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(54) Device to draw threads between a beam and a winding machine

Vorrichtung zum Einziehen von Fäden von einem Baum zu einer Wickelmaschine

Dispositif pour rentrer des fils entre une ensouple et un bobinage

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(73) Proprietor: **JAEGGLI S.p.A.**
20123 Milano (IT)

(72) Inventors:
• **Minto, Luigi**
I-31025 Santa Lucia Di Piave (TV) (IT)

• **Lancerotto, Fabio**
I-20131 Milano (IT)
• **Caccia Dominioni, Ambrogio**
I-20123 Milano (IT)

(74) Representative:
Petraz, Gilberto Luigi
GLP S.r.l.
Piazzale Cavedalis 6/2
33100 Udine (IT)

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Description

This invention concerns a device to draw threads being unwound between a beam and a winding machine, as set forth in the main claim.

The invention is employed advantageously in cooperation with winding machines fed by beams of yarns and used downstream of textile processes such as continuous mercerisation, for instance.

A plurality of threads or yarns being fed parallel to each other and coming from one or more beams is taken up at the same time by these winding machines.

The invention is set to work advantageously for a pre-set limited time before the beginning of the continuous unwinding operation while the individual ends of the plurality of threads or yarns have to be brought to their corresponding winding heads to be anchored.

The invention is also advantageously set to work automatically whenever at least one thread or yarn of the plurality of threads or yarns being unwound from the beam is broken.

By textile threads or yarns are meant materials consisting of continuous or discontinuous fibres of a natural or chemical origin as normally included in processes of the textile field.

In textile processes where it is advantageous to treat a plurality of threads or yarns continuously at the same time, that plurality can be taken up on supports such as beams, to which we shall refer in the description that follows.

When we write of a plurality of threads or yarns, we mean a quantity which may amount to between some tens and some thousands.

In any event each packaged beam, whether it contains tens or thousands of threads or yarns, entails the problem of having to be unwound when those threads or yarns are to be used singly thereafter.

This takes place, for instance, when their purpose is to feed knitting machines or to act as warp in weaving machines or to be dyed or for many other analogous applications.

In general the preferred package is a bobbin, whether cylindrical or tapered, of various gauges according to the specific use.

There is then the problem of unwinding from the beam the plurality of threads or yarns wound thereon and of delivering those threads or yarns individually to their respective winding units.

It is obvious that this operation entails many problems linked above all to the presence of many threads or yarns in movement in close proximity to each other, such problems being well known to any person skilled in the textile field.

Moreover, the ever greater need to take up as little space as possible for obvious financial reasons is in contrast with the situation of having to have available a very great number of take-up units positioned near each other.

EP-A-0 427 032 discloses a winding machine to take up a plurality of textile threads or yarns being unwound parallel to each other at the same time from one or more package supports; this winding machine is positioned advantageously downstream of apparatuses which process the plurality of parallel threads or yarns.

This machine includes a headstock for taking up and unwinding the package support or supports holding the plurality of threads or yarns, the supports being beams advantageously, and includes also a supporting structure to hold a plurality of winding heads in a number coordinated with the number of threads or yarns to be wound.

This state of the art accepts great limits to its working capacity owing to the problems of engaging and delivering the end of each thread to its respective winding head, the problems of breakage of the thread, the delivery of the broken ends to the machine operator, etc.

A great problem with these machines is linked to the preliminary operations of unwinding the beam to bring the ends of the single threads to the respective packages to which they have to be secured individually.

A device disclosed in EP-A-0 492 505 was embodied to overcome these problems and especially the problem linked to the interception, drawing and taking-up of broken threads automatically during the operations. This device comprises for each thread between the beam and thread package a first guide tube followed by a switch and by a second guide tube; the second guide tube follows substantially the first guide tube.

An aspirator unit of a type that maintains a negative pressure and, advantageously, a shears unit to shear threads are associated with the second guide tube.

When a feeler that monitors single threads signals that a thread is broken, the switch is rotated and puts the first guide tube in communication with the second guide tube, which is kept under a negative pressure by the aspirator unit.

The beam continues unwinding while the broken thread is removed through the aspirator unit.

This device entails several problems linked to the high costs of its embodiment and the installation of the necessary plant inasmuch as a great number of switches, guide tubes and relative accessories such as solenoids, sensors, etc. are required.

Moreover, this device requires a great consumption of energy since all the aspirator units are always working to keep the second guide tubes always under a negative pressure.

Furthermore, the continuous working of the aspirator units causes a very unpleasant noise for the operators of the winding machine.

Besides, with the device disclosed in the above document the beam is never halted and the broken thread is not re-used and is only taken up to prevent it possibly becoming entangled with the other threads being unwound.

This fact always involves a great financial loss, above all when the thread is of a good quality.

DE-A-2.718.689 discloses a Venturi system to draw the thread. A Venturi system is in itself a well known system, but it is necessary to bear in mind the fact that the Venturi systems of the state of the art take up a great deal of space and cannot be combined with a plurality of combined conduits in close proximity with little free space between them.

The present applicants have designed, tested and embodied this invention to overcome all the above shortcomings and to achieve further advantages.

The device according to this invention is set forth and characterised in the main claim, while the dependent claims describe variants of the idea of the main embodiment.

This invention enables the capacity of the winding heads to be fully exploited by increasing the average working speed without causing problems.

Moreover, in the preliminary operations the invention enables the ends of the single threads to be brought to their respective thread packages for anchorage for the subsequent winding step; it also makes possible the automatic interception and positioning of any broken thread.

It also makes possible the automatic delivery of the broken end to the machine operator when knotting takes place. It also reduces the dust and dirt and the waste of thread.

According to the invention a plurality of guide tubes equal in number to the threads on the beam is provided between the beam unwinding assembly and the winding machine.

The end of each guide tube coincides with its own switch means, a small roller for instance, fitted so as to correspond with the relative thread package.

The guide tubes may consist of glass or a plastic or of metal.

According to the invention a device to draw broken threads cooperates with the plurality of guide tubes and consists of thread aspiration/ejection means, which are momentarily actuated and then generate a current of aspiration air towards the switch means within each tube.

The device according to the invention is actuated for the first time at the beginning of the operations to draw the ends of the single threads until they have been brought to their respective thread package and is also actuated whenever at least one of the threads breaks during the winding operations.

During the preliminary start-up operations the current of air producing a negative pressure draws all the threads on the beam, whereas, if at least one thread breaks, the current of air draws that at least one broken thread and makes it unwind regularly from the beam, thus preventing that thread becoming entangled with the other threads being unwound.

Whereas in the first case above the device is actu-

ated by hand by the machine operator, the actuation of the device in the second case is governed by the breakage of at least one thread as detected by the relative feeler associated with the thread package.

The breakage is signalled to a managing and control assembly, which governs the winding machine and sends a stop signal in this case; this signal causes the beam and the winding machine to be halted gradually with a pre-set gradient of descent of speed.

The device according to the invention includes for each thread a thread aspiration/ejection means which extends to work within the guide tube in question from the outside in a position at an angle towards the outlet. In this way, while the unbroken threads continue being wound onto their respective thread packages, the broken thread is drawn into the respective guide tube and brought to the switch means by the current of air passing through that guide tube.

When the winding machine is completely stopped, the machine operator can take the broken thread from the switch means, shear the excess thread and knot the end to the end wound on the corresponding thread package.

The beam and the winding machine are then re-started with a pre-set gradient of increase of speed until they reach the normal running speed of the winding machine, while the action of negative pressure in the device according to the invention is stopped.

In view of the high speeds of unwinding of the beam, according to a variant a thread take-up chamber is associated with, and positioned immediately downstream of, each switch means so as to prevent any problems being created by the broken thread unwinding from the beam and drawn by the current of air of the device according to the invention.

In this way the broken thread drawn by the current of air is collected in the take-up chamber, and it is enough for the machine operator to engage that thread, shear it to the correct length and knot it to the end of the thread still positioned on the corresponding thread package.

According to a variant an assembly holding a buffer stock of compressed air and acting as a compensator is included between the guide tubes and the beam.

The attached figures are given as a non-restrictive example and show two preferred embodiments of the invention as follows:-

- Fig.1 is a side diagrammatic view of a form of embodiment of a winding machine equipped with the device according to the invention;
- Fig.2 is a partial plan view of the machine of Fig.1;
- Fig.3 is a partial lengthwise view of the machine of Fig.2;
- Fig.4 shows in an enlarged scale the conveyor assembly of the device according to the invention;
- Fig.5 shows in a further enlarged scale a cross-

section of the conveyor assembly along the line A-A of Fig.4;

Fig.6a shows in an enlarged scale a variant of the detail C of Fig.3;

Fig.6b shows a section along the line B-B of Fig.6a.

According to the invention a device 10 to draw threads 11 and/or broken threads 111 between a beam and a winding machine 13 is located between the beam and a plurality of guide tubes 14, which are positioned in close proximity to each other so as not to take up space.

Fig.1 is a part view of a winding machine 13 fed by a beam, which is not shown here but bears a plurality of threads 11; the threads 11 may be, for instance, fifty or one hundred in number or be in another determined number.

The beam is positioned and set in rotation by a drive unit which controls its unwinding.

According to a variant, which is not shown here, the bundle of threads 11 leaving the beam passes through an assembly holding a buffer stock of thread of the type described in EP-A-0 492 505; this assembly has the purpose of compensating any differences in speed and consumption, or feed, between the beam and the units located downstream thereof.

The bundle of threads 11 leaves the beam and is arranged fan-wise so as to take on a coordinated position at an alignment zone 15.

A guide tube 14 corresponds with each single thread 11 in this alignment zone 15.

The plurality of guide tubes 14 positioned side by side cooperates with the device 10 that draws broken threads 111; this device 10 comprises an aspirator/drawing assembly 16 consisting of a box-shaped chamber 17, which is substantially airtight and through which a plurality of conveyor tubes 32 passes from one side to the other side of the chamber 17, each conveyor tube 32 being associated with a corresponding guide tube 14.

Each conveyor tube 32 is associated with means to aspirate/eject thread, these means consisting of at least one hole that connects at an angle the box-shaped chamber 17 to the inside of the conveyor tube 32.

In this case the conveyor tubes 32 are installed removably in the box-shaped chamber 17 by means of the interposition of seal engagement means 24 consisting of an annular packing of an O-ring type 25.

Positioning and clamping means 26 consisting in this case of a flange 27, which cooperates with one sidewall of the box-shaped chamber 17, and of a spacer ring 28 associated with a resilient ring 29 cooperating with the opposite sidewall of the box-shaped chamber 17 are included to ensure proper positioning of the conveyor tubes 32 within the box-shaped chamber 17.

If the resilient ring 29 and spacer ring 28 are removed, it is possible to withdraw the conveyor tube 32 from the box-shaped chamber 17 for replacement.

The box-shaped chamber 17 includes at least one

immission duct 18 associated with compression means consisting of an air compressor 19 in this case.

Each conveyor tube 32 includes in its intermediate segment 20 within the box-shaped chamber 17 at least one injection hole 21 of a small diameter suitably facing in the direction of feed of the thread 11 within the guide tube 14.

In the device 10 according to the invention the air under pressure delivered into the box-shaped chamber 17 passes through the injection holes 21 and flows through the conveyor tubes 32 and guide tubes 14, thus creating a negative pressure which attracts the single threads 11 and draws them from the unwinding beam by a pre-set desired length.

When the threads 11 have been unwound by the desired length, the device 10 according to the invention is halted to enable the machine operator to knot the ends of the single threads 11 to the respective thread packages 23.

If one or more threads break during the winding operation, the device 10 according to the invention is actuated automatically and the negative pressure created in the guide tubes 14 attracts the broken thread 111 and draws it by unwinding it from the beam and thus preventing possible problems of entanglement with the other threads 11 being unwound.

If a thread 111 is broken during processing, the drawing action ensures drawing of the end of the broken thread 111 with a speed equal to the winding speed so as to keep the broken thread 111 always under a slight tension to prevent it becoming entangled with the other threads 11.

The air compressor 19 is such as will ensure the maintaining of a negative pressure at about the desired value, which will ensure substantially the drawing of a determined number of broken threads 111 at a pre-set speed for a pre-set time.

According to a variant the box-shaped chamber 17 contains a plurality of compartments, with each of which is associated its own immission duct 18 (Fig.4), so as to ensure a negative pressure and therefore a substantially equal drawing action within each conveyor tube 32 and therefore each guide tube 14.

By regulating suitably the rate of flow of air admitted through the single immission ducts 18 it is possible to ensure a substantially even and constant flow of air through the various guide tubes 14 even if the latter have considerably different lengths from each other.

A uniform unwinding of all the threads 11 being unwound from the beam is ensured in this way.

Each guide tube 14 cooperates at its end with switch means consisting in this case of a deflection plate 33 and switch roller 22 positioned in correspondence with each thread package 23; the switch roller 22 has the task of converting substantially horizontal motion of the thread 11 into substantially vertical motion.

According to a variant (Figs.6) a take-up chamber

30 is associated with, and located downstream of, each switch roller 22; in this take-up chamber 30 is collected the broken thread 111 drawn by the current of air. In this case the take-up chamber 30 has sidewalls consisting of a perforated mesh 12 to enable the drawing air to escape, while the broken thread 111 withheld by the perforated mesh 12 collects within the take-up chamber 30.

We shall describe hereinafter the various working steps of the drawing and take-up device 10 according to the invention.

When a feeler associated with a thread package 23 signals that a thread 111 is broken, a managing and control unit 31 which manages the winding machine 13 sends a halt signal, which slows the beam and the thread packages 23 according to a pre-set gradient of reduction of speed.

The air compressor 19 which delivers compressed air into the box-shaped chamber 17 is actuated at the same time.

According to a variant which is not shown here, shut-off valve means fitted to a tank holding a buffer stock of compressed air fed by the compressor 19 are opened.

The compressed air passing through the injection holes 21 creates within the conveyor tubes 32 and therefore the guide tubes 14 a negative pressure, which draws the broken thread 111 within the guide tube 14 until the broken thread 111 has been brought to the relative switch roller 22.

The broken thread 111 is diverted by the deflection plate 33 or else is collected within the take-up chamber 30.

When the winding machine 13 has been halted, the compressor 19 is stopped and the machine operator can shear the broken thread 111 and knot it to the end of the thread on the relative thread package 23.

The machine operator now re-starts the winding machine 13 and beam according to a pre-set gradient of increase of speed until the normal working speed is reached.

Claims

1. Device to draw threads (11) and/or broken threads (111) being unwound between a beam and a winding machine (13), the device comprising one guide tube (14) per each thread (11-111), the plurality of guide tubes (14) being in close proximity to each other, and each guide tube (14) including a conveyor tube (32) comprising means to aspirate and eject thread, which can be momentarily actuated and are associated with means that sense broken thread (111) and wherein the means to aspirate/eject thread are associated with an airtight box-shaped chamber (17) characterized in that the device comprises means for a controlled braking and acceleration of the beam and of the winding

machine 13, the airtight box-shaped chamber containing a plurality of guide tubes (14) and being put momentarily under pressure, the thread aspiration/ejection means consisting of injection holes (21) which connect at an angle the box-shaped chamber (17) to the inside of each conveyor tube (32).

2. Device as in Claim 1, in which each conveyor tube (32) can be replaced by being withdrawn from the box-shaped chamber (17).
3. Device as in Claim 1 or 2, in which an assembly holding a buffer stock of thread is included between the beam and the plurality of guide tubes (14).
4. Device as in any claim hereinbefore, in which each switch means (22) is associated with a specific deflection plate (33) (Fig.3).
5. Device as in any of Claims 1 to 4 inclusive, in which each switch means (22) is associated with a thread take-up chamber (30) (Figs.6).
6. Device as in any claim hereinbefore, in which the airtight box-shaped chamber (17) contains a plurality of compartments, with each of which is associated its own duct (18) for immission of air under pressure, the duct (18) being equipped with means to regulate the rate of flow of incoming air.

Patentansprüche

1. Vorrichtung zur Mitnahme von Fäden (11) und/oder gerissenen Fäden (111), die zwischen einem Baum und einer Spulmaschine (13) abgewickelt werden, wobei die Vorrichtung ein Führungsrohr (14) für jeden Faden (11 - 111) aufweist, die Führungsrohre (14) eng nebeneinander angeordnet sind und jedes Führungsrohr (14) ein Förderrohr (32) hat, das Mittel zum Ansaugen und Ausstoßen aufweist, die zeitweise aktivierbar und mit Mitteln verbunden sind, die einen gerissenen Faden (111) feststellen, wobei die Mittel zum Ansaugen und Ausstoßen des Fadens einem luftdicht abgeschlossenen, kastenförmigen Raum (17) zugeordnet sind, dadurch gekennzeichnet, daß die Vorrichtung Mittel zum gesteuerten Abbremsen und Beschleunigen des Baumes und der Spulmaschine (13) aufweist, daß der luftdicht abgeschlossene, kastenförmige Raum eine Mehrzahl von Führungsrohren (14) aufnimmt und zeitweise mit Druck beaufschlagt ist, und daß die Mittel zum Ansaugen/Ausstoßen des Fadens aus Injektionsbohrungen (21) bestehen, die den kastenförmigen Raum (17) unter einem Winkel mit dem Inneren jedes Förderrohres (32) verbinden.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß jedes Förderrohr (32) durch Herausziehen aus dem kastenförmigen Raum (17) ersetzt werden kann. 5
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß zwischen dem Baum und der Menge der Führungsrohre (14) eine Puffereinheit für die Fäden angeordnet ist. 10
4. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jedes Umlenkglied (22) einer besonderen Umlenkwand (33) zugeordnet ist (Figur 3). 15
5. Vorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß jedes Umlenkglied (22) einem Fedensammelraum (30) zugeordnet ist (Figuren 6). 20
6. Vorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der luftdicht abgeschlossene, kastenförmige Raum (17) eine Mehrzahl von Abteilen hat, denen jeweils eine eigene Zuführleitung (18) für Druckluft zugeordnet ist, wobei die Zuführleitung (18) Mittel zum Einstellen des eintretenden Luftdurchsatzes aufweist. 25

Revendications

1. Dispositif d'entraînement des fils (11) et/ou des fils cassés (111) qui se déroulent entre une ensouple et un bobinoir (13), comprenant un tuyau de guide (14) pour chaque fil (11-111), tous ces tuyaux de guide (14) étant très voisins l'un à l'autre et chaque tuyau de guide (14) présentant un tuyau de transport (32) qui présente à son tour des moyens d'aspiration et d'éjection du fil actionnables à temps et associés à des moyens de relèvement des fils cassés (111), les moyens d'aspiration et d'éjection du fil susdits étant associés à une chambre en caisson (17) étanche, caractérisé en ce qu'il comprend des moyens de freinage et d'accélération contrôlée de l'ensouple et du bobinoir (13), la chambre en caisson étanche susdite contenant plusieurs tuyaux de guide (14) et étant mise temporairement sous pression, les moyens d'aspiration et d'éjection du fil susdits étant constitués par des trous d'injection (21) qui relie en angle la chambre en caisson (17) susdite avec l'intérieur de chaque tuyau de transport (32). 30
2. Dispositif selon la revendication 1, caractérisé en ce que chaque tuyau de transport (32) est remplaçable par l'extraction de la chambre en caisson (17). 35
3. Dispositif selon la revendication 1 ou 2, caractérisé en ce qu'il y a un groupe d'accumulation des fils entre l'ensouple et les tuyaux de guide (14). 40
4. Dispositif selon l'une ou l'autre des revendications précédentes, caractérisé en ce que chaque déviateur (22) est associé à un cloison de déviation spécifique (33) (figure 3). 45
5. Dispositif selon l'une ou l'autre des revendications précédentes jusqu'à 4, caractérisé en ce que chaque déviateur (22) est associé à une chambre de récolte (30) (figures 6). 50
6. Dispositif selon l'une ou l'autre des revendications précédentes, caractérisé en ce que la chambre en caisson (17) étanche présente plusieurs compartiments, à chacun desquels étant associé un conduit d'injection (18) d'air sous pression, ce conduit (18) étant pourvu de moyens de réglage du débit de l'air entrant. 55





