



(51) International Patent Classification:
B65H 67/08 (2006.01)

(21) International Application Number:
PCT/IB2017/057254

(22) International Filing Date:
20 November 2017 (20.11.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2016-746 30 November 2016 (30.11.2016) CZ

(71) Applicant: **MASCHINENFABRIK RIETER AG**
[CH/CH]; Klosterstrasse 20, 8406 Winterthur (CH).

(72) Inventors: **KUBOVY, Václav**; Pivovarska 38, 562 03 Ústí
nad Orlicí (CZ). **STEKLIKOVA, Jarmila**; Travník 1995,

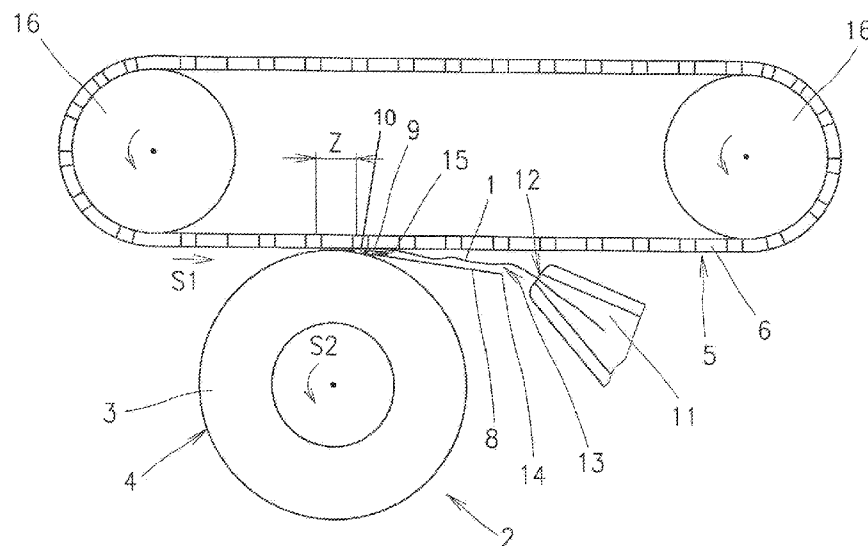
56002 Ceska Trebova (CZ). **ZARECKY, Radek**; Rybick-
ova 1042, 56002 Ceska Trebova (CZ).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

(54) Title: METHOD FOR DETECTING THE YARN END ON A BOBBIN IN A TEXTILE MACHINE PRODUCING OR PRO-
CESSING YARN AND A DEVICE FOR PERFORMING THE METHOD

Fig. 1



(57) Abstract: The invention relates to a method and device for detecting the yarn (1) end on a bobbin (2) in a textile machine producing or processing yarn, especially after the interruption of winding due to a yarn (1) breakage, when after the breakage the bobbin (2) is approached by a suction nozzle (11), into which the yarn (1) end is sucked from the rotating bobbin. A bar (8) and a movable means (6) having a carrier surface (5) approach the surface (4) of the package (3) on the bobbin (2). The movable means (6) is moving in a different direction as the rotating bobbin (2), whereupon the yarn (1) end is captured and withdrawn from the bobbin (2) by the movement of the movable means (6) and the yarn (1) end is carried to the suction nozzle (11).

EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

Method for detecting the yarn end on a bobbin in a textile machine producing or processing yarn and a device for performing the method

5 Field of the invention

The invention relates to a method and device for detecting the yarn end on a bobbin in a textile machine producing or processing yarn, particularly after interruption of winding caused by a yarn breakage, when after the yarn breakage the bobbin is approached by a suction nozzle, into which the yarn end is sucked from the rotating bobbin.

10

Description of related art

In the manufacture or processing of yarn, yarn is wound on a bobbin for further processing. Due to different circumstances, irregularities, etc. yarn breaks occur during winding yarn on the bobbin. After the yarn is broken, the yarn end is wound on the bobbin and for further operations on the machine, such as resumption of the winding of the yarn, it is necessary to detect the yarn end on the bobbin, grasp it and introduce it into the appropriate working means of the textile machine, which performs further operations to resume yarn winding. In principle, this can be done either manually or automatically, or also in certain semi-automatic modes.

20

In the field of automatic detecting the yarn end on a bobbin, the method that has been proven successful over the years is a method of detecting by means of a suction nozzle, whose suction mouth approaches the bobbin with the desired yarn end, whereby strong vacuum is supplied to the suction nozzle. During the subsequent rotation of the bobbin, the yarn end is sucked in from the surface of the bobbin, by which means the yarn end is detected, whereupon, while the bobbin continues to rotate, the detected yarn end is by a suitable motion of the suction nozzle moved to a desired position on the machine for carrying out further operations to resume winding.

25

30

However, a problem occurs with some types of bobbins in which the automated detecting of the yarn end on the bobbin by using strong vacuum is unsuccessful or has only little success. This may be caused by several factors, but one of the main factors is the

fact that during a yarn breakage a very short free end is created, or the yarn end or the end portion of the yarn may be partially trapped in the package, and so even strong vacuum from the known suction nozzle is not able to detect successfully such an end or end portion of the yarn on the bobbin and take it to a defined state or position. Another
5 disadvantage of the known solutions using strong vacuum is their high energy intensity required to create this strong vacuum.

DE102016203066 discloses a device for detecting the yarn end on a package on a bobbin in a weft winding machine, in which the package gets into contact with an excita-
10 tion surface of a textile made of synthetic fibers, which serves to excite the free yarn end on the package, whereupon this free yarn end on the package is sucked by another rotation of the bobbin into the suction aperture assigned to the circumference of the package on the bobbin, by which means this yarn end is detected for further operations. The disadvantage of this arrangement is relatively low reliability of the detecting process
15 for firmer packages, such as those produced on ring spinning machines, as well as a risk of damaging the package by the contact with the excitation surface. Another short-coming is the relatively high amount of the suction air required for sucking in the excited yarn end from the surface of the bobbin to the suction nozzle.

20 **Summary of the invention**

The aim of the present invention is to eliminate or at least reduce the drawbacks of the background art, especially to increase the effectiveness of automated detection of the yarn end on a bobbin.

25 The aim of the invention is achieved by a method for detecting a yarn end on a rotating bobbin in a textile machine producing or processing yarn, after the interruption of winding due to a yarn breakage, wherein after the yarn breakage the rotating bobbin is approached by a suction nozzle, into which the yarn end is sucked from the rotating bobbin, which is characterized in that

- 30 • a bar and a movable means having a carrier surface approach the surface of the package on the bobbin;

- wherein the movable means is moving in a different direction as the rotating bobbin, whereupon the yarn end is captured and withdrawn from the bobbin by the movement of the movable means, wherein the yarn is drawn within a space between the movable means and the bar; and
- 5 • the yarn end is carried to the suction nozzle, into which it is subsequently sucked by the stream of the sucked-in air in the direction away from the movable means to a defined position in the suction nozzle for further operation.

The aim of the invention is as well achieved by a device for detecting the yarn end on a rotating bobbin in a textile machine producing or processing yarn after the interruption of winding of the yarn onto the bobbin due to a yarn breakage, which comprises in a suction nozzle alignable with a package on the rotating bobbin and connected to a vacuum source, which device is characterized in

- movable means having a carrier surface capable of approaching the surface of the package on the bobbin,
- whereby the movable means is movable in a different direction as the rotating bobbin in order to capture the yarn end and withdrawn it from the bobbin; and
- a bar which is provided between the surface of the package and the carrier surface of a movable means so that a captured yarn can be led between the bar and the carrier surface to the suction nozzle.

The advantage of the invention is a substantial increase in reliability of detecting the yarn end on the bobbin, while using a considerably lower vacuum than is usual in solutions according to the background art, which applies also to the bobbins where the yarn end is not only wound on the bobbin, but it is even “trapped” in the package, and so it resists being sucked in by strong vacuum using the existing technology.

Preferably, the movable means is perforated and air is sucked by a suction nozzle through the movable means to capture the yarn end and withdraw it from the bobbin. This advantageously improves the effectiveness of detecting and capturing the yarn end on the bobbin.

Preferably, the suction nozzle is arranged so that air is sucked in a space between the movable means and the bar. Thus, the suction nozzle can be arranged in the space between the rear edge of the bar and the carrier surface of the movable means or it can be located between the bar and the carrier surface of the movable means. In a preferred example of the invention, the bar is situated obliquely to the direction of the movement of the carrier surface. This measure enhances advantageously the suction effect of the air being sucked in by the suction nozzle on the yarn being in the space between the bar and the carrier surface.

Preferably, the bar is provided with a securing counter edge which advantageously restricts a reverse movement of the yarn from a space between the bar and the carrier surface. The securing counter edge could be composed of a bent front portion of the bar in the direction of the movement of the carrier surface, whereby the bar could be situated opposite the direction of the movement of the carrier surface. Alternatively, it could be created by another suitable method and/or is situated on another portion of the bar, e.g. in its middle portion, etc.

Preferably, the bar or the front edge of the bar has the width of the carrier surface of the movable means. The movable means could move in a direction opposite to the rotating bobbin and could be an endless movable belt or of a rotatable cylinder surface. It could be made from a textile material or leather or a synthetic material. These measures enhance the effectiveness of the inventive method.

The suction nozzle is preferably associated with an unillustrated sensor of the presence of yarn indicating that the yarn end has been sucked into the suction nozzle, which is at the same time a signal of successful detection of the yarn end on the bobbin, as well as a signal for subsequent operations aimed at the renewal of the winding of the yarn on the bobbin, i.e., e.g., to resume yarn production or yarn processing.

Brief description of drawings

The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which

Fig. 1 shows the general principle of the invention with a first embodiment of a movable means in the form of an endless movable belt without a front suction nozzle on the rear side of the movable means;

5

Fig. 2 shows the general principle of the invention with a second embodiment of the movable means in the form of an endless movable belt with the front suction nozzle on the rear side of the movable means; and

10 **Fig. 3** represents the general principle of the invention with a third embodiment of the movable means in the form of a rotatable cylindrical surface.

Same reference numbers are used for same features in different figures.

15 **Detailed Description of the invention**

A method for detecting the yarn end on a bobbin in a textile machine and a device for performing the method will be described with reference to an example of embodiment in a spinning machine producing yarn 1, which is wound on a rotating bobbin 2, which is
20 rotatably mounted in the machine structure of the textile machine. The yarn 1 being wound forms on the bobbin 2 a package 3 with a surface 4. The method and device can be also used in a textile machine processing yarn 1.

In the example of embodiment in Figs. 1 and 2, the movable means 6 is made as an
25 endless movable belt wrapped around at least two guide pulleys 16, at least one of which is connected to a rotation drive. In an unillustrated example of embodiment, the system of the pulleys 16 provided with a tensioning device to ensure that the required tension is maintained in the movable means 6.

30 In the exemplary embodiment in Fig. 3, the movable means 6 is provided as a cylinder surface which is rotatably mounted in the frame of the device for detecting the yarn 1 end and is coupled to a drive of its rotation.

According to a preferred embodiment, the carrier surface 5 has a surface structure that improves the adhesiveness of the detected yarn 1 to the carrier surface 5, e.g., if the movable means 6 is formed by an endless movable leather belt, it is advantageous for the carrier surface 5 to be subjected to a finishing process, such as grinding or another suitable technology for structuring the leather surface (surface wrinkling, hairing). For example, if the movable means 6 is provided in the form of a belt made of a synthetic material, the carrier surface 5 either has also been wrinkled by an appropriate technology, or it is smooth and adhesiveness between the carrier surface 5 and the yarn 1 end being detected is determined by the material composition of the movable means 6, by the surface treatment of the carrier surface 5, the material composition of the yarn 1, the yarn 1 hairiness, etc. However, the adhesiveness of the yarn 1 being detected to the carrier surface 5 must not be too great so that the yarn 1 can be successfully detected and, at the same time, relatively readily delivered to other means of the device according to the present invention in the further steps of the method according to the invention.

In the direction S1 of the movement of the movable means 6 when detecting the yarn 1 end on the bobbin 2 in the region of approaching the movable means 6 to the surface 4 of the package 3 on the bobbin 2 is aligned with a bar 8, which is with its front edge 9 situated opposite the direction S1 of the movement of the movable means 6 when detecting the yarn 1 end on the bobbin 2. The front edge 9 of the bar 8 has approximately the width of the carrier surface 5 of the movable means 6. Between the front edge 9 of the bar 8 and the carrier surface 5 of the movable means 6 is created a space 10 for capturing the detected yarn 1 end and leading it between the bar 8 and the carrier surface 5 during the passage of the yarn 1 end towards the suction nozzle 11, as will be described in more detail below.

The width of the yarn 1 end detecting zone on the bobbin 2 is determined by the width of the carrier surface 5 of the movable means 6, i.e. the dimension in the plane of the carrier surface 5 in the direction perpendicular to the direction S1 of the movement of the movable means 6. The length of the yarn 1 end detecting zone on the bobbin 2, i.e. the dimension of the detecting zone in the direction of the rotation of the bobbin 2, is determined by the mutual arrangement of the surface 4 of the package 3 on the bobbin

2 and the position of the space 10 between the front edge 9 of the bar 8 (which will be described below) and the carrier surface 5.

5 The above-mentioned suction nozzle 11 is by its mouth 12 associated with the space 13 between the rear edge 14 of the bar 8 and the carrier surface 5 of the movable means 6 or it is located between the bar 8 and the carrier surface 5 of the movable means 6. In the illustrated example of embodiment, the bar 8 is situated obliquely to the direction S1 of the movement of the carrier surface 5. This measure enhances the suction effect of the second stream of the air being sucked in by the suction nozzle 11 on the yarn 1
10 being detected in the space 13 between the bar 8 and the carrier surface 5.

The suction nozzle 11 is associated with an unillustrated sensor of the presence of yarn 1 indicating that the yarn 1 end has been sucked into the suction nozzle 11, which is at the same time a signal of successful detection of the yarn 1 end on the bobbin 2, as well
15 as a signal for subsequent operations aimed at the renewal of the winding of the yarn 1 on the bobbin 2, i.e., e.g., to resume yarn 1 production or yarn 1 processing.

In a preferred embodiment, the bar 8 is provided on its side adjacent to the carrier surface 5 with a securing counter edge 15, which has the same width of the carrier surface
20 5 of the movable means 6 and is directed against the direction S1 of the movement of the carrier surface 5 during detecting the yarn 1 end on the bobbin 2. The securing edge 15 restricts the possible reverse movement of the yarn 1 from the space between the bar 8 and the carrier surface 5, thus increasing the success of transferring the detected yarn 1 end from the bobbin 2 to the suction nozzle 11, as will be described in more detail hereinafter. In the illustrated example of embodiment, the securing edge 15 is
25 formed by bending the front portion of the bar 8 in the direction S1 of the movement of the carrier surface 5, and so according to the angle of the bending it may even extend the space 10 to a greater length of the carrier surface 5, than would be the space 10 defined only by the front edge 9 of the bar 8 and the carrier surface 5. In an unillustrated
30 example of embodiment, the securing edge 15 is created by another suitable method and/or is situated on another portion of the bar 8, e.g. in its middle portion, etc.

The whole above-described device for detecting the yarn 1 end on the bobbin 2 is mounted on an unillustrated manipulation means, by which the device for detecting the yarn 1 end on the bobbin 2 approaches the surface 4 of the package 3 on the respective bobbin 2 to assume the required position and reach the required distance of the carrier surface 5 and the space 10 from the surface 4 of the package 3 on the respective bobbin 2. For example, the manipulation means is part of an attending device, which is arranged movably along a row of workstations of the spinning machine, wherein each workstation comprises apart from other means also a winding device of yarn 1 on a bobbin 2. Preferably, the suction nozzle 11 is independently positionable between the position in which it is with its mouth 12 aligned with the carrier surface 5 of the movable means 6 and the position in which it is possible to deliver the yarn end 1 captured in the suction nozzle 11 to other working means of the textile machine to resume the winding of the yarn 1 on a bobbin 2, e.g. to resume the yarn 1 production.

The invention is based on the fact that the carrier surface 5 of the movable means 6 and the bar 8 approach the surface 4 of the package 3 on the bobbin 2 creating a space 10 in which the yarn end is detected and captured. During detecting the yarn 1 end on the bobbin 2, the carrier surface 5 is movable in the direction S1 in a different direction than the direction S2 and preferably in an opposite direction to the direction of S2 of the movement of the surface 4 of the package 3 on the bobbin 2 when detecting the yarn 1 end. The bobbin 2 therefore rotates in the direction S2. During detecting the yarn 1 end, the carrier surface 5 is advantageously in close proximity to the surface 4 of the package 3 on the bobbin 2, preferably not touching it so that the package 3 is not damaged. At the same time, however, the carrier surface 5 is as close to the surface 4 of the package 3 as possible, since it is true that the closer it is to the surface 4 of the package 3 the smaller the space 10 is and it is more likely that the yarn end 1 on the bobbin 2 is successfully detected and captured, especially in ring spinning machines.

As a result of rotating the bobbin 2 and the opposite or different direction of the movement of the carrier surface 5, the yarn end 1 is captured in the space 10 and by the movement of the movable means 6 it is withdrawn from the bobbin 2, whereby it still passes through the space 10, until the yarn end is delivered to the mouth 12 of the suc-

tion nozzle 11, into which it is sucked. When transporting the detected end of the yarn 1 to the suction nozzle 11, slippage may occur between the detected yarn 1 and the carrier surface 5 in the space 10, since due to the possible conical shape of the package 3 on the bobbin 2 it is not possible to completely harmonize the circumferential speed of the carrier surface 5 and the surface 4 of the package 3 of the bobbin 2, or a temporary increase in the tension in the captured end portion of the yarn 1 arises and, consequently, reaction force is created, acting against the direction of movement of the carrier surface 5, this reaction force being capable of breaking the captured end portion of the yarn 1. The risk of the detected yarn 1 end being pulled down back onto the bobbin, e.g., due to a part of the yarn 1 length being trapped in the package 3 on the bobbin 2, is further prevented by the action of a stream of the air being sucked in by the suction nozzle 11, or also by a certain adhesiveness of the yarn 1 to the carrier surface 5 and, last but not least, also by the securing counter edge 15 on the bar 8, particularly when the detected yarn 1 end is pulled down back onto the bobbin 2 as a result of the resistance against releasing the end portion of the yarn 1 from the bobbin 2 due to the yarn being trapped in the package 3, when a temporary increase in the tension in the captured end portion of the yarn 1 arises and, consequently, reaction force is created, acting against the direction of the movement of the carrier surface 5 and this reaction force is in some cases capable of withdrawing the captured end portion of the yarn 1 from the space 10 as far as to the bobbin 2. The suction of the yarn 1 into the suction nozzle 11 is subsequently indicated by the above-mentioned sensor of the presence of yarn 1 in the suction nozzle 1. From the suction nozzle 11 the detected yarn 1 end is subsequently delivered to the following means to renew the winding process or to resume the yarn 1 production.

According to the embodiment in Figs. 2 and 3, to improve the effectiveness of detecting the yarn 1 end on the bobbin 2, the carrier surface 5 is permeable to air and its rear side is in the region Z of the carrier surface 5 approaching the surface 4 of the package 3 on the bobbin 2 is aligned with a front suction nozzle 7 connected to the vacuum source, thereby creating the first stream of the air being sucked in. The front suction nozzle 7 is with its suction inlet assigned to the rear side of the movable means 6. Under the rear side of the movable means 6 we understand here the side of the movable means 6 op-

posite to the side that during detecting the yarn 1 end approaches the surface 4 of the package 3 on the bobbin 2, e.g. the rear side of the endless movable belt according to Fig. 2 or the inner area of the cylindrical surface if the movable means 6 is made as a cylinder according to Fig. 3, etc. The permeability of the carrier surface 5 to air is

5 achieved by, e.g., making the movable means 6, from a material which is air permeable, such as from various textiles, permeable plastics, and other suitable air-permeable materials. Optionally, the movable means 6 is made permeable to air by perforation, that is to say, by an appropriate system of through holes of a suitable shape, size and three-dimensional layout. In that case the movable means 6 may also be made from other
10 materials, which are not permeable to air, such as leather, impermeable plastics and other synthetic materials, metals, etc. Apparently, the permeability of the movable means 6 to the air may be solved by different methods and by using different materials of the movable means 6.

15 The method for detecting the yarn 1 end on the bobbin 2 modified by adding a front suction nozzle 7 consists in that in the described approaching position of the carrier surface 5 and the pressing line 10 to the bobbin 2, the yarn end 1 on the bobbin 2 is in addition acted upon by the first air stream being sucked in by the front suction nozzle 7 through the carrier surface 5. By rotating the bobbin 2, by moving the carrier means 5 and by the
20 first stream of the air being sucked in, the end of the yarn 1 is removed from the surface 4 of the package 3 on the bobbin 2 and is captured in the space 10, whereupon by a movement of the movable means 6 it is carried further through the space 10 as far as to the mouth 12 of the rear suction nozzle 11, which is in this example of embodiment the rear suction nozzle 11, into whose mouth 12 the yarn end is sucked in by the second
25 stream of the air being sucked in. Possible risk of the detected yarn 1 end being pulled down back onto the bobbin 2, e.g., due to a part of the yarn 1 length being trapped in the package 3 on the bobbin 2, is prevented by the space 10 itself and then by the action of the two streams of the air being sucked in, or, in case of need, by a certain adhesiveness of the yarn 1 to the carrier surface 5 and, last but not least, also by the secur-
30 ing counter edge 15 on the rectifying bar 8. The suction of the yarn 1 end into the rear suction nozzle 11 is subsequently indicated by the above-mentioned sensor of the presence of yarn 1 in the rear suction nozzle 11. From the rear suction nozzle 11 the

detected yarn end 1 is subsequently delivered to the following members to resume the winding process or the yarn 1 production.

The advantage of the present invention is a substantial increase in reliability of detecting the yarn end on the bobbin, while using a considerably lower vacuum than is usual in solutions according to the background art, which applies also to the bobbins where the yarn end is not only wound on the bobbin, but it is even “trapped” in the package, and so it resists being sucked in by strong vacuum using the existing technology.

10 **Reference numbers**

	1	Yarn
	2	Bobbin
	3	Package
	4	Surface
15	5	Carrier surface
	6	Movable means
	7	Front suction nozzle
	8	Bar
	9	Front edge
20	10	Space
	11	Rear suction nozzle
	12	Mouth
	13	Space
	14	Rear edge
25	15	Counter edge
	16	Guide pulleys
	S1, S2	Direction
	Z	Region

Claims

1. A method for detecting a yarn end on a rotating bobbin (2) in a textile machine producing or processing yarn (1) after the interruption of winding of the yarn onto the bobbin (2) due to a yarn (1) breakage, wherein after the yarn breakage the rotating bobbin (2) is approached by a suction nozzle (11), into which the yarn (1) end is sucked from the rotating bobbin (2), the method is characterized in that
- a bar (8) and a movable means (6) having a carrier surface (5) approach the surface (4) of the package (3) on the bobbin (2);
 - wherein the movable means (6) is moving in a different direction as the rotating bobbin (2), whereupon the yarn (1) end is captured and withdrawn from the bobbin (2) by the movement of the movable means (6), wherein the yarn is drawn within a space (13) between the movable means (6) and the bar (8); and
 - the yarn (1) end is carried to the suction nozzle (11), into which it is subsequently sucked by the stream of the sucked-in air in the direction away from the movable means (6) to a defined position in the suction nozzle (11) for further operation.
2. The method according to claim 1, characterized in that the movable means (6) is perforated and air is sucked through the movable means (6) to capture the yarn (1) end and withdraw it from the bobbin (2).
3. The method according to claim 1 or 2, characterized in that the suction nozzle (11) is arranged so that air is sucked in the space (13) between the movable means (6) and the bar (8) through which the yarn is drawn.
4. The method according to claims 1 to 3, characterized in that the bar (8) is provided with a securing counter edge (15) which restricts a reverse movement of the yarn (1) from the space (13) between the bar (8) and the carrier surface (5).
5. The method according to claims 1 to 4, characterized in that the movable means (6) is moving in a direction opposite to the rotating bobbin (2).

6. The method according to claims 1 to 5, characterized in that the moving means (6) is composed of an endless movable belt or of a rotatable cylinder surface.

7. The method according to claims 1 to 6, characterized in that indicating by a sensor which is associated in the suction nozzle (11) that the yarn (1) end has been sucked into the suction nozzle (11).

8. A device for detecting the yarn end on a rotating bobbin (2) in a textile machine producing or processing yarn (1) after the interruption of winding of the yarn onto the bobbin (2) due to a yarn (1) breakage, which device comprises a suction nozzle (11) alignable with a package (3) on the rotating bobbin (2) and connected to a vacuum source, the device is characterized in

- movable means (6) having a carrier surface (5) capable of approaching the surface (4) of the package (3) on the bobbin (2),
- whereby the movable means (6) is movable in a different direction as the rotating bobbin (2) in order to capture the yarn (1) end and withdrawn it from the bobbin (2); and
- a bar (8) which is provided between the surface of the package (3) and the carrier surface (5) of a movable means (6) so that a captured yarn can be led between the bar and the carrier surface (8) to the suction nozzle (11).

9. The device according to claim 8, characterized in that a suction nozzle (7) is provided inside the movable means (6) which is perforated and through which air is sucked to capture the yarn (1) end and withdraw it from the bobbin (2).

10. The device according to claim 8 or 9, characterized in that the suction nozzle (11) arranged in a space (13) between the rear edge (14) of the bar (8) and the carrier surface (5) of the movable means (6) or it is located between the bar (8) and the carrier surface (5) of the movable means (6).

11. The device according to claims 8 to 10, characterized in that the suction nozzle (11) is associated with a sensor of the presence of yarn (1) indicating that the yarn (1) end has been sucked into the suction nozzle (11).

12. The device according to claims 8 to 11, characterized in that the movable means (6) is an endless movable belt or of a rotatable cylinder surface.

5 13. The device according to any of claims 8 to 12, characterized in that the bar (8) is provided with a securing counter edge (15), which is composed of a bent front portion of the bar (8) and which restricts a reverse movement of the yarn (1).

10 14. The device according to any of claims 8 to 13, characterized in that bar (8) is situated opposite to the direction (S1) of the movement of the movable means (6).

15. The device according to any of claims 8 to 14, characterized in that the bar (8) is situated obliquely to the direction (S1) of the movement of the carrier surface (5).

15 16. The device according to any of claims 8 to 15, characterized in that the bar (8) or the front edge (9) of the bar (8) has the width of the carrier surface (5) of the movable means (6).

20 17. The device according to any of claims 8 to 16, characterized in that the movable means (6) is made from a textile material or leather or a synthetic material.

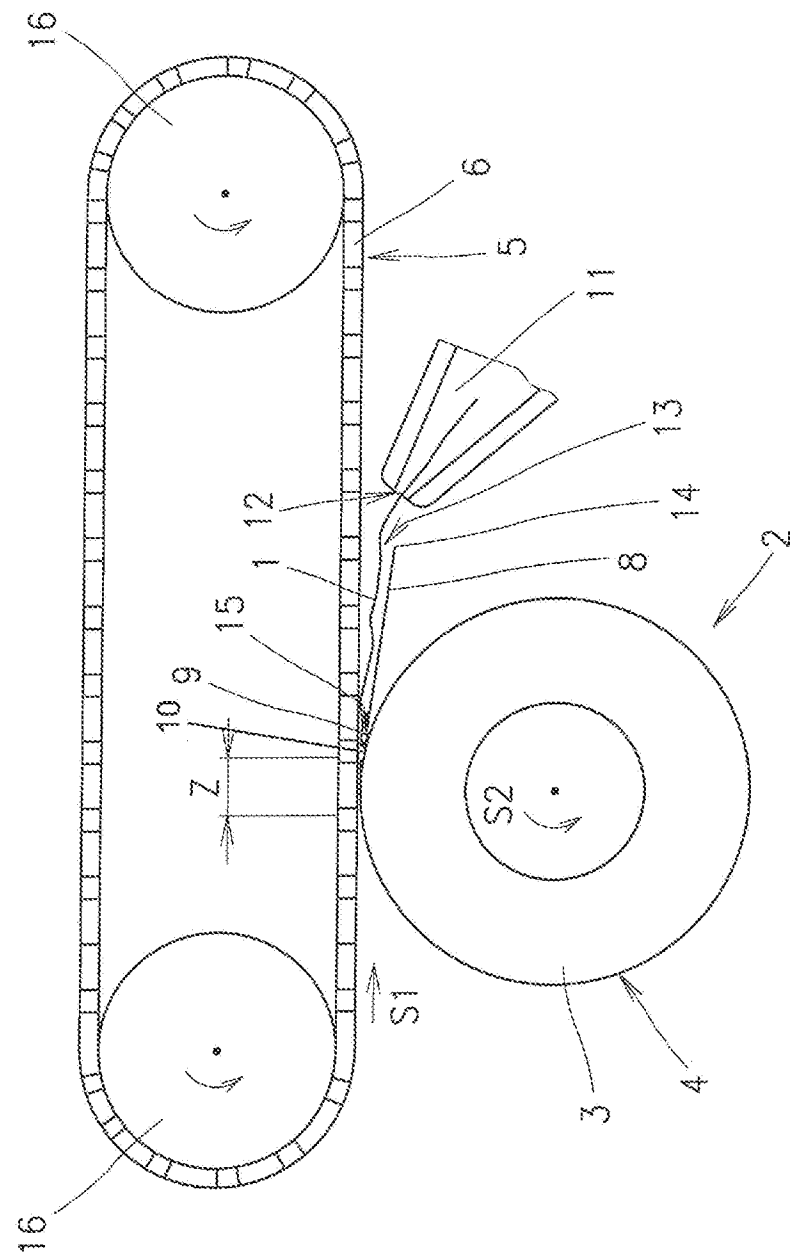


Fig. 1

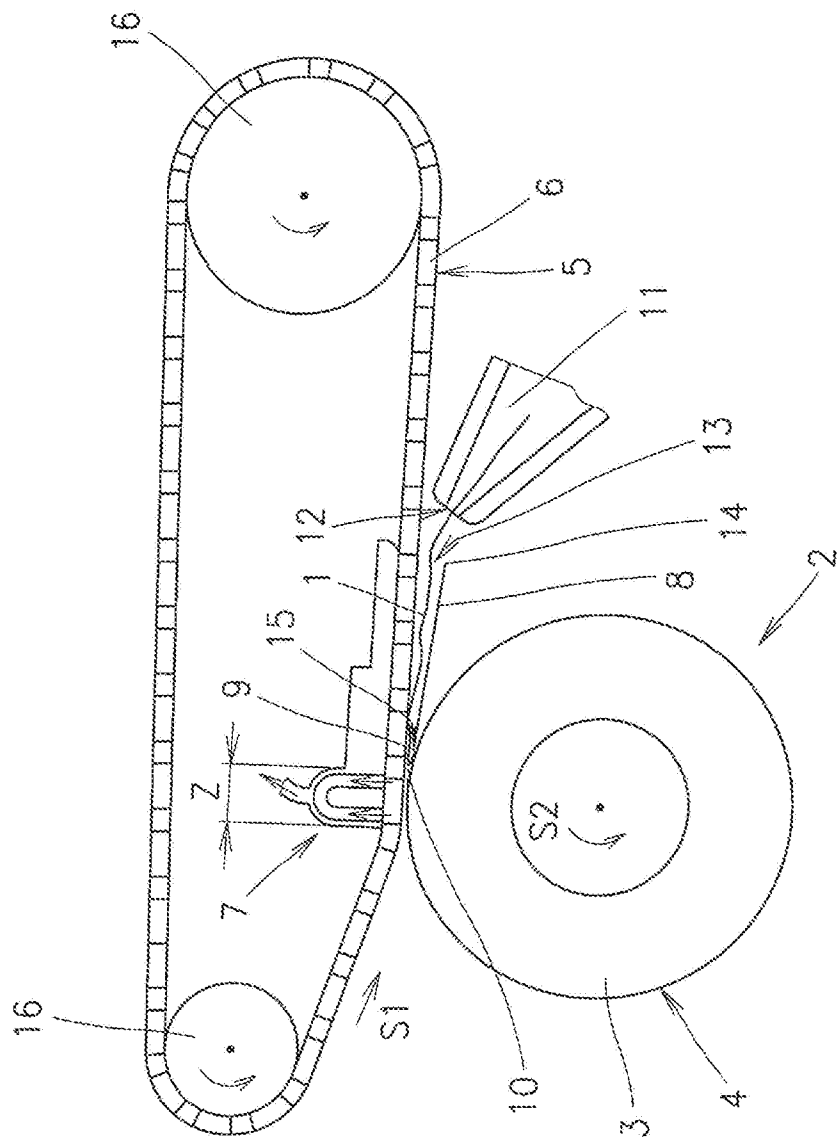


Fig. 2

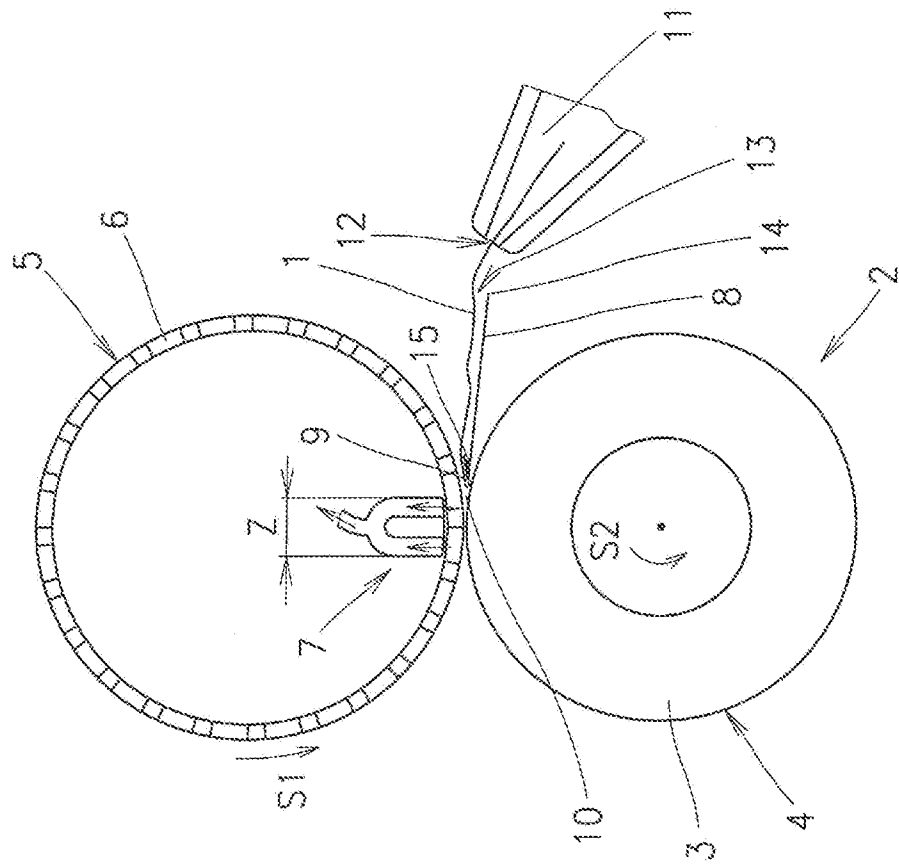


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2017/057254

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65H67/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	JP 2016 141561 A (MURATA MACHINERY LTD) 8 August 2016 (2016-08-08) figures -----	1,3-8, 10-17 2,9
X	JP H03 56771 U (-) 31 May 1991 (1991-05-31) figures -----	1,8
A	EP 0 493 859 A1 (TOYODA AUTOMATIC LOOM WORKS [JP]) 8 July 1992 (1992-07-08) column 2, line 55 - column 3, line 20 column 5, lines 30-40; figures -----	1-17
A	EP 0 581 077 A1 (SCHLAFHORST & CO W [DE]) 2 February 1994 (1994-02-02) column 6, line 45 - column 7, line 1; figures ----- -/--	1-17



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

29 January 2018

Date of mailing of the international search report

05/02/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Lemmen, René

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2017/057254

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP H10 139285 A (TORAY INDUSTRIES) 26 May 1998 (1998-05-26) abstract; figures -----	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2017/057254

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2016141561 A	08-08-2016	NONE	
JP H0356771 U	31-05-1991	JP H0356771 U JP H0729098 Y2	31-05-1991 05-07-1995
EP 0493859 A1	08-07-1992	EP 0493859 A1 JP H04241136 A	08-07-1992 28-08-1992
EP 0581077 A1	02-02-1994	CN 1087316 A CZ 9301338 A3 DE 4225349 A1 EP 0581077 A1 JP H06166470 A	01-06-1994 16-03-1994 03-02-1994 02-02-1994 14-06-1994
JP H10139285 A	26-05-1998	JP 3562177 B2 JP H10139285 A	08-09-2004 26-05-1998