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(54) **MACHINE FOR THE CONTINUOUS TREATMENT OF FABRIC, IN PARTICULAR FOR THE CONTROL OF DIMENSIONAL STABILITY**

MASCHINE ZUR KONTINUIERLICHEN BEHANDLUNG VON GEWEBE, INSBESONDERE ZUR KONTROLLE DER DIMENSIONSSTABILITÄT

MACHINE POUR LE TRAITEMENT CONTINU DE TISSU, EN PARTICULIER POUR LA COMMANDE DE LA STABILITÉ DIMENSIONNELLE

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(56) References cited:

WO-A1-2013/171710 GB-A- 2 158 472
US-A- 4 922 567 US-A- 5 309 613

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Description

[0001] This invention regards a machine for the industrial processing of fabric, and more specifically for finishing treatments.

[0002] In the textile industry great importance is given to processing phases for the so-called shrinkage of the fabric, aimed at making the fabric dimensionally stable and therefore capable of maintaining its own dimensions during all the successive production processes.

[0003] Currently the best results in terms of dimensional stability are obtained with the drum processing system for fabric.

[0004] This system calls for the fabric to be inserted into a machine equipped with one or more slotted drums and be subjected to the mechanical action generated by the rotation of the drum, which alternatively rotates clockwise and counterclockwise. The drums may be equipped with protruding wings to increase the agitation of the fabric and jets of hot air and steam for the drying of the fabric.

[0005] The drum system is therefore a discontinuous processing system that, although it has the advantage of guaranteeing a soft hand and puffs up the fabric, has the disadvantage of being unproductive and costly, above all for those who must process significant volumes on a daily basis. Moreover, it can be confirmed that during the treatment the fabric is tangled and forms marked folds.

[0006] To improve the softness and the hand of the fabric, other machines called tumblers are used, which subject the fabric to a mechanical action of agitation and vibration that compacts the fibers, resulting therefore in a satisfactory shrinkage of the fabric.

[0007] Tumblers cause the fabric, whether wet or dry, to be moved at high speed using jets of air that sustain it and transport it cyclically between the extremes of a special duct. The fabric may also be pushed, during its course inside the duct or at the end of it, against one or more protruding elements, preferably gridded. In this way the tumblers make it possible to grant the fabric a good dimensional stability, as well as softness and a fluffy hand.

[0008] The patent for industrial invention N.1374887 describes a tumbler in which the fabric to be treated is subjected to the action of vibration obtained with jets of hot air produced by oscillating nozzles and the impact against gridded objects on which it is tossed at high speed in a duct for pneumatic transport.

[0009] The patent for the utility model N. 202017000051242 describes a machine in which the fabric is moved, without undergoing tensions, thanks to the thrust exercised by the air directed onto it from below upwards inside a duct for pneumatic transport in the form of an inverted U.

[0010] US 4,922,567 discloses a machine for fabric treatment including a first imbibing module, second air drying module and a third module in form of a pneumatic tumbler drier.

[0011] WO 2013/171710 describes a treatment line for shrinking and increasing the volume of a fabric, and a method for treatment of a fabric. US 5,309,613 describes a process and apparatus for improving the handle and surface of textile fabrics and knitted materials. GB 2,158,472 describes a method and apparatus for the dry treatment of fabric.

[0012] It was discovered, and forms the object of this invention, that in order to obtain the best results for the stabilization of the fabric, it is necessary that the following conditions be guaranteed:

- the fabric must be treated with set and controlled values of humidity,
- the drying must not occur in a short time, nor with high processing temperatures,
- during the processing of the fabric it is necessary to eliminate all possible tensions.

[0013] The scope of this invention is that of creating a machine for the treatment of various types of fabric that, having guaranteed the conditions listed above, makes it possible to obtain, with a gradual and continuous process, an optimal dimensional stability of the fabric as well as a good hand. The invention obtains this scope by means of a machine for the continuous treatment of fabric that comprises a first module for the soaking and relaxing of the fabric in water, a second module for the controlled drying of the fabric, to the point of reaching a set value of humidity, and a third module consisting of a tumbler to treat the fabric to the point of being completely dry, as described in Claim 1, which is here intended to be referred to herein.

[0014] Further advantageous characteristics are the subject of the dependent claims.

[0015] Therefore, the machine makes it possible, with a gradual and continuous process, to finalize all phases of the shrink treatment of the fabric, eliminating all the tensions that the fabric is subjected to during discontinuous processes. Indeed, advantageously the fabric inside the machine is moved by means of motorized cylinders synchronized by means of a control unit that calculates and corrects every variation of pulling by means of the feedback given by the fabric during its course through the treatment modules.

[0016] Moreover, the solution proposed enables the appreciable improvement of the results that would be obtained with the treatment of the fabric in a traditional tumbler, as the predrying of the fabric, still in absence of pulling and with controlled residual humidity, makes it possible for the tumbler to function under optimal conditions. Indeed, the tumbling treatment of a fabric with a set degree of residual humidity makes it possible to respect, on one hand, the time necessary for the tumbler to provide the hand, and on the other not to add that level of inertia to the fabric in movement that would prevent it from reaching its primary objective, namely the near-total shrinkage of the fabric. These and further advantages of

the invention will better be understood from the description of a preferred embodiment, as outlined by way of example and not of limitation, illustrated in the attached drawing, where:

Fig. 1 is a schematic view of the longitudinal cross-section of a machine according to the invention.

[0017] In the figure, equal or essentially equal components are marked by the same references.

[0018] With reference to Figure 1, the machine according to the invention is essentially made of a module 1 for the soaking of the fabric, a module 2 for the controlled and partial drying of the fabric, and by a tumbler 3, connected together and equipped with a feeding system for the continuous treatment of a fabric 20.

[0019] The feeding system designed to introduce the fabric 20 into the machine is preferably made up of an idle reel or cylinder 5 and a motorized reel or cylinder 25 that, cooperating with a system of stretching and tautening rollers 18, making it possible to pick up the fabric 20 from a transporting trolley 4, and convey it to the inside of module 1 of the machine in a wide and taut position.

[0020] Downstream of the cylinder 25 it may be useful to install a pair of photocells 21 to control the alignment of the fabric 20.

[0021] The module for the soaking of the fabric 1 consists essentially of a tank 7 designed to contain the bath, equipped in a known way with ducts with intake and draining valves and a bath recirculation system, not illustrated in the figure. Preferably a series of two or more spray nozzles 19 is arranged above the tank 7.

[0022] A slide 6, or equivalent means, is installed in proximity to the zone where the fabric 20 enters the tank 7, to facilitate the formation of uniform and regular small folds. Preferably, the tank 7 is equipped with a conveyor belt 8, of a mesh type, designed to prevent the folds formed in the fabric 20 from being immersed excessively in the bath. The conveyor belt 8 is also configured in such a way as to favor a gradual extraction of the fabric from the tank 7.

[0023] In proximity to the zone where the fabric 20 is lifted from the tank 7, a feeler pin 9 and a pair of pressing cylinders 10, 10' are installed, preferably with pressure that can be regulated.

[0024] To introduce and advance the fabric 20 inside the module 2, the feed system consists of a motorized wheel or cylinder 26, that cooperates with the cylinder 10, which is also motorized, and a pair of opposing belts 11 and 11', to contain the small folds of the fabric 20.

[0025] Usefully, depending on the fabric to be treated, the belt 11 can be equipped with a pin chain or replaced with a known type of pin chain.

[0026] Module 2 for the controlled and partial drying of the fabric consists of two opposing lines of ventilation boxes 12 and 12', connected to a heating and air supply unit, not illustrated in the figure. The ventilation boxes that make up rows 12 and 12' are preferably arranged in offset positions along the course that the fabric follows inside the dryer 2. A tumbler 3 of a known type, sche-

matically indicated in the figure, is installed downstream from the dryer 2 to receive the fabric treated therein.

[0027] In proximity to the entrance to the tumbler 3 there is a probe 22 designed to detect the degree of humidity or the temperature of the fabric 20 exiting the dryer 2. Preferably the probe 22 transmits the values detected to a machine control unit.

[0028] The tumbler 3 essentially comprises a duct 15 designed for the pneumatic transport of the fabric between two tanks 13 and 14, preferably equipped with a weighing system, which alternately collects the fabric incoming and outgoing from said duct 15. It is equipped in a known way with air supply ducts, in communication with a ventilation and supply unit not illustrated in the figure.

[0029] In the example provided, the duct 15 is of the type equipped, in proximity to the entrances, with two pairs of mobile shutters 27 and 28 that, when activated alternately, make it possible to move the fabric, without tensions, due only to the thrust provided by the air directed onto it from below upwards, as described in the patent for the utility model N.202017000051242.

[0030] Depending on the fabric being processed, and based on the shrinkage one wishes to obtain, the tumbler 3 can usefully be of the known type with movement of the air in pure thrust, with no impact on the grids, of the type with more marked air movement and consequential thrust of variable impact against the grids to obtain more intense hands, without in any case interfering with the shrinkage effect of the fabric, for example as described in the patent for industrial invention N. 1374887.

[0031] The tumbler 3 may in any case be of a different type but designed to treat the fabric, in absence of pulling, until totally dry.

[0032] Downstream from the tumbler 3 there is a conveyor belt installed 24, driven by motorized rollers 16, for the transport of the fabric to the crosslapper device 23.

[0033] The functioning takes place as follows.

[0034] The loading of the machine occurs, in a known way, by sewing the head of the fabric 20 to a drawing-in machine cloth that completes the course through modules 1, 2, and 3 of the machine, from the trolley 4 to the crosslapper device 23. The fabric 20, arranged in folds in the trolley 4, is picked up using the feed system consisting of cylinders 5, 25 and introduced in the soaking module 1 passing through the cylinders 18, where it is stretched and tautened for its entire length, including the selvage.

[0035] After having intercepted the slide 6, which facilitates the formation of small folds in a uniform and regular fashion, the fabric 20 reaches a mesh belt 8 and is introduced into the bath in the tank 7.

[0036] The fabric 20 will then be sprinkled and accompanied by the mesh belt 8 until it reaches the synchronism device or feeler pin 9.

[0037] Depending on the type of fabric to be treated, the machine allows the folds of the fabric 20 to float on the water or simply be transported by the belt 8 and wet exclusively by a series of spray nozzles 19 arranged

above it.

[0038] The machine advantageously uses the mesh conveyor belt 8 to prevent the folds in the fabric 20 from being excessively immersed in the water and to be able to arrange them evenly. Another purpose of the belt 8 is to accompany the folds during the floating phase to be able to then gradually remove them from the water and bring them into contact with the synchronism device 9.

[0039] During this last stage of its course in module 1, the fabric 20 begins to gradually lose the excess water before reaching the pressing cylinders 10, 10'.

[0040] The feeler pin 9 makes it possible to synchronize the speed of the belt 8 with the pressing cylinders 10, 10' and, still in perfect synchronism, arrange the fabric onto the conveyor belt 11 of the dryer 2, overfeeding it by a percentage set by the operator.

[0041] The conveyor belts 11, 11' accompany the fabric in a loose fashion, so with no tension whatsoever, to the rocker 13 of the tumbler 3.

[0042] The probe 22 may be of the type designed to directly detect the degree of residual humidity of the fabric exiting module 2, but preferably, for greater precision due to the limits of measurement of the humidity detectors, the probe 22 is of the type designed to detect the temperature at which the fabric exits module 2. The value detected by the probe 22 is sent to the control unit that, based on the fabric to be treated and the results required, verifies if this value corresponds to an ideal and set value that makes it possible to optimize the function of the tumbler 3.

[0043] The fabric 20 that enters the tumbler 3, then passes through, as is known, the duct 15 only thanks to the thrust created by the direct air blown onto it from below upwards and is alternately arranged in small folds in the collection basins 13 and 14 with effective, but not traumatic, results on the fibers.

[0044] The change from one basin to the other is determined according to the values detected by the weighing devices connected to the basins 13 and 14, but the machine may also provide other types of sensors, for example loading cells. The speed of the fabric can be regulated by varying the air flow inside the duct 15, according to algorithms known by the sector technician, based on the weight of the fabric, the type of fabric to be treated, and the results required. Upon exiting the tumbler 3 the fabric 20, transported by the belt 24, is arranged in folds in a trolley 17.

[0045] The control unit, not illustrated in the figure, equipped with a command interface, therefore allows the setting of the machine operating parameters and the processing of the data detected by the sensors installed inside the machine and makes the suitable corrective interventions.

[0046] In particular, for each type of fabric the time and temperatures of the treatment are set, based on a sample, to obtain the value of residual humidity that enables the tumbler 3 to perform under optimal conditions and obtain the best results.

[0047] In the case in which, for greater precision, the machine makes use of a probe 22 that detects the temperature of the fabric and not the humidity, the weighing of the test sample of the fabric is performed to determine the relationship between the temperature and the residual humidity of the fabric.

[0048] During the treatment of the fabric 20, the control device, based on the values detected by the probe 22, may therefore vary the speed of advancement of the fabric passing inside modules 1 and 2, commanding the fabric feed system for the purpose of increasing or reducing the treatment times of the fabric in the dryer 2 and, as a consequence, relaxation in the tank 7.

[0049] The movement of the belt and/or chain 11 is governed by the control unit that synchronizes the speed with the rotation of the pressing cylinders 10 so that the fabric 20 is arranged on the belt and/or chain 11 loosely, overfed at a percentage set by the operator.

[0050] According to the invention, the machine therefore makes it possible to obtain a shrinkage of the treated fabric and a dimensional stability very near zero, both in width (weft) and in length (warp, as the fabric can be treated gradually, by humidity treatment and without being subject to any tension, with pre-set and controllable values of the drying times and processing temperatures.

Claims

1. Machine for the continuous treatment of a fabric (20) comprising:

- a first module (1) for the imbibing and relaxing of said fabric (20) arranged in small folds, equipped with a tank (7) to contain the bath;
- a second module (2) for the controlled drying of said fabric (20) arranged in small folds, equipped with a means of ventilation (12, 12') and a probe (22) to detect the value of residue humidity and/or temperature of the fabric exiting said module (2);
- a third module (3) comprising a tube (15) equipped with means for the pneumatic transport of said fabric (20) between the openings of said tube (15) until the drying of the fabric;
- a system for dragging said fabric (20) between said first (1), second (2) and third (3) modules capable of overfeeding the fabric in said first (1) and second (2) modules to arrange it and move it in small folds;
- means of control and regulation of the speed of said dragging system intended to vary the speed of advancement of the fabric (20) inside said first (1) and second (2) modules, based on the values detected by said probe (22).

2. Machine for the treatment of a fabric (20) according to the previous claim **characterized by** the fact that

said fabric (20) dragging system consists of at least one pair of motorized reels or cylinders (25, 26), arranged respectively at the entrances of said first (1) and second (2) modules, and at least two conveyor belts (8, 11) capable of moving the fabric in small folds into the respective first (1) and second (2) modules

3. Machine for the dragging of fabric (20) according to claim 2 **characterized by** the fact that in proximity to the fabric (20) pick up zone from the tank (7) of said first module (1), there is a pair of pressing cylinders (10, 10'), with adjustable pressure. 10
4. Machine for the treatment of a fabric (20) according to claim 3 **characterized by** the fact that said means of control and regulation of the speed of said dragging system comprises a feeler pin (9) capable of synchronizing the speed of the conveyor belt (8) of said first module (1) with the pressing cylinders (10, 10') and arranging the fabric (20) on the conveyor belt (11) of second module (2) overfeeding it at a percentage set by the operator. 20
5. Machine for the treatment of a fabric (20) according to one of the claims from 2 to 4 **characterized by** the fact that the conveyor belt (8) of the first module (1) is a mesh type and configured to contain the fabric (20) and favor a gradual extraction from the tank (7). 25
6. Machine for the treatment of a fabric (20) according to one of the claims from 2 to 5 **characterized by** the fact that said second module (2) is equipped with a further conveyor belt (11') opposite the conveyor belt (11) of the second module (2) for the containment of the folds of fabric (20). 30
7. Machine for the treatment of a fabric (20) according to one of the claims from 2 to 6 **characterized by** the fact that the conveyor belt (11) of the second module (2) is equipped with a pin chain. 40
8. Machine for the treatment of a fabric (20) according to one of the previous claims **characterized by** the fact that the tank (7) is equipped with two or more spray nozzles (19) arranged over it. 45
9. Machine for the treatment of a fabric (20) according to one of the previous claims **characterized by** the fact that said first module (1) is equipped with a slide (6) capable of facilitating the formation of small folds in the fabric entering said tank (7). 50
10. Machine for the treatment of a fabric (20) according to one of the previous claims **characterized by** the fact that a widening and tightening roller system (18) and a pair of photocells (21) for the alignment control of the fabric (20) are installed at the entrance to said 55

first module (1).

11. Machine for the treatment of fabric (20) according to one of the previous claims **characterized by** the fact that said third module (3) consists of a known type of tumbler in which the pipe (15) has an inverted U form and is equipped in proximity to the opening of two pairs of movable shutters (27, 28) capable of moving the fabric (20) by the sole effect of the force of the air directed onto it from below upward. 5
12. Machine for the treatment of fabric (20) according to one of the claims from 1 to 10 **characterized by** the fact that said third module (3) consists of a tumbler capable of treating the fabric, in absence of pulling, in said pipe for pneumatic transport (15), subjecting it to the action of a blast of hot air and the impact against obstacles onto which it is launched at high speed. 10
13. Machine for the treatment of a fabric (20) according to one of the previous claims **characterized by** the fact that one control unit, equipped with a command interface, makes it possible to set the functioning parameters of the machine and elaborate the data detected by sensors to adopt the most suitable corrective interventions on the fabric dragging system in said first (1), second (2) and third (3) modules and control the operating temperatures. 20

Patentansprüche

1. Maschine zur kontinuierlichen Behandlung eines Gewebes (20), umfassend: 35
 - ein erstes Modul (1) zum Aufsaugen und Entspannen des Gewebes (20), in kleinen Falten angeordnet, mit einem Tank (7) ausgestattet, um das Bad zu enthalten;
 - ein zweites Modul (2) zum kontrollierten Trocknen des Gewebes (20), in kleinen Falten angeordnet, mit einem Lüftungsmittel (12, 12') und einer Sonde (22) ausgestattet, um den Wert von Restfeuchtigkeit und/oder Temperatur des Gewebes zu erkennen, welches das Modul (2) verlässt;
 - ein drittes Modul (3), umfassend ein Rohr (15), welches mit Mitteln zum pneumatischen Transport des Gewebes (20) zwischen den Öffnungen des Rohres (15) bis zum Trocknen des Gewebes ausgestattet ist;
 - ein System zum Schleppen des Gewebes (20) zwischen dem ersten (1), zweiten (2) und dritten (3) Modul, welches zum Überzuführen des Gewebes in dem ersten (1) und zweiten (2) Modul imstande ist, um es anzuordnen, und es in kleinen Falten zu bewegen;

- Mittel zum Steuern und Regeln der Geschwindigkeit des Schleppsystems, das zum Variieren der Fortbewegungsgeschwindigkeit des Gewebes (20) innerhalb des ersten (1) und zweiten (2) Moduls, basierend auf den von der Sonde (22) erkannten Werten bestimmt ist.
2. Maschine zur Behandlung eines Gewebes (20) nach dem vorstehenden Anspruch, **gekennzeichnet durch** die Tatsache, dass das Schleppsystem des Gewebes (20) aus mindestens einem Paar an motorisierten Walzen oder Zylindern (25, 26) besteht, die jeweils an den Eingängen des ersten (1) und zweiten (2) Moduls angeordnet sind, und mindestens zwei Förderbändern (8, 11), welche zum Bewegen des Gewebes in kleinen Falten in das jeweilige erste (1) und zweite (2) Modul imstande ist.
 3. Maschine zum Schleppen von Gewebe (20) nach Anspruch 2, **gekennzeichnet durch** die Tatsache, dass in der Nähe der Aufnahmezone des Gewebes (20) aus dem Tank (7) des ersten Moduls (1) ein Paar an Presszylindern (10, 10') mit einstellbarem Druck vorhanden ist.
 4. Maschine zur Behandlung eines Gewebes (20) nach Anspruch 3, **gekennzeichnet durch** die Tatsache, dass die Mittel zum Steuern und Regeln der Geschwindigkeit des Schleppsystems einen Fühlerstift (9) umfassen, der zum Synchronisieren der Geschwindigkeit des Förderbandes (8) des ersten Moduls (1) mit den Presszylindern (10, 10') und Anordnen des Gewebes (20) auf dem Förderband (11) des zweiten Moduls (2) imstande ist, mit einer Überführung mit einem vom Bediener eingestellten Prozentsatz.
 5. Maschine zur Behandlung eines Gewebes (20) nach einem der Ansprüche 2 bis 4, **gekennzeichnet durch** die Tatsache, dass das Förderband (8) des ersten Moduls (1) in der Art mit Maschen ist, und konfiguriert ist, um das Gewebe (20) zu enthalten, und eine schrittweise Extraktion aus dem Tank (7) zu fördern.
 6. Maschine zur Behandlung eines Gewebes (20) nach einem der Ansprüche 2 bis 5, **gekennzeichnet durch** die Tatsache, dass das zweite Modul (2) mit einem weiteren Förderband (11') gegenüber dem Förderband (11) des zweiten Moduls (2) zum Eingrenzen der Falten des Gewebes (20) ausgestattet ist.
 7. Maschine zur Behandlung eines Gewebes (20) nach einem der Ansprüche 2 bis 6, **gekennzeichnet durch** die Tatsache, dass das Förderband (11) des zweiten Moduls (2) mit einer Nadelkette ausgestattet ist.
 8. Maschine zur Behandlung eines Gewebes (20) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass der Tank (7) mit zwei oder mehr darüber angeordneten Sprühdüsen (19) ausgestattet ist.
 9. Maschine zur Behandlung eines Gewebes (20) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass das erste Modul (1) mit einem Schieber (6) ausgestattet ist, der zum Erleichtern der Bildung von kleinen Falten in dem Gewebe imstande ist, das in den Tank (7) eintritt.
 10. Maschine zur Behandlung eines Gewebes (20) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass ein Verbreitungs- und Straffungswalzensystem (18) und ein Paar an Fotozellen (21) zur Ausrichtkontrolle des Gewebes (20) am Eingang zum ersten Modul (1) installiert sind.
 11. Maschine zur Behandlung eines Gewebes (20) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass das dritte Modul (3) aus einer bekannten Art von Trommel besteht, deren Rohr (15) die Form eines umgekehrten U aufweist und in der Nähe zur Öffnung von zwei Paaren an beweglichen Klappen (27, 28) ausgestattet ist, die zum Bewegen des Gewebes (20) nur durch die Wirkung der Kraft der Luft imstande ist, die von unten oder oben darauf gerichtet wird.
 12. Maschine zur Behandlung eines Gewebes (20) nach einem der Ansprüche 1 bis 10, **gekennzeichnet durch** die Tatsache, dass das dritte Modul (3) aus einer Trommel besteht, die zur Behandlung des Gewebes, ohne Ziehen, in dem Rohr zum pneumatischen Transport (15) imstande ist, indem sie es der Wirkung einer Druckwelle aus heißer Luft und dem Aufprall auf Hindernisse aussetzt, auf die es mit hoher Geschwindigkeit geworfen wird.
 13. Maschine zur Behandlung eines Gewebes (20) nach einem der vorstehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass eine Steuereinheit, die mit einer Befehlsschnittstelle ausgestattet ist, es ermöglicht, die Betriebsparameter der Maschine einzustellen und die Daten auszuarbeiten, die von Sensoren erkannt werden, um die geeignetsten Korrekturmaßnahmen am Gewebeschleppsystem in dem ersten (1), zweiten (2) und dritten (3) Modul vorzunehmen und die Betriebstemperaturen zu steuern.

Revendications

1. Machine de traitement continu d'un tissu (20) comprenant :

- un premier module (1) d'imprégnation et de relâchement dudit tissu (20) agencé en petits plis, équipé d'une cuve (7) pour contenir le bain ;
 - un deuxième module (2) de séchage commandé dudit tissu (20) agencé en petits plis, équipé d'un moyen de ventilation (12, 12') et d'une sonde (22) pour détecter la valeur d'humidité résiduelle et/ou de température du tissu sortant dudit module (2) ;
 - un troisième module (3) comprenant un tube (15) équipé d'un moyen de transport pneumatique dudit tissu (20) entre les ouvertures dudit tube (15) jusqu'au séchage du tissu ;
 - un système d'entraînement dudit tissu (20) entre lesdits premier (1), deuxième (2) et troisième (3) modules capable de suralimenter le tissu dans lesdits premier (1) et deuxième (2) modules pour l'agencer et le déplacer en petits plis ;
 - un moyen de commande et de régulation de la vitesse dudit système d'entraînement prévu pour faire varier la vitesse d'avancement du tissu (20) à l'intérieur desdits premier (1) et deuxième (2) modules sur la base des valeurs détectées par ladite sonde (22).
2. Machine de traitement d'un tissu (20) selon la revendication précédente, **caractérisée par le fait que** ledit système d'entraînement de tissu (20) consiste en au moins une paire d'enrouleurs ou de cylindres motorisés (25, 26), agencés respectivement au niveau des entrées desdits premier (1) et deuxième (2) modules, et au moins deux bandes transporteuses (8, 11) capables de déplacer le tissu en petits plis dans les premier (2) et deuxième (2) modules respectifs.
3. Machine d'entraînement de tissu (20) selon la revendication 2, **caractérisée par le fait qu'**à proximité de la zone de prélèvement de tissu (20) dans la cuve (7) dudit premier module (1), se trouve une paire de cylindres de pressage (10, 10') à pression réglable.
4. Machine de traitement d'un tissu (20) selon la revendication 3, **caractérisée par le fait que** ledit moyen de commande et de régulation de la vitesse dudit système d'entraînement comprend un palpeur (9) capable de synchroniser la vitesse de la bande transporteuse (8) dudit premier module (1) avec les cylindres de pressage (10, 10') et d'agencer le tissu (20) sur la bande transporteuse (11) du deuxième module (2) en le suralimentant à un pourcentage défini par l'opérateur.
5. Machine de traitement d'un tissu (20) selon l'une des revendications 2 à 4, **caractérisée par le fait que** la bande transporteuse (8) du premier module (1) est d'un type à mailles et configurée pour contenir le tissu (20) et favoriser une extraction progressive de la cuve (7).
6. Machine de traitement d'un tissu (20) selon l'une des revendications 2 à 5, **caractérisée par le fait que** ledit deuxième module (2) est équipé d'une autre bande transporteuse (11') opposée à la bande transporteuse (11) du deuxième module (2) pour la rétention des plis de tissu (20).
7. Machine de traitement d'un tissu (20) selon l'une des revendications 2 à 6, **caractérisée par le fait que** la bande transporteuse (11) du deuxième module (2) est équipée d'une chaîne à rouleaux.
8. Machine de traitement d'un tissu (20) selon l'une des revendications précédentes, **caractérisée par le fait que** la cuve (7) est équipée de deux buses de pulvérisation (19) ou plus agencées au-dessus de celle-ci.
9. Machine de traitement d'un tissu (20) selon l'une des revendications précédentes, **caractérisée par le fait que** ledit premier module (1) est équipé d'une glissière (6) capable de faciliter la formation de petits plis dans le tissu entrant dans ladite cuve (7).
10. Machine de traitement d'un tissu (20) selon l'une des revendications précédentes, **caractérisée par le fait qu'**un système de rouleaux élargisseurs et tendeurs (18) et une paire de cellules photoélectriques (21) pour la commande d'alignement du tissu (20) sont installés au niveau de l'entrée dudit premier module (1).
11. Machine de traitement de tissu (20) selon l'une des revendications précédentes, **caractérisée par le fait que** ledit troisième module (3) consiste en un type connu de culbuteur dans lequel le tube (15) présente une forme de U inversé et est équipé, à proximité de l'ouverture, de deux paires de volets mobiles (27, 28) capables de déplacer le tissu (20) par le seul effet de la force de l'air dirigé sur celui-ci du bas vers le haut.
12. Machine de traitement de tissu (20) selon l'une des revendications 1 à 10, **caractérisée par le fait que** ledit troisième module (3) consiste en un culbuteur capable de traiter le tissu, en l'absence de traction, dans ledit tube pour le transport pneumatique (15), en le soumettant à l'action d'un souffle d'air chaud et à l'impact contre des obstacles sur lesquels il est lancé à grande vitesse.
13. Machine de traitement d'un tissu (20) selon l'une des revendications précédentes, **caractérisée par le fait qu'**une unité de commande, équipée d'une interface de commande, permet de définir les para-

mètres de fonctionnement de la machine et d'élaborer les données détectées par des capteurs pour adopter les interventions correctives les plus appropriées sur le système d'entraînement de tissu dans lesdits premier (1), deuxième (2) et troisième (3) modules et commander les températures de fonctionnement.

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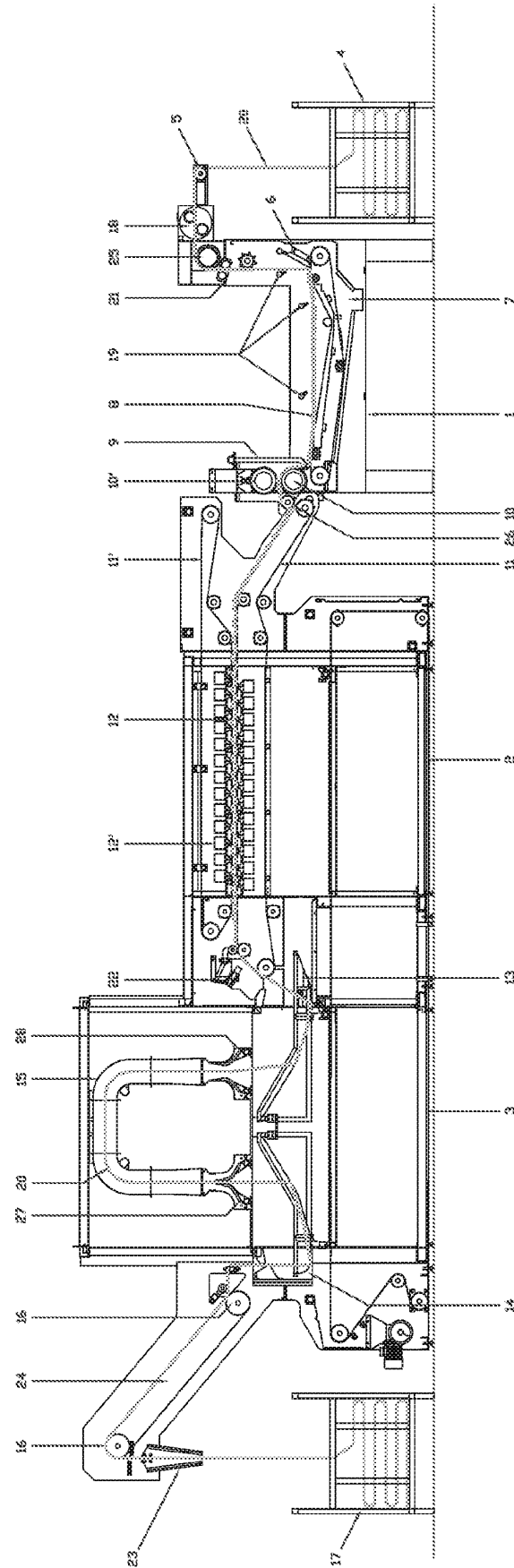


Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 202017000051242 A [0009]
- US 4922567 A [0010]
- WO 2013171710 A [0011]
- US 5309613 A [0011]
- GB 2158472 A [0011]