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2013/08986 24 July 2013 (24.07.2013) TR
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- (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, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, 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.

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(54) Title: A BALLOON DIAMETER CONTROL UNIT FOR A CABLING APPARATUS

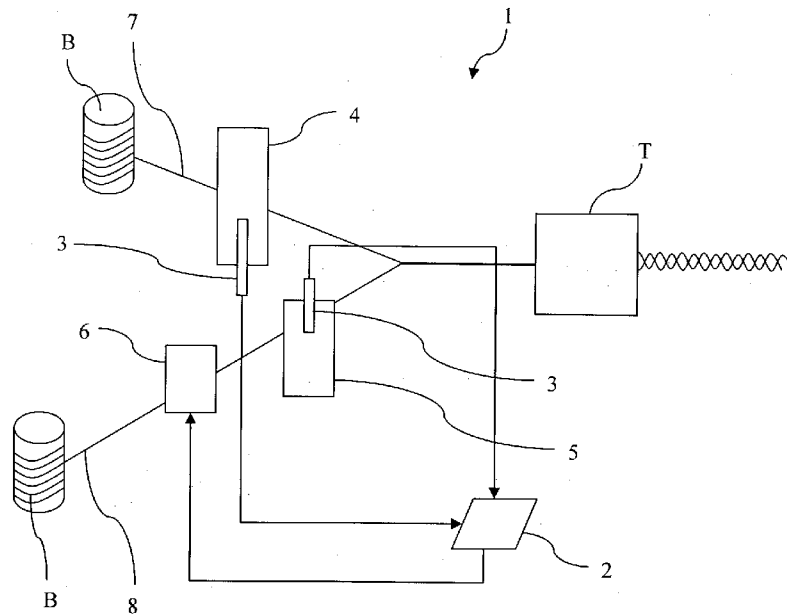


Figure 1

[Continued on next page]

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- Published:**
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 - *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(57) Abstract: The present invention relates to a balloon diameter control unit (1) which enables the balloon diameter to be directly controlled by means of position sensors (3) in a twisting machine for direct cabling. The present objective is to provide a balloon diameter control unit in order to control the diameter of the balloon formed during twisting with a feedback and thus to minimize the energy consumption.

DESCRIPTION

A BALLOON DIAMETER CONTROL UNIT FOR A CABLING APPARATUS

Field of the Invention

5 The present invention relates to a balloon diameter control unit which enables the balloon diameter to be directly controlled by means of the position sensors in twisting machines making direct cabling, and thus to decrease the energy consumption.

10 Background of the Invention

The first step performed in cord fabric production is to twist yarns to be used in the structure of the cord fabric. It was determined that the balloon effect occurring during this twisting process causes more energy consumption than required.

15 The current twisting machines making direct cabling performs twisting process of one outer yarn and one inner yarn on a regulator. Cabling is a process to provide more elasticity to two cords. The twisted yarns (cords) are placed inside the tire by being cabled in two or more layers, and this provides elasticity to the tire. While performing this, the inner yarn is fed towards the regulator from the
20 position called pot vessel. The outer yarn is fed from the creel. The yarn fed from the creel enters into the regulator with the yarn fed from the pot, and the twisted yarns are cabled on top of each other, and then the product is wound around the winding cylinder. Before the outer yarn is fed to the regulator, it enters into the spindle motor, and the yarn coming out of the disc on the spindle motor is directed
25 between the pot and the sheet limiting the position via the yarn twisting plate. A balloon is formed between the pot vessel and the sheet. A control about balloon diameter is not practiced. The balloon is formed depending on the speed applied in the machine and the dtex value of the product, and comprises the large part of the energy consumption. The energy consumption increases with the increasing
30 dtex value. Increase in speed and dtex caused by the centrifugal effect causes a direct increase in the energy consumption. At the same time, since feeding the

outer yarn is performed with only outer yarn brake control, no precaution can be taken against breaking or tension changes.

5 German Patent document no DE4220824, an application known in the state of the art, twister for pneumatic yarn spinning from fiber bundle- has two -twisters in series with polygonal yarn passage and final balloon limit. The twister has two twisting units. Their jets inject compressed air into yarn channels which act as eddy chambers, in series behind each other. A yarn balloon control is at the outlet of the second twister. The channel passing through, as the yarn passage, is
10 expanded into a polygonal cross section. The structure restricts the movement of the developing yarn, so that it travels on a straight line with limited ballooning movement.

The Great Britain patent document no GB389011, an application known in the state of the art, discloses improvements in spinning and/or twisting textile fiber and artificial silk. In spinning or twisting threads of natural fibers or of artificial silk, balloon forming and tangential breaking during the yarn passing through the rotating bobbin is enabled to be determined. By means of an adjustable yarn
15 guide, the balloon formation is controlled.

20 The biggest problem in applications known in the state of the art is that the outer yarn feeding system is only connected to brake. The brake is not an equipment that can response any problem occurring in outer yarn feeding. Furthermore, it is ineffective against the unnecessary loosening or narrowing occurring in case of
25 balloon formation. Balloon formation or the size of the balloon in the final product is ineffective after a certain point. It is expected that the said required maximum values are provided and it can adapt to the changing conditions after that.

30

Summary of the Invention

The present objective of the present invention is to provide a balloon diameter control unit in order to control the diameter of the balloon formed during twisting with a feedback created by sensors in regulator+spindle motors and thus to minimize the energy consumption.

5

Detailed Description of the Invention

“A balloon diameter control unit” developed to fulfill the objectives of the present invention is illustrated in the accompanying figure, wherein:

Figure 1 is the schematic view of the inventive balloon diameter control unit

10

The components shown in the figures are each given reference numbers as follows:

1. Balloon diameter control unit
2. Control card
- 15 3. Sensor
4. Regulator
5. Spindle motor
6. Outer yarn feeding motor
7. Inner yarn
- 20 8. Outer yarn

T. Twisting member

B. Reel

The inventive balloon diameter control unit (1) comprises a control card (2) which
25 receives the information about the coming angle of the outer yarn (8) sent to the twisting member (T) via sensors (3) located on the regulator (4) and the spindle motor (5), and therefore which controls the outer yarn feeding motor (6) in order to arrange the properties of outer yarn (8) such as its angle, tension that is effective in determining the balloon diameter value. In order to adjust the amount
30 of the yarn (7, 8) in the balloon formed around the pot, the control card (2)

arranges the outer yarn transmission speed of the outer yarn feed motor (6) with feedback in accordance with the information it receives from the sensors (3).

5 The angle difference between the outer yarn (8) exiting from the spindle motor (5) and entering the regulator (4) determines the status of the balloon around the pot. If this angle is above a certain level, the outer yarn (8) starts to wrapped around the disc surrounding the spindle motor (5), and this causes the balloon formed around to pot to become larger unnecessarily.

10 In the control system which the inventive balloon diameter control unit (1), a control card (2) controls the outer yarn feeding motor (6) according to the angle values of the regulator (4) and the spindle motor (5). The said control card (2) receives the required angle information from the regulator (4) and the spindle motor (5) via the sensors (3) located thereon, and controls the balloon. Therefore,
15 the diameter of the balloon is continuously kept at the desired level. By means of the said balloon diameter control performed by utilizing the information received from the regulator (4) and the spindle motor (5), it will not be affected from the maintenance need of the machine, maintenance need of the bearings in the spindle motor (5) or the style changes in the final product. Moreover, creating separate
20 formula for each dtex value will not be required.

Feeding outer yarn (8) is provided with the outer yarn (8) to be dispersed to the regulator (4) during the rotation of the spindle motor (5) in the state of the art. However in the inventive balloon diameter control unit (1), the outer yarn feeding
25 motor (6) enabling the outer yarn (8) to be fed to the twisting member (T) is preferred as a step motor in order to perform this feeding in a controlled way with pulses given to the motor.

The most important factor in balloon control is that the outer yarn (8) feeding is
30 performed in a controlled way. By this means, both a significant decrease such as 14-21% is observed in the energy consumption depending on the dtex value, and

breaking originating from the outer yarn (8) decreases nearly 80% since the outer yarn (8) feeding is provided through a step motor and with feedbacks from the sensor (3) in a controlled way.

CLAIMS

1. A balloon diameter control unit (1) which enables to control the balloon formed because of the angle difference between the outer yarn (8) exiting from the spindle motor (5) and entering the regulator (4) and becoming larger by the outer yarn (8) wrapping around the disc surrounding the spindle motor (5), and **characterized by** a control card (2) which receives the information about the coming angle of the outer yarn (8) sent to the twisting member (T) via sensors (3) located on the regulator (4) and the spindle motor (5), and therefore which controls the outer yarn feeding motor (6) in order to arrange the properties of outer yarn (8) such as feeding angle of the outer yarn (8) from the spindle motor (5) to the regulator (4) and the tension of the outer yarn (8) during this feeding that is effective in determining the balloon diameter value.
2. A balloon diameter control unit (1) according to claim 1, **characterized by** the control card (2) which arranges the outer yarn transmission speed of the outer yarn feed motor (6) with feedback in accordance with the information it receives from the sensors (3) in order to adjust the amount of the yarn (7, 8) in the balloon formed around the pot.
3. A balloon diameter control unit (1) according to claim 1 or 2, **characterized by** outer yarn feeding motor (6) which is a step motor that enables the outer yarn (8) to be fed to the twisting member (T) and this feed to be done in a controlled way with the pulses given to the motor.

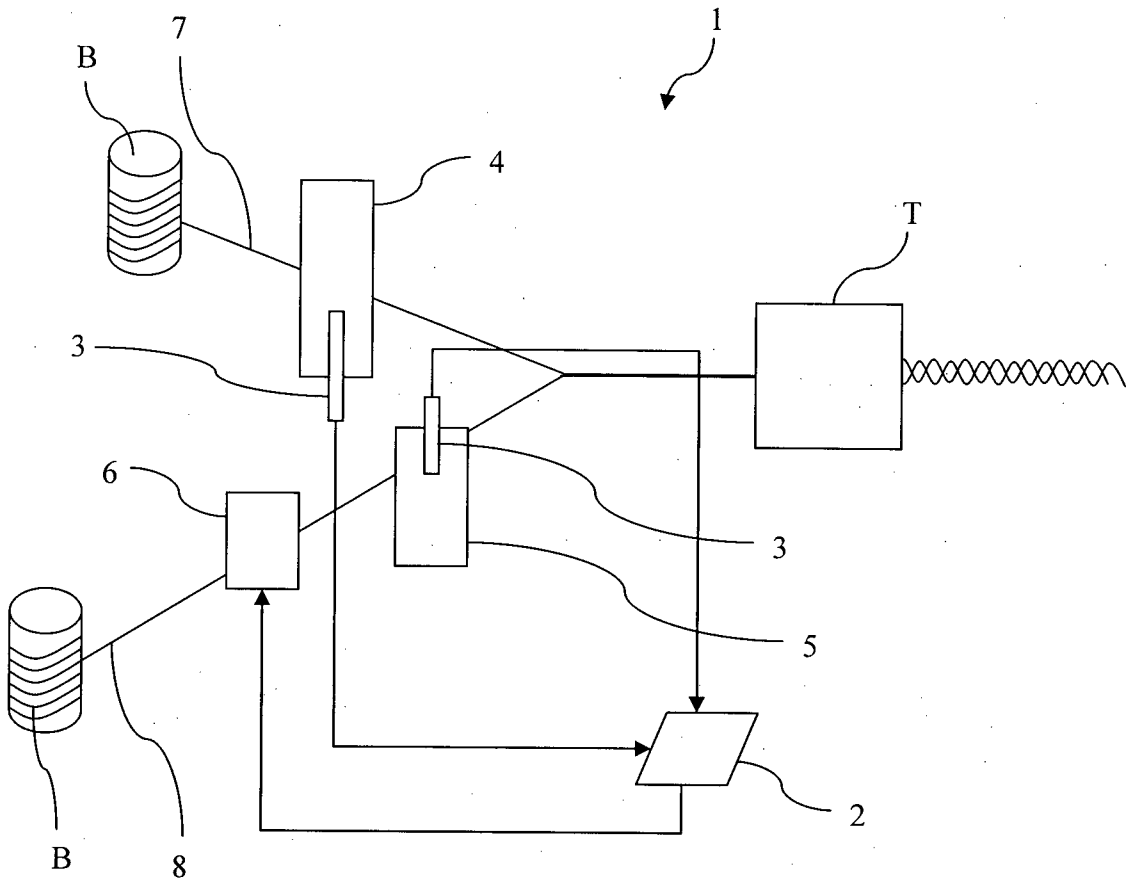


Figure 1

INTERNATIONAL SEARCH REPORT

International application No
PCT/TR2014/000195

A. CLASSIFICATION OF SUBJECT MATTER
INV. D02G3/28
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)
D02G D01H

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	FR 2 944 296 A1 (RITM [FR]) 15 October 2010 (2010-10-15) the whole document	1-3
A	----- US 2 731 785 A (VIBBER ALFRED W) 24 January 1956 (1956-01-24) column 6, line 42 - column 7, line 70; figures 6-7	1
A	----- US 2 870 596 A (VIBBER ALFRED W) 27 January 1959 (1959-01-27) column 8, line 21 - column 11, line 70; figures 6-7	1
A	----- EP 0 477 497 A1 (BARMAG BARMER MASCHF [DE]) 1 April 1992 (1992-04-01) column 2, line 21 - column 4, line 48; figures 1-4	1

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 6 November 2014	Date of mailing of the international search report 14/11/2014
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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 Pollet, Didier
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/TR2014/000195

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2944296	A1	15-10-2010	EP 2419554 A1 22-02-2012
			ES 2423318 T3 19-09-2013
			FR 2944296 A1 15-10-2010
			WO 2010119214 A1 21-10-2010

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EP 0477497	A1	01-04-1992	NONE
