EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
03.04.1996 Bulletin 1996/14

(21) Application number: 91201570.8

(22) Date of filing: 20.06.1991

(54) Machine for preparing yarn packages and corresponding method
Maschine zur Vorbereitung von Fadenspulen und entsprechendes Verfahren
Machine pour préparer des bobines et méthode correspondante

(84) Designated Contracting States:
CH DE FR GB LI

(30) Priority: 29.06.1990 IT 2081290

(43) Date of publication of application:
02.01.1992 Bulletin 1992/01

(73) Proprietor: SAVIO MACCHINE TESSILI S.r.l.
I-33170 Prodenone (IT)

(72) Inventors:
• Badioli, Roberto
  I-33170 Prodenone (FR)

• Quaia, Amedeo
  I-33080 Porcia-Pordenone (FR)
• Bertoli, Luciano
  I-33170 Prodenone (FR)

(74) Representative: Fusina, Gerolamo et al
Ing. Barzanò & Zanardo Milano S.p.A,
Via Borgotuovo, 10
I-20121 Milano (IT)

(56) References cited:

• PROFS

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

This invention relates to high-quality yarn production by the integrated spinning and winding process, in which the yarn is produced in the first stage generally in a ring spinning machine, whereas in the second stage the produced yarn is rewound to remove or at least considerably reduce its defective portions in order to obtain a product which is of good quality both in terms of its appearance and in terms of its mechanical strength.

The winding process is much faster than the spinning process and therefore a small number of winding stations is able to wind or rewind the yarn produced in a much higher number of spinning stations producing a large number of wound yarn packages which are then combined into a smaller number of larger-size bobbins which represent the final product of the spinning-winding machine.

For the winding stage the packages produced in the spinning station must be presented to the winding stations with a yarn end in a predetermined position, this being generally a vertical position with the yarn end inserted through the upper aperture of the tube which forms the core of the package.

The winding machine is thus able to automatically grasp the yarn end and commence its rewinding to form the bobbin.

Currently available spinning-winding machines are characterised by a large number of spinning stations of up to one thousand or more, but only a small number of winding stations of the order of some tens, between which the empty tubes recycled from the winding machine for receiving the new wound packages and the yarn-wound packages to be rewound are conveyed. In order to reduce the work load this conveying together with the prearranging of the packages is handled in recently designed spinning-winding machines by automatic conveyor devices of various designs which limit the work of the operators to mere supervision and intervention in the case of possible machine malfunction.

The winding stage generally has a higher capacity than the spinning stage to allow the winding machine to handle the yarn production without any build-up during its operation.

The problem of conveying the packages and tubes was dealt with up to a few years ago by interposing truck-mounted bins between the two stages to randomly receive the full packages or empty tubes, and from which they were withdrawn by loading and arranging devices or more simply by the operators themselves.

The winding machine discharges not only tubes completely empty of yarn for recycling to the spinning machine, but also a small but not negligible number of tubes not completely empty of yarn, from which the automatic winding machine is unable to take up further yarn because the end is no longer recoverable by the devices with which each station is equipped.

These irregular packages from which part of the yarn cannot be unwound arise because of imperfect package winding during the spinning operation, resulting in successive yarn turns becoming engaged under slack turns which have been previously wound, so that when these turns are unwound in the winding machine they become blocked with the result that the yarn breaks at a point prior to the path through which the yarn is under the control of the winding members, and along which yarn continuity can be automatically restored by splicing.

These tubes have to be selected, recovered and fed to the package arranging device in order to use up the yarn still wound on them by finding its end and then refeeding them to the winding machine.

The known art comprises a large number of spinning-winding machine arrangements.

According to German patent No. 3235442 of Murata Kikai, the packages and tubes are conveyed between the spinning and winding machines with the aid of disc supports provided with a tube engagement peg, the discs being placed on conveyor belts.

US patent No. 3941323 of Savio describes a device for preparing wound packages for rewinding, including searching for, preparing and retaining the yarn end. USA patent No. 4432196 of the same proprietor describes a device for conveying packages between the two stages, USA patent No. 4571931 of Schlafhorst describes a transfer device between the spinning and winding machines which acts as a buffer store between the two machines and feeds the packages to the winding machine when requested by the winding stations. This device also includes means for prearranging the packages.

A spinning-winding process according to US-A-45 71931 provides:

- drawing the manufactured bobbins from a conveyor, by a gripper 60,
- preparing such bobbins by suction, in order to insert the thread end into the tube of the respective spool,
- delivering the prepared spools to a spool storage magazine. Such device is constituted by a circular magazine rotating around a vertical axis. The prepared spools are delivered to a belt conveyor,
- delivering the prepared spools to the winding units according to the requirements of the winding stations that have a void position in their circular winding magazines; the spools are let fall on such belt conveyor and are conveyed laid down in casual horizontal position. From the conveyor to said magazine the spools are let fall in vertical position.

The proposed methods include a large variety of conveyor systems, namely smooth conveyor belts on which the packages are either laid on their sides or supported by said discs, conveyor belts provided with fixed vertical pegs for engaging the tubes and packages in a vertical position, sector elevators and conveyors, and gripping devices, generally combined with each other.

The machine for preparing packages or bobbins according to the invention is described with reference to
a typical embodiment shown in Figures 1 to 4 by way of non-limiting example.

Figure 1 is an overall view of the machine according to the invention together with a spinning and a winding machine.

The spinning machine 1 consists of a plurality of ring spinning stations 2, in which the feed sliver is worked to produce yarn which is collected in the form of packages 3 located in the bottom of the unit.

The spinning stations 2 can be disposed on one or both faces of the spinning machine to form spinning faces.

Each spinning face is provided with devices 4 for doffing the complete packages and replacing them with empty tubes on which the yarn is then wound to form new packages, and a device 5 for conveying said packages and said empty tubes. According to a preferred embodiment the conveying device 5 consists of a belt conveyor driven with stepwise movement and provided with pegs 6 designed to hold in a vertical position the packages to be unloaded from the spinning machine and the empty tubes to be loaded onto it. The even numbered pegs are intended to receive the product packages and the odd numbered pegs are intended to receive the empty tubes or vice versa.

The doffing operation consists essentially of the following procedure. When the spinning section has completed the packages to the desired wound length and these are to be doffed and replaced with empty tubes, the doffing device 4 rises and moves its gripper members 7 over the top of the packages 3, represented by the top of the tube, and withdraws them by raising said packages from the spinning machine, moving them outwards and then lowering them onto the even numbered pegs 6 of the conveyor 5.

European patent application EP-A-0 290 063 of the present applicant describes gripper members for the doffing operations within a spinning machine.

The gripper members 7 are then released to leave the packages on the even pegs, and the doffing device is then raised through a small distance. The conveyor 5 is advanced through one step so that its gripper members are now in a position corresponding with the empty tubes disposed on the odd pegs. The device 4 is lowered to make contact with the top of the empty tubes and its gripper members 7 again made to operate on the empty tubes. The device 4 then undergoes the reverse movement to that previously described, to mount the empty tubes in place of the complete packages which have just been unloaded from the spinning units.

At the commencement of the doffing operation the odd pegs are occupied by the empty tubes to be supplied to the spinning machine, and on termination of the operation the even pegs are occupied by the complete packages to be fed to the winding machine.

Said packages are conveyed by advancing the conveyor 5 stepwise towards the transferring unit 9 which, in a preferred but not exclusive embodiment, consists of a stepping conveyor provided with gripper members 10 and having a portal configuration, which enables equipment and persons to pass between the spinning and winding machines.

According to the embodiment shown in Figure 1 by way of example, the grippers 10 grip the middle of the packages 3.

The conveyor 5 and transferring unit 9 move synchronously so that each new package 3 presented by the conveyor 5 is received by an open gripper 10 which is ready to close. When the package has been withdrawn by the grippers 10 of the transferring unit 9, and the transferring unit has advanced through one step to present a new gripper 10, the conveyor 5 is able to undergo a new advancement step to present a new package. The control sensors used can be mechanical feelers, photoelectric cells or equivalent sensing devices.

If the spinning machine 1 is constructed with two spinning faces and two conveyors 5, there will also be two transferring units provided. The transferring unit or units 9 discharge the packages 3 into a positioning funnel 11 which feeds the device 12 for rearranging the packages for their feed to the winding machine.

If there are two transferring units 9 and both the spinning faces have packages to be conveyed, the package conveying procedure can be implemented by firstly entirely discharging one spinning face and then the other or by alternately presenting packages from both conveyors 5 so that the positioning funnel 11 alternately receives packages from both faces one at a time.

In order to shorten conveying times, for the first method of operation the conveyor can be operated with double steps, whereas for the second method the two conveyors can be operated with single instead of double steps and staggering between the two faces the positions occupied by the complete packages and empty tubes.

Before the next doffing operation, other empty tubes are loaded onto the conveyor 5 in their assigned even or odd position.

The spinning and winding operations can be conducted independently by arranging a buffer store of packages between the two machines and supplying the feed funnel 11 of the device 12 from this store.

The package rearranging device 12 represents one of the most characteristic parts of the present invention and is described hereinafter in greater detail with reference to Figure 2. Its purpose is to rearrange the packages so that their yarn end is intact and free, and inserted by a predetermined length through the upper aperture of the tube which acts as the core of the package 3 fed to the winding machine. In this respect the winding machine is provided with means for taking up the yarn from this position and automatically commencing its rewinding.

The device 12 feeds the package carrier 13 which serves the winding machine 14.

The package carrier 13 consists of a conveyor in the form of a horizontally moving chain or belt carrying a series of preferably vertical or off-vertical cylindrical pockets which receive the rearranged packages from
the device 12 and convey them to all the constituent winding stations 15 of the winding machine 14.

The package carrier 13 is also one of the most characteristic parts of the present invention and is described hereinafter with reference to Figure 3 which shows it in greater detail.

Each winding station 15 is provided with a multiposition loading support 16 (in Figure 3 three positions are shown by way of example, namely one of the package being wound, one for a reserve package and one for the tube to be discharged) in which the packages to be unwound during winding are placed and from which the empty tubes are removed to be recycled upstream by a conveyor 17. The loader 16 is in the form of a rotatable support provided with slightly tapering pegs for centering the packages and tubes placed on them and for holding them in an approximately vertical position, and is driven with stepwise rotation to move into the working state the position already provided with a package to be unwound, so that as soon as one package is empty another can be immediately worked without even having to wait for the time required for reloading a new package fed by the package carrier 13.

The empty tubes and defective packages are expelled by a mechanism 18, consisting for example of a cam-controlled rod which removes the tubes from their pegs to discharge them onto the tube recycle conveyor 17. Within the path of this conveyor there is inserted a selector 19 for selecting empty tubes and packages still containing a residual yarn winding. The selection can be made for example by the device in accordance with U.S. patent No. 4,871,072 of SAVIO S.p.A.

The empty tubes are recycled to the spinning machine by the conveyor 20 whereas the packages containing a residual winding are conveyed to the collection bin 22 by the conveyor belt 21.

If completely empty, the tubes recycled to the spinning machine are fed to the vertical belt 23 which conveys them to the loading station for the spinning machine conveyor 5, whereas if they contain wound yarn residues they are discarded to be cleaned separately.

Figure 2 shows the device 12 for preparing the package in order to prearrange it for its subsequent rewinding.

The funnel 11 contains the package 3 originating from the spinning stage either directly via the transferring unit 9 or from a further conveyor which withdraws from a buffer package store if the spinning and winding stages are not directly connected.

The door 31 allows the package 3 to fall into the underlying compartment 32 after a control sensor has provided a signal to the effect that this compartment is free of packages. In this respect, the device 12 consists of a fixed cylindrical tank comprising a circular wall 33 and a flat bottom 34, and within which a drum 35 rotates about the axis 36.

The drum 35 is provided with a series of compartments which rotate with it to carry the packages into a plurality of stations in which the preparation stages arc carried out.

In the position occupied by the compartment 32, sensor means 37 such as photoelectric cells or mechanical sensors check whether the compartment is occupied by a package. If the compartment is free the sensors cause a new package to be loaded from the overlying funnel 11, whereas if the compartment is occupied they provide the enabling signal for the forward rotation of the compartment.

The drum therefore rotates to move the said compartment into position 38 in which the first preparation stage takes place, in accordance with Figure 2A.

In the station 38 there is a live centre with a conical cavity 39 driven by a motor not shown in the figure, and against which the package is pressed and centered by an axially mobile idle centre 40.

When the package 3 is locked between the live centre 39 and idle centre 40 the live centre 39 is rotated to unwind the yarn wound on the lower end of the package 3, as normally it has to be.

During the spinning stage, as the packages are produced the last yarn turns are wound on the lower end of the tube and the package is then freed by tearing the yarn during the doffing operation.

By the effect of both the counter-rotation and the suction provided by the nozzle 41 disposed in the bottom of the compartment, the yarn end is taken in by the nozzle 41 and cut with the scissors 42. That portion of yarn which may have been damaged at the end of spinning or during doffing is thus removed.

The yarn end is now parallel to the package axis.

The drum now moves to the second station, which provides a further search for an extending yarn end in case the first operation had been unsuccessful, for example because the yarn end had not been correctly wound on the tube base.

In the second station 43 (Figure 2B) there are a rotating live centre 44 with a conical cavity and an idle centre 45 which moves axially to centre and lock the package 3. These are similar to those of the first station but are rotated in the direction of the package winding, to thus wind the yarn.

When the live centre 44 and idle centre 45 have been moved towards each other to lock the package 3, this is rotated while a claw-shaped implement 46 is slid slowly downwards in contact with the surface of the package, which as it rotates applies the yarn to the claw, so unravelling the package yarn end, releasing it and making it parallel to the package axis. The claw-shaped implement 46 is slightly pressed against the package and moved slowly downwards along the guide 47 parallel to the tube axis. The package rotates in the direction of the winding, causing the yarn to surmount the claw 46 as the speed of advancement of the claw is less than the axial speed at which the wound yarn turn proceeds.

The drum then moves to the third preparation station 48 (Figure 2C).

The suction nozzle 49, comprising a suction slit 50 and a curved body 51 extending as far as the suction manifold, is moved up to the package 3 and draws in the
yarn end. The curved body 51 comprises a slit 52 along the interior of its curve so that yarn for which the yarn end has entered the manifold re-emerges to take the path 53.

The package 3 is then advanced to the fourth preparation station 54, while still leaving the yarn end captured in 53. The yarn moves into the position shown by the dashed line and enters the lead-in 55.

Said lead-in comprises a yarn presence sensor 56 which notifies when the yarn end has been received.

In position 54 the package 3 rests with the base of its tube in a position corresponding with a suction nozzle 57 comprising a conical lead-in for its correct centering.

When enabled by the sensor 56, on sensing the presence of yarn in the V-shaped lead-in 55, a scissor cutter 58 disposed in proximity to said lead-in is operated to cut the yarn. The thus released yarn end is drawn into the interior of the package tube by the effect of the suction through the nozzle 57, which is activated by a solenoid valve 59 operated when the sensor 56 enables the cutting of the yarn end.

The package is now rearranged for use in the winding operation.

The described yarn preparation procedure in terms of the searching for the yarn end is similar in its essential lines to that described in the cited USA patent No. 3941323.

The drum then advances into the fifth station 60, in which a drop 61 operated by a pneumatic piston 62 is provided and when enabled by the sensor 56 opens under the control of the underlying device 13. The package 3 rearranged for the rewinding of its yarn is thus transferred to the device 13.

If in contrast the sensor 56 does not give the enabling signal for the discharge of the package because it has not sensed yarn presence, the package is conveyed through the stations 54 and 60 without being discharged, and is moved beyond the path of the device 12.

The distance between the package 3 and the scissor cutter 58 must be such that a sufficient yarn end length is left for it to penetrate into the tube by a sufficient length, preferably by 2/3 of its length.

Any package which on the basis of the sensing operation by the sensor 56 has not been properly prepared is recirculated stepwise until it reaches the position of the compartment 32, to recommence the cycle.

This event is recorded in the machine control memory, and any compartment occupied by a recycled package is kept available for it for a further one or at the most two revolutions.

After one or two repetitions of the operation, the occupied compartment is freed in a subsequent station, for example 63, provided with a drop similar to 61 which discharges the unprepared package into a discarded package box, not shown in the figure, via a lead-in 64.

The device 12 operates with the loading position 32 and its five preparation stations always occupied by packages and advances one step each time the subsequent device 13 requires a package from it because it has a free position to occupy. The device 12 therefore operates in line with the subsequent device 13.

The further available stations, for example from 65 to 68, are used for feeding packages not completely empty of yarn to undergo preparation for rewinding, and from which the yarn end must be recovered in order to be able to recycle them to the rewinding.

Figure 3 shows the package carrier 13.

This consists of a belt 70 of vertical or slightly off-vertical axis driven by pulleys rotated by a motor not shown in the figure, and carrying a series of flared pockets 72 having a bottom aperture 73 which can be opened on command when in a position corresponding with the loaders 16 which, as stated by way of example heretofore, comprise a free peg 74 to be loaded with a new package while the adjacent peg 75 is already provided with a package being unwound, and the peg 76 carries a tube to be discharged.

In correspondence with the peg in position 74 there is a chute-shaped lead-in 77 which guides the package onto said peg, which is offered to it.

The spinning-winding machine as heretofore described results in considerable yarn production advantages, as will be apparent from the description of the spinning-winding procedure.

According to the present invention the packages are conveyed in such a manner as to maintain the pockets 72 and at least one of the pegs of the loader 16 of each spinning station always filled with packages prearranged for winding. The winding procedure is therefore over a considerable period independent of the times required for the delivery of new packages by the spinning machine, and is not affected by any build-ups in the conveying between the two stages, which work on hundreds of full packages and empty tubes per hour of operation, so allowing such build-ups to be remedied without influencing the winding stage.

If the package loader 16 contains three or more pegs, the package can be changed in it by firstly removing the emptied tube and then replacing it with a new prearranged package, or vice versa. If the loader has only two positions the emptied tube must be firstly removed and then replaced with a new package. In both cases the other position carries the already present package into its working position without any delay.

The conveyor 13 is always kept moving. This movement can be slow and continuous, or can be stepwise.

The two methods are equivalent because of the flaring of the pockets 72 and the lead-in 77, allowing discharge during movement both from the swing door 61 and from the openable base 73. Figure 4 shows the pocket container 72 in greater detail.

Each pocket container 72, fixed to the belt 70, is provided with a base 73 which can be opened by an electromechanical release device operated by the loaders 16 each time they rotate. When a rotation has taken place, an operating rod for the release device - of conventional type and therefore not shown in the figures - is extended so that it engages the first container 72 presented, so
opening its base 73. This rod then retracts until it is again triggered.

As already described, the pocket 72 travels along its path normally provided with a package 3 which rests on the base 73. Detecting sensors are located along the path of the pocket 72 just prior to where it passes under the position in which the package is discharged from the position 60 of the package prearranging device 12.

The sensor 78, for example a magnetic sensor which detects the presence of a metal projection on the upper part of the pocket, indicates the presence of the pocket which is being moved into the position for receiving the package, and the sensor 79, for example a flexible rod, determines whether a package is already present or whether the pocket is empty.

If the sensor 78 detects the presence of the pocket and the sensor 79 detects that the pocket is empty, the discharge command is fed to the drop 61.

When the position 60 has been discharged, the device 12 is rotated through one step, so that package prearranging is resumed and another package is introduced in position 32.

Until position 60 is released of its prearranged package, the device 12 is kept at rest and cannot receive further packages.

The pocket container 72, loaded with its package by 61, continually travels along the face of the winding machine 14 on the belt 70 until a loader 16 requests its package and causes the base 73 to open, so that the package 3 falls into the lead-in 77 and then onto the peg 74. The pocket 72 continues along its path in an open configuration until it encounters an inclined surface 80 which resets the base 73 by snap-closing it. This resetting member is located prior to the sensors 78 and 79, which themselves precede the position for loading by 12.

The package carrier 13 preferably has a number of pockets equal to a multiple of the number of winding stations, namely two or three times, to ensure a whole number of reserve packages. The remaining part of the conveying procedure is therefore in a direct line to the winding machine without the need for intermediate buffers. The conveying procedure operates such that the available positions of the package carrier 13 are always kept engaged, and its request for packages extends upstream as far as the doffing device, which is therefore dependent on it, leaving aside the intrinsic capacity of the intermediate conveyor members. In the device and method according to the invention, the operations involved in the prearranging and conveying of the packages are conducted with the packages always in a substantially vertical position, so obviating any need for handling to orientate them correctly for winding.

Claims

1. A method of preparing yarn packages and conveying the prepared yarn packages to the winding stage comprising the following steps:

   - a) prearranging packages of yarn having a core and produced during spinning by inserting a yarn end through the upper cavity of a yarn tube, wherein the said prearranging step comprises rotating the yarn package in an opposite direction to the yarn winding and searching for the yarn end by a suction nozzle (41) disposed in proximity to a base of the yarn tube, said rotation being carried out maintaining the yarn package centred between centring means (39,40), rotating the prearranged yarn package in the direction of the yarn winding and scanning the external surface of the yarn package with a claw-shaped implement (46), said rotation being carried out maintaining the yarn package centred between centring means (44,45), so that the yarn end is arranged parallel to the yarn package axis, retaining the yarn end by a curved suction nozzle (49), cutting the yarn to length and then cutting the cut yarn end into the upper cavity of the tube which forms the core of the yarn package;

   - b) sensing whether the yarn end has been grasped by a suction means during said prearranging step, and recycling the yarn package for which the yarn end has not been grasped back to said prearranging step;

   - c) conveying the prearranged yarn packages to a yarn package carrier (13) at a winding station of a winding machine (14); and

   - d) fully loading the package carrier (13) to act as a buffer for the feed to the winding stations; wherein said prearranging and conveying steps, the packages are maintained in a substantially vertical position.

2. A method of preparing packages as claimed in claim 1, characterised in that the scanning of the external surface of the yarn package with a claw-shaped implement (46) is carried out with a speed of advancement of the claw (46) is less than the axial speed at which the wound yarn turn proceeds, so causing the yarn turn to surmount the claw (46).

3. A method of preparing packages as claimed in claim 1, further comprising the step that any yarn package that, on the basis of the sensing operation by sensor (56), has not been properly prepared is recirculated, characterised in that this event is recorded in the machine control memory and that any compartment of the drum (35) occupied by a recycled package is kept available for a further one or at the most two revolutions.

4. A machine for preparing yarn packages comprising:

   - a) a yarn package prearranging device for prearranging packages of yarn produced in a preceding spinning step, said device comprising
means for withdrawing the yarn end wound on the packages originating from the spinning step, means \(39, 40\) for centring and rotating the yarn package in an opposite direction to the yarn windings, means for seeking the yarn end along the surface of the package by means of a claw-shaped implement \(46\) traversing the package surface so that the yarn end has been grasped, means \(44, 45\) for centring and rotating the yarn package in the direction of package winding during said traversing operation, means \(50\) for grasping the yarn end, means \(56\) for sensing whether or not the yarn end has been grasped, means \(57, 58, 59\) for inserting the yarn end through the upper cavity of a tube which forms the core of the prearranged package and means \(61, 62\) for discharging those prearranged packages for which the yarn end have been inserted through the upper cavity of the tube from the device; and

- b) a package carrier \(13\) for conveying the prearranged packages to a plurality of winding stations \(15\) for unwinding the yarn to form yarn bobbins, said package carrier \(13\) comprising a horizontal extending conveyor having substantially vertical pockets \(72\) and adapted to continuously travel along the winding stations to deliver the prearranged packages when requested.

5. A machine for preparing yarn packages as claimed in claim 4, characterised in that the package carrier has a number of pockets \(72\) equal to a multiple of the number of winding stations \(15\).

Patentansprüche

1. Verfahren zum Herrichten von Garnwickeln und zum Fördern der hergerichteten Garnwicke zu der Wickelstufe, das die folgenden Schritte umfaßt:

- a) Voranordnen von während des Spinnens erzeugten Garnwickeln mit einem Kern durch Einführen eines Fadenendes durch den oberen Hohlraum einer Garnhülse, bei dem der Voranordnungsschritt das Drehen des Garnwickels in einer Gegenrichtung zum Garnaufwickeln und das Suchen nach dem Fadengende durch eine in der Nähe einer Basis des Garnwickels angeordneten Saugdüse \(41\) umfaßt, und die Drehung, während der Garnwickel zwischen Zentriereinrichtungen \(39, 40\) zentriert gehalten wird, erfolgt, Drehen des vorangeordneten Garnwickels in Garnaufwicklerrichtung und Abtauen der Außenfläche des Garnwickels mit einem klauenförmigen Werkzeug \(46\), wobei die Drehung, während der Garnwickel zwischen Zentriereinrichtungen \(44, 45\) zentriert gehalten wird, erfolgt, so daß das Fadenende parallel zum Garnwickel angeordnet ist, Festhalten des Fadenendes durch eine gekrümmte Saugdüse \(49\), Abschneiden des Fadens auf Länge und dann Abziehen des abgeschnittenen Fadenendes in den oberen Hohlraum der Hülse, die den Kern des Garnwickels bildet,

- b) Feststellen, ob das Fadenende von einer Saugeinrichtung während des Voranordnungsschritts ergriffen wurde, und Zurückführen des Garnwickels, für den das Fadenende nicht erfaßt wurde, zum Voranordnungsschritt,

- c) Fördern des vorangeordneten Garnwickels zu einem Garnwickeltäger \(13\) an einer Wickelstation einer Wickelmaschine \(14\), und

- d) vollständiges Beladen des Garnwickeltägers \(13\), um als ein Puffer für die Aufgabe zu den Wickelstationen zu dienen, wobei während der Voranordnungs- und Förderschritte die Wickel in einer weitgehend senkrechten Lage gehalten sind.

2. Verfahren zum Herrichten von Wickeln nach Anspruch 1, dadurch gekennzeichnet, daß das Abtasten der Außenfläche des Garnwickels mit einem klauenförmigen Werkzeug \(46\) und einer Vorschubgeschwindigkeit der Klauen \(46\) erfolgt, die kleiner ist als die Axialgeschwindigkeit, mit der die Garnwicklung voranschreitet, um so zu bewirken, daß die Garnwicklung die Klau \(46\) übersteigt.

3. Verfahren zum Herrichten von Wickeln nach Anspruch 1, das ferner den Schritt umfaßt, daß irgendein Garnwickel, der auf der Grundlage des Abtastvorgangs durch einen Sensor als nicht ordnungsgemäß vorbereitet gilt, zurückgeführt wird, dadurch gekennzeichnet, daß dieses Ereignis im Maschinensteuerungsspeicher aufgezeichnet und daß jede von einem zurückgeführten Garnwickel belegte Kammer der Trommel \(35\) für eine weitere oder höchstens zwei Drehungen vorgehalten wird.

4. Eine Maschine zum Herrichten von Garnwickeln, umfassend

- a) eine Garnwickelvoranordnungsvorrichtung zum Voranordnen von Garnwickeln, die in einem vorgeordneten Spinnsschritt erzeugt wurden, wobei die Vorrichtung umfaßt eine Einrichtung zum Abziehen des Fadenendes, das auf dem vom Spinnsschritt kommenden Garnwickel aufgewickelt wurde, Einrichtungen \(39, 40\) zum Zentrieren und Drehen des Garnwickels in entgegengesetzte Richtung zu den Garnwindungen, eine Einrichtung zum Aufsuchen des Fadenendes längs der Wickeloberfläche mittels eines klauenförmigen Werkzeugs \(46\), das längs der Spulenoberfläche verfahren wird, so daß das Fadenende ergriffen wurde, Einrichtungen \(44, 45\) zum Zentrieren und Drehen des
Garnwickels in Richtung der Garnwickelwindungen während des Verfahrens, eine Einrichtung (50) zum Ergreifen des Fadenendes, eine Einrichtung (56) zum Feststellen, ob das Fadenende ergriffen wurde oder nicht, Einrichtungen (57, 58, 59) zum Einführen des Fadenendes in den oberen Hohlraum eines Rohrs, das den Wickelkern des vorangeordneten Wickels bildet, und Einrichtungen (61, 62) zum Abgeben jedes vorausgerichteten Wickels, für die das Fadenende durch den oberen Hohlraum der Hülse von der Vorrichtung eingeführt worden war.

- b) einen Wickelträger (13) zum Fördern der vorangeordneten Wickel zu einer Vielzahl von Wickelstationen (15) zum Abwickeln des Fadens zur Bildung von Garnspulen, wobei der Wickelträger (13) einen sich horizontal erstreckenden Förderer mit weitgehend vertikalen Taschen (72), der ständig längs der Wickelstationen zur Abgabe der vorangeordneten Wickeln bei Anforderung geführt werden kann, umfaßt.


Revendications

1. Procédé pour préparer des bobines de filé et acheminer les bobines de filé jusqu'à l'étage d'enroulement, ce procédé comprenant les étapes suivantes consistant à:

   a) accommoder préalablement les bobines de filé comportant un noyau et produites pendant le filage par insertion d'une extrémité de filé à travers la cavité supérieure d'un tube pour filé, ladite étape d'accommodement préalable consistant à faire tourner la bobine de filé dans un sens opposé au sens d'enroulement du filé et à rechercher l'extrémité de filé à l'aide d'une buse d'aspiration (41) disposée à proximité de la base du tube pour filé, ladite rotation étant effectuée en maintenant la bobine centrée entre des moyens de centrage (39, 40), à faire tourner la bobine de filé préalablement accommodée dans le sens d'enroulement du filé et à explorer la surface extérieure de la bobine de filé avec un organe (46) en forme de griffe, ladite rotation étant effectuée en maintenant la bobine de filé centrée entre des moyens de centrage (44, 45), de manière que l'extrémité de filé soit disposée parallèlement à l'axe de la bobine de filé, à retenir l'extrémité de filé à l'aide d'une buse d'aspiration courbée (49), à couper le filé à la longueur, puis à tirer l'extrémité de filé coupée dans la cavité supérieure du tube qui forme le noyau de la bobine de filé;

b) détecter si oui ou non l'extrémité de filé a été saisie par un moyen d'aspiration pendant l'étape d'accommodement préalable, et à recycler vers l'étape d'accommodement préalable la bobine de filé pour laquelle l'extrémité de filé n'a pas été saisie;

c) acheminer la bobine préalablement accommodée jusqu'à un porte-bobines (13) se trouvant à un poste d'enroulement d'une bobineuse (14); et
d) charger complètement le porte-bobines (13) de manière qu'il agisse comme un tampon pour l'alimentation du poste d'enroulement, les bobines, pendant les étapes d'accommodement préalable et d'acheminement, étant maintenues dans une position sensiblement verticale.

2. Procédé pour préparer les bobines selon la revendication 1, caractérisé en ce que l'on effectue l'exploration de la surface extérieure de la bobine de filé avec un organe en forme de griffe (46) à une vitesse d'avancement de la griffe (46) inférieure à la vitesse axiale à laquelle la spire du filé enroulé a lieu, en faisant ainsi en sorte que la spire de filé surmonte la griffe (46).

3. Procédé pour préparer des bobines selon la revendication 1, comprenant, en outre, l'étape par laquelle toute bobine de filé qui, sur la base de l'opération de détection par le capteur (56), n'a pas été correctement préparée est remise en circulation, caractérisé en ce que cet événement est enregistré dans la mémoire de commande de la machine et que tout compartiment du tambour (35), occupé par une bobine recyclée, est maintenu disponible pendant un autre tour ou au plus deux tours supplémentaires.

4. Machine pour préparer des bobines de filé comprenant:

   a) un dispositif d'accommodement préalable de bobines de filé pour accommoder préalablement des bobines de filé produites au cours de l'étape de filage précédente, ledit dispositif comprenant un moyen pour extraire l'extrémité de filé enroulée sur les bobines provenant de l'étape de filage, des moyens (39, 40) pour centrer et faire tourner la bobine de filé dans un sens opposé au sens des enroulements de filé, un moyen pour chercher l'extrémité de filé le long de la surface de la bobine au moyen d'un organe en forme de griffe (46) effectuant un mouvement transversal sur la surface de la bobine de manière que l'extrémité de filé soit saisie, des moyens (44, 45) pour centrer et faire tourner la bobine de filé dans le sens d'enroulement de la bobine pendant l'opération de
mouvement transversal, un moyen (50) pour saisir l’extrémité de filé, un moyen (56) pour détecter si oui ou non l’extrémité de filé a été saisie, des moyens (57, 58, 59) pour insérer l’extrémité de filé à travers la cavité supérieure d’un tube qui forme le noyau de la bobine accommodée préalablement et des moyens (61, 62) pour décharger celles des bobines préalablement accommodées pour lesquelles l’extrémité de filé a été insérée à travers la cavité supérieure du tube à partir du dispositif; et
b) un porte-bobines (13) pour acheminer les bobines accommodées préalablement jusqu’à une pluralité de postes d’enroulement (15) afin de dérouler le filé de manière à former des bobines de filé, ledit porte-bobines (13) comprenant un convoyeur s’étendant horizontalement et comportant des augets (72) sensiblement verticaux et adaptés pour se déplacer continuellement le long des postes d’enroulement afin de délivrer, sur demande, les bobines préalablement accommodées.

5. Machine pour préparer des bobines de filé selon la revendication 4, caractérisé en ce que le porte-bobines comporte un nombre d’augets (72) égal à un multiple du nombre de postes d’enroulement (15).