in all respects the working temperature (indicated in the following with Ti, again for exhibition convenience) or, as more preferable, be gradually increased until reaching the working temperature Ti which has been preset by the operator and which subsequently remains constant during the remaining part, the most salient for duration, of the drumming cycle.

[0016] In this second case, the transient time which, in the initial stages of the drumming cycle, serves to reach the working temperature Ti starting from the initial temperature Ti may present, for example, by way of only illustrative title, a duration of thirty minutes and the resulting temperature increase can be represented by a heating curve, in a Cartesian temperature = f (time) diagram.

[0017] The drumming cycle which, in the initial stages, provides a gradual increase in temperature from an initial value Ti to a final value Ti when fully operational is more indicated and preferred since the speed with which the drum reaches the optimal working temperature depends on (or, in other words, is different depending on) various factors, such as:

- temperature outside the rotating drum, in the production factory (variable depending on the season and place);
- type of leather introduced into the rotating drum;
- status of the rotating drum itself.

[0018] Actually, however, it would be not only appropriate but also ideal and widely desirable, from a production point of view, that the initial temperature Ti was not set by the operator but rather took substantially into account the aforesaid factors, in particular the temperature of the external environment and of the leathers introduced therein and, more generally, of the actual conditions in which the rotating drum is at the moment of the beginning of the drumming cycle.

[0019] This is to avoid what, negatively, is often found in the current operating methodology followed today in the tanning sector, i.e. overheating of the drum - for example in summer or in presence of leathers coming from the previous processing (typically finishing or drying) yet heated - during the transient time that passes while passing from the initial temperature Ti to the working temperature (or operating temperature) Ti or, at the contrary, a failed correct heating of the drum - for instance during winter - in the preset transient time or the achievement of the working temperature Ti in a longer transient time.

[0020] It should be considered, indeed, that, for example in winter, the ambient temperature in a production factory is on average 15°C while in summer such an ambient temperature reaches 30 °C and, assuming in both cases to reach 40 °C, the followed heating curve is therefore more pending in the first case than in the second one.

[0021] Following the operating logic currently used in the tanning sector, it is evident the risk, often tangible and verifiable although totally misunderstood and neglected in such a sector, to generate electricity waste in passing, during the very first stage of the drumming cycle, from the initial temperature Ti - at which the cylindrical barrel of the rotating drum starts rotating - to the working (or set point) temperature T_l - at which the cylindrical barrel fully operatively rotates -.

[0022] In this situation, it seems quite probable that, after the transitional period in which the electronic processing program regulates the operation of the drum so that the working temperature Ti is reached following the set heating curve, starting from the initial temperature Ti empirically set as well (albeit on the basis of a production history and the operator's experience), the actual temperature at which the drum is exceeds the working temperature T_l to be followed during the subsequent salient part of the drumming cycle, with the obvious disadvantages that this entails in terms of energy.

[0023] By absurd or paradoxically, the operator should at that point adjust the functioning of the rotating drum so as to automatically cool its cylindrical barrel, venting heat and releasing the hot air contained in its volume, a measure which the applicant does not believe is followed at the current state of the art in the sector of the tanning of the leathers.

[0024] This established waste of energy impacts, therefore, in a negative way on production costs, although, it is reaffirmed, scarcely perceived by the operators of the sector, especially because it is well known that this consolidated operative habit does not generate particular defects on the leather treated inside the rotating drum.

[0025] Starting, therefore, from the awareness of the limitation just mentioned of the current state of art herein considered, the present invention intends to fully remedy to it.

[0026] In particular, main purpose of the present invention is to implement a method for adjusting the formula parameters of a drumming cycle of tannery leathers, which in the initial stage of the drumming cycle takes into account the actual conditions in which the "rotating drum" system is as a whole.

[0027] Within such a scope, it is task of the present invention to implement a method for adjusting the formula parameters of a drumming cycle of tannery leathers which allows to get a still significant saving of electrical energy with respect to the operating methods followed in the known technique.

[0028] It is another task of the invention to develop a method for adjusting the formula parameters of a drumming cycle of tanning leathers which allows to improve the production costs associated with it.

[0029] It is a second purpose of the invention to indicate a method for adjusting the formula parameters of a drumming cycle of tannery leathers which can be implemented relatively simply, without involving further constructive and/or functional investments in the rotary drum to which it applies.

[0030] It is a last but not least purpose of the present invention to provide a method for adjusting the formula parameters of a drumming cycle of tanning leathers which is therefore more efficient than equivalent methods of the known type.

[0031] The aforesaid purposes are achieved by means of a method for adjusting the formula parameters of a drumming cycle of leathers according to claim 1, as hereinafter referred for the sake of brevity of exposure.

[0032] Further applicative features of detail of the method of the present invention are reported in the related dependent claims.

[0033] The aforementioned claims, hereinafter specifically and concretely defined, are integral part of the present description.

[0034] Advantageously, the method for adjusting the formula parameters of a drumming cycle of tannery leathers, object of the invention, allows to achieve savings in electrical energy (necessary for the operation of the rotating drum during a given drumming cycle) with respect to the comparable methods of the prior art.

[0035] This is due to the fact that, in the method of the invention, the operations of initially detecting the effective temperature T_e inside the cylindrical barrel of the rotating

drum, performed before starting the drumming cycle by rotating the cylindrical barrel around a linear axis (generally horizontal) and after the operation of introducing the leathers into the aforesaid cylindrical barrel, and subsequently setting the initial time interval t_r of the drumming cycle necessary to pass, inside the cylindrical barrel, from the effective temperature T_e to the working temperature T_l, according to the effective temperature T_e detected before starting the rotation of the cylindrical barrel about the linear axis, are properly provided.

[0036] The initial temperature Ti is therefore free, not pre-set, in the method of the invention, and the heating curve will be calculated subsequently, preferably automatically by a processing and control program.

[0037] Equally advantageously, the method for adjusting the formula parameters of a drumming cycle of leathers of the current invention, by safeguarding the consumption of electric energy in the initial stage of the drumming cycle, gets an improvement of the production costs associated with it with respect to the prior art, other factors involved in the calculation of the total production cost being equal. Equally advantageously, the method for adjusting the formula parameters of a drumming cycle of leathers of the invention occurs without acting invasively and onerously on the components of the rotating drum with which it is implemented.

[0038] Advantageously, therefore, the method for adjusting the formula parameters of a drumming cycle of leathers of the present invention is more efficient than similar methods of the known type.

[0039] Further features and particularities will become clearer from the following description, relating to a preferred applicative embodiment of the method for adjusting the formula parameters of a drumming cycle of leathers subjected herein to exclusive claim, given by indicative and illustrative, but not limitative, way.

[0040] The method for adjusting the formula parameters of a drumming cycle of leathers considered herein comprises, according to practice, the following operations:

- introducing, inside a cylindrical barrel, belonging to a tannery rotating drum, a plurality of leathers to be drummed in a given drumming cycle and coming from a previous finishing or drying process;
- setting a working temperature, or set point temperature T_l, at which the drumming cycle of said leathers is performed, in its main and salient duration, when fully operational.

[0041] According to the invention, the method comprises the following further operations:

- initially detecting the effective temperature T_e inside the cylindrical barrel of the rotating drum, performed before starting the drumming cycle by rotating the cylindrical barrel itself around a linear axis and after the operation of introducing the leathers into the aforementioned cylindrical barrel;
- subsequently setting an initial time interval t_r of the drumming cycle necessary to pass, inside the cylindrical barrel, from the effective temperature T_e to the working temperature T_l, according to the effective temperature T_e detected before starting the rotation of the cylindrical barrel around the linear axis.

[0042] In particular, the linear axis around which the cylindrical barrel rotates is, preferably, substantially horizontal.

[0043] In addition, the leathers to be drummed are substantially equal each other by type and/or come from a same given production batch, in such a way that the production is as uniform and homogeneous as possible.

[0044] In a preferred but non-binding way, the operation of detecting the effective temperature T_e into the cylindrical barrel of the rotating drum is performed by means of thermometer associated (under the operating profile) to a dust collector which, as known in the tanning sector, is operatively connected with such a cylindrical barrel.

[0045] The aforesaid thermometer can be arranged indifferently, depending on the applicative requirements of the customer and/or the constructive choices of the manufacturer, inside or outside the dust collector.

[0046] Moreover, the operation of detecting the effective temperature T_e inside the aforesaid cylindrical barrel determines the resultant of the temperature Tt of the cylindrical barrel itself, which is in contact with the external environment (the production factory) in which it is contained, and of the temperature T_p of the leathers contained into the cylindrical barrel, which as said can be sometimes introduced rather hot inside the latter due to the previous processing to which they have been subjected.

[0047] In addition, in the method of the invention the operation of setting the initial time interval of the drumming cycle is performed manually by an operator acting on the rotating drum or, alternatively, it occurs automatically by means of a central processing and control unit associated with the rotating drum which controls its operation and which, in the specific case, calculates the initial time interval on the basis of the data preset by the operator stored and/or memorized in it.

[0048] It follows, therefore, that, contrary to the known art, the initial temperature of the drumming cycle is variable, not fixed a priori in an arbitrary manner, and solely depends on the effective temperature T_e detected into the cylindrical barrel. Likewise, also the initial time interval of the drumming cycle is variable and solely depends on the effective temperature T_e detected into the cylindrical barrel that indicates which temperature difference must be in order to reach the working temperature (or operating temperature) T_l when fully operational.

[0049] Following the operation of detecting the effective temperature T_e, the actual relative humidity UR_e in the cylindrical barrel is also determined, this quantity being (as known) closely related to the temperature and

increasing as the temperature decreases in a closed system which indeed a rotating drum in operation is.

[0050] More in detail, in the transition from the effective temperature T_e to the working temperature T_l during the initial time interval of the drumming cycle, the temperature describes, on the basis of the time variable (in a Cartesian diagram temperature = f (time), therefore), a progressively increasing heating curve.

[0051] On the basis of the description just given, it is understood, therefore, that the method for adjusting the formula parameters (typically temperature and relative humidity) of a drumming cycle of tannery leathers, object of the present invention, achieves the purposes and reaches the advantages mentioned above.

[0052] In essence, therefore, the primary technical concept underlying the current invention method consists in significantly, surprisingly and originally innovative overturning a consolidated operating practice in a drumming cycle of leather performed in the tanning sector, providing, in the extreme synthesis, to measure in real time the initial temperature inside the rotating drum and to set, as a consequence, the time interval needed to reach the working temperature at steady starting from the effective temperature detected rather than setting a generic, determined, hypothesized, hypothetical and, although accurate, always empirical initial temperature at the operator's discretion, as it happens instead in the current state of the art: this allows to get, through the invention, significant savings of electricity that reflect in an always welcome and convenient containment of production costs.

[0053] Upon execution, changes could be made to the method for adjusting the formula parameters of a drumming cycle of tannery leathers of the invention, consisting, for example, in a working temperature T_l at which the drumming cycle takes place different from that one indicated above, by way of pure indicative example.

[0054] It is, finally, clear that several other changes could be made to the method for adjusting the formula parameters of a drumming cycle of leathers concerned, without departing from the principle of novelty intrinsic in the inventive idea expressed herein, as it is clear that, in the practical implementation of the invention, materials, shapes and sizes of the illustrated details could be changed, as needed, and replaced with others technically equivalent.

Claims

1. Method for adjusting the formula parameters of a drumming cycle of leathers comprising the following operations:

   - introducing into a cylindrical barrel, belonging to a tannery rotary drum, a plurality of leathers to be drummed in a given drumming cycle;
   - setting a working temperature, or set point temperature (T_l), at which said drumming cycle of said leathers is performed,

   characterized in that it comprises the following additional operations:

   - initially detecting the effective temperature (T_e) inside said cylindrical barrel of said rotary drum, performed before starting said drumming cycle by rotating said cylindrical barrel around a linear axis and after said operation of introducing said leathers into said cylindrical barrel;
   - subsequently setting an initial time interval (t_r) of said drumming cycle needed to pass inside said cylindrical barrel from said effective temperature (T_e) to said working temperature (T_l), according to said effective temperature (T_e) detected before starting said rotation of said cylindrical barrel around said linear axis.

2. Method according to claim 1, **characterized in that** said linear axis around which said cylindrical barrel rotates is substantially horizontal.

3. Method according to any of the previous claims, **characterized in that** said leathers to be drummed are essentially equal each other by type and/or come from the same production batch.

4. Method according to any of the previous claims, **characterized in that** said operation of detecting said effective temperature (T_e) into said cylindrical barrel is performed by means of a thermometer associated under the operating profile with a dust collector operatively connected with said cylindrical barrel.

5. Method according to any of the previous claims, **characterized in that** said operation of detecting said effective temperature (T_e) into said cylindrical barrel determines the resultant of the temperature (Tt) of said cylindrical barrel, which is in contact with the external environment in which it is contained, and the temperature (T_p) of said leathers contained into said cylindrical barrel.

6. Method according to any of the previous claims, **characterized in that** said operation of setting said initial time interval of said drumming cycle is performed manually by an operator who manages the functioning of said rotary drum or by means of a central process and control unit calculating said initial time interval based on the data preset therein.

7. Method according to any of the previous claims, **characterized in that** the initial temperature of said drumming cycle is variable and solely depends on said effective temperature (T_e) detected into said cy-

lindrical barrel.

8. Method according to any of the previous claims, **characterized in that** said initial time interval of said drumming cycle is variable and solely depends on said effective temperature (T_e) detected into said cylindrical barrel.

9. Method according to any of the previous claims, **characterized in that**, following said operation of detecting said effective temperature (T_e), the actual relative humidity (UR_e) is also determined into said cylindrical barrel.

10. Method according to any of the preceding claims, **characterized in that**, when passing from said effective temperature (T_e) to said working temperature (T_l) during said initial time interval of said drumming cycle, the temperature describes, on the basis of the time variable, a progressively increasing heating curve.

Patentansprüche

1. Verfahren zur Einstellung der Formelparameter eines Trommelzyklus für Leder, umfassend folgende Vorgänge:

   - Einführen einer Vielzahl von Ledern, die in einem bestimmten Trommelzyklus gewalkt werden sollen, in ein zylindrisches Fass, das zu einer rotierenden Gerbtrommel gehört;
   - Einstellen einer Arbeitstemperatur oder Solltemperatur (T_l), bei der der Trommelzyklus der Leder durchgeführt wird,

   dadurch gekennzeichnet, dass es folgende zusätzliche Vorgänge umfasst:

   - anfängliches Erfassen der effektiven Temperatur (T_e) innerhalb des zylindrischen Fasses der Rotationstrommel, das vor dem Starten des Trommelzyklus durch Drehen des zylindrischen Fasses um eine lineare Achse und nach dem Vorgang des Einführens der Leder in das zylindrische Fass durchgeführt wird;
   - anschließendes Einstellen eines Anfangszeitintervalls (t_r) des Trommelzyklus, das innerhalb des zylindrischen Fasses von der effektiven Temperatur (T_e) zur Arbeitstemperatur (Ti) vergehen muss, entsprechend der effektiven Temperatur (T_e), die vor Beginn der Drehung des zylindrischen Fasses um die lineare Achse erfasst wurde.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die lineare Achse, um die sich das zylindrische Fass dreht, im Wesentlichen horizontal ist.

3. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die dem Walken zu unterziehenden Ledern vom Typ her im Wesentlichen zueinander gleich sind und/oder aus demselben Produktionslos stammen.

4. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorgang des Erfassens der effektiven Temperatur (T_e) innerhalb des zylindrischen Fasses mittels eines Thermometers durchgeführt wird, das in operativer Hinsicht einem Staubsammler zugeordnet ist, der betriebsmäßig mit dem zylindrischen Fass verbunden ist.

5. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorgang des Erfassens der effektiven Temperatur (T_e) innerhalb des zylindrischen Fasses das Ergebnis der Temperatur (Tt) des zylindrischen Fasses, das mit der äußeren Umgebung, worin es enthalten ist, in Kontakt steht, und der Temperatur (T_p) der Leder, die in dem zylindrischen Fass enthalten sind, bestimmt.

6. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Vorgang des Einstellens des Anfangszeitintervalls des Trommelzyklus manuell von einem Bediener, der den Betrieb der rotierenden Trommel verwaltet, oder mittels einer zentralen Prozess- und Steuereinheit durchgeführt wird, die das anfängliche Zeitintervall basierend auf den darin voreingestellten Daten berechnet.

7. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Anfangstemperatur des Trommelzyklus variabel ist und ausschließlich von der effektiven Temperatur (T_e) abhängig ist, die in dem zylindrischen Fass erfasst wird.

8. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Anfangszeitintervall des Trommelzyklus variabel ist und ausschließlich von der effektiven Temperatur (T_e) abhängig ist, die in dem zylindrischen Fass erfasst wird.

9. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** nach dem Vorgang des Erfassens der effektiven Temperatur (T_e), auch die aktuelle relative Feuchte (UR_e) in dem zylindrischen Fass bestimmt wird.

10. Verfahren nach irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** beim Übergang von der effektiven Temperatur (T_e) zu der Arbeitstemperatur (T_l) während des Anfangszeitintervalls des Trommelzyklus, die Temperatur eine zunehmend ansteigende Heizkurve auf Basis der Zeitvariable beschreibt.

Revendications

1. Procédé de réglage des paramètres de formule d'un cycle de lustrage de cuirs comprenant les opérations suivantes :

- introduire dans un tonneau cylindrique, appartenant à un tambour rotatif de tannerie, une pluralité de cuirs à lustrer dans un cycle de lustrage donné ;
- définir une température de fonctionnement, ou température de point de consigne (T_l), à laquelle ledit cycle de lustrage desdits cuirs est réalisé,

caractérisé en ce qu'il comprend les opérations supplémentaires suivantes :

- initialement détecter la température effective (T_e) à l'intérieur dudit tonneau cylindrique dudit tambour rotatif, réalisée avant le début dudit cycle de lustrage en tournant ledit tonneau cylindrique autour d'un axe linéaire et après ladite opération d'introduire lesdits cuirs dans ledit tonneau cylindrique ;
- successivement définir un intervalle de temps initial (t_r) dudit cycle de lustrage nécessaire pour passer à l'intérieur dudit tonneau cylindrique de ladite température effective (T_e) à ladite température de fonctionnement (T_l), selon ladite température effective (T_e) détectée avant le début de ladite rotation dudit tonneau cylindrique autour dudit axe linéaire.

2. Procédé selon la revendication 1, **caractérisé en ce que** ledit axe linéaire autour duquel ledit tonneau cylindrique tourne est sensiblement horizontal.

3. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits cuirs à lustrer sont essentiellement égaux entre eux en type et/ou proviennent du même lot de production.

4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite opération de détecter ladite température effective (T_e) dans ledit tonneau cylindrique est réalisée au moyen d'un thermomètre associé sous le profil opérationnel avec un dépoussiéreur relié de manière opérationnelle avec ledit tonneau cylindrique.

5. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite opération de détecter ladite température effective (T_e) dans ledit tonneau cylindrique détermine le résultat de la température (Tt) dudit tonneau cylindrique, qui est en contact avec l'environnement extérieur dans lequel il est contenu, et la température (T_p) desdits cuirs contenus dans ledit tonneau cylindrique.

6. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite opération de définir ledit intervalle de temps initial dudit cycle de lustrage est réalisée manuellement par un opérateur qui dirige le fonctionnement dudit tambour rotatif ou au moyen d'une unité centrale de traitement et de commande calculant ledit intervalle de temps initial sur la base des données qui y sont prédéfinies.

7. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la température initiale dudit cycle de lustrage est variable et dépend uniquement de ladite température effective (T_e) détectée à l'intérieur dudit tonneau cylindrique.

8. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit intervalle de temps initial dudit cycle de lustrage est variable et dépend uniquement de ladite température effective (T_e) détectée à l'intérieur dudit tonneau cylindrique.

9. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que**, suivant ladite opération de détecter ladite température effective (T_e), l'humidité relative réelle (UR_e) est aussi déterminée à l'intérieur dudit tonneau cylindrique.

10. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que**, lorsque l'on passe de ladite température effective (T_e) à ladite température de fonctionnement (T_l) pendant ledit intervalle de temps initial dudit cycle de lustrage, la température décrit, sur la base de la variable temps, une courbe de chauffage progressivement croissante.

REFERENCES CITED IN THE DESCRIPTION

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