



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.05.2018 Bulletin 2018/21

(51) Int Cl.:
D01H 7/92 (2006.01) D01H 13/16 (2006.01)

(21) Application number: **17201863.2**

(22) Date of filing: **15.11.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **21.11.2016 CZ 20160721**

(54) **DEVICE FOR MONITORING THE SAGGING OF A ROVING BEFORE A WINDING DEVICE OF A PREPARATORY MACHINE FOR PRODUCING A ROVING**

(57) The invention relates to a device for monitoring the sagging of a roving (1) before a winding device (4) of a preparatory machine for producing a roving (1), in which in the area of the maximum sagging of the roving (1) is arranged a sensor of the sagging of the roving (1), which comprises an elongated source (5) of modulated radiation oriented towards the roving (1) and an elongat-

ed sensor (7) of radiation for monitoring the radiation reflected from the roving (1), arranged parallel to the elongated source (5) of radiation, a selective amplifier being assigned to each of them, whereby the length of the elongated source (5) of radiation and the length of the elongated sensor (7) of radiation is greater than the presumed maximum sagging of the roving (1).

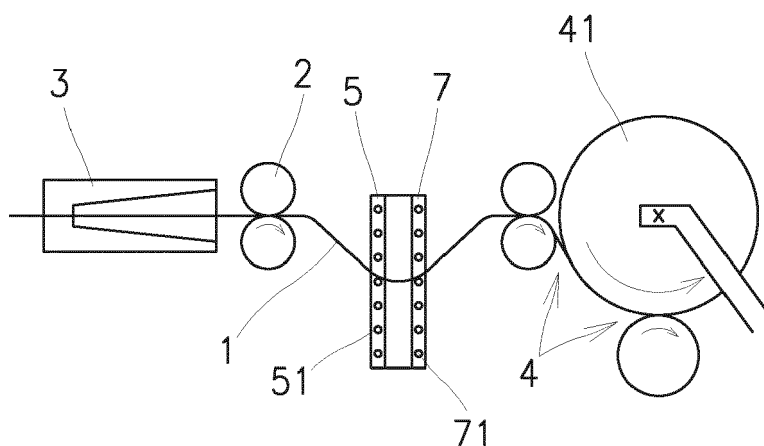


Fig. 1

Description

Technical field

[0001] The invention relates to a device for monitoring the sagging of a roving before a winding device of a preparatory machine for producing a roving.

Background art

[0002] Fine textile yarns are usually produced on spinning machines, for example on ring spinning machines. The technology of fibrous material preparation for this production includes preparatory spinning in which a relatively soft roving, strengthened by a small amount of twist, is formed from a strand of staple fibers. At the outlet of the roving frame, the roving is wound on a roving bobbin, which serves as a supply package for a ring spinning machine. In terms of dimensions and weight, the roving must be a uniform linear textile formation, which allows at the same time further processing, and so the imparted protective twist provides the roving with only low strength. When winding the roving on a bobbin, it is necessary to maintain a constant tensile strength in the roving between the outlet of the roving frame and the roving bobbin, which in no case exceeds the relatively low tensile strength of the roving resulting from the low level of its twist.

[0003] EP 2 112 258 (US2009/0289141) discloses a device in which the resulting roving contains substantially parallelized fibers across the entire cross-section and only a few fibers on the outer surface of the roving are wound around the roving body. Consequently, the roving is sufficiently held together, which substantially replaces the protective twist of the roving formed on flyers. This effect is achieved by using a pneumatic device arranged downstream of a drafting arrangement of sliver. The pneumatic device comprises a vortex chamber in which the individual fibers of the sliver are wound around core fibers. The roving is drawn off from the pneumatic device by draw-off rollers. Following the pneumatic device is arranged a winding apparatus for winding a roving, which comprises a rotatable spindle for a bobbin, which is associated with a driven pair of feeding rollers which are arranged directly in front of the roving bobbin and which have a nip line through which the roving to be wound is guided.

[0004] The roving between the draw-off rollers and the winding device of roving freely sags to eliminate the changes in the tension of the roving when being wound, since the changes might lead to its break. The sagging of the roving must be monitored so that the roving tension before the winding device of the preparatory machine for producing a roving is maintained within predetermined limits needed for the optimal winding of the roving.

[0005] The goal of the invention is to provide a device for monitoring the sagging of a roving which would be reliable, inexpensive and easy to produce due to its simple design.

Principle of the invention

[0006] The goal of the invention is achieved by a device for monitoring the sagging of a roving, whose principle consists in that in the area of the maximum sagging of the roving is arranged a sensor of the sagging of the roving, which comprises an elongated source of modulated radiation, which is oriented towards the roving, and an elongated sensor of radiation for monitoring the radiation reflected from the roving, arranged parallel to the elongated source of radiation, whereby the length of the elongated source of radiation and the length of the elongated sensor of radiation is greater than the presumed maximum sagging of the roving. This allows continuous monitoring of the sagging of the roving and obtaining information about the roving position.

[0007] In a preferred embodiment, the elongated source of radiation comprises at least one row of radiators and the elongated sensor of radiation comprises at least one row of sensing elements, each of which having a selective amplifier assigned to it. This arrangement allows evaluation of each sensing element separately and enables to obtain information about the specific position of the roving in front of the sensor.

[0008] To ensure high resistance to ambient DC and alternating light (radiation), each selective amplifier contains a resonant circuit with a synthetic inductance to selectively evaluate only the modulated radiation of the respective elongated source. In addition, this arrangement eliminates the saturation of the sensing elements by strong light (radiation) while maintaining their sensitivity and dynamics.

[0009] In order to maintain the roving tension within the pre-determined limits, the selective amplifiers are connected via a derivatively integrating detector and evaluation members to a control system. The control system enables to regulate the speed of the roving entering the area of the sagging of the roving, leaving the area of the sagging of the roving or simultaneously both on the side of the roving entering the area of the sagging of the roving and on the side of leaving the area of the sagging of the roving.

Description of drawings

[0010] An exemplary embodiment of the device according to the invention is schematically shown in the accompanying drawings, in which Fig. 1 shows the location of the sensor of the sagging of the roving between the draw-off rollers of the pneumatic device and the winding device, Fig. 2 shows the device according to the invention with the roving shown in front of the sensor and the control system, 3a represents a diagram of a resonant circuit with real inductance, and Fig. 3b is a schematic diagram of a resonant circuit with synthetic inductance.

Examples of embodiment

[0011] In a preparatory machine for producing a roving it is important to secure the sagging of the roving 1 between the draw-off rollers 2 of a pneumatic device 3 for winding outer fibers around the roving 1 body and a winding device 4 of the roving 1 on a bobbin 41 to eliminate the changes in the tension of the roving 1 which could lead to its break. The ratio of the speed of the draw-off rollers 2 of the pneumatic device 3 and the winding device 4 of the roving is regulated according to the size of the sagging.

[0012] The device for monitoring the sagging of the roving 1 before the winding device 4 comprises an elongated source 5 of radiation, which is positioned adjacent to the path of the roving 1 in the area of the maximum sagging of the roving 1 and is oriented towards the roving 1. The length of the elongated source 5 of radiation is greater than the presumed maximum sagging of the roving 1 and in an exemplary embodiment it is about 30 cm. The elongated source 5 of radiation comprises a plurality of radiators 51 arranged in at least one row, which in the exemplary embodiment are formed by LED diodes emitting infrared radiation. The radiators 51 are connected to a means 6 for generating modulated radiation with a selectable but predetermined pulse frequency.

[0013] An elongated sensor 7 of radiation, which serves to monitor the radiation reflected from the roving 1, is mounted parallel to the elongated source 5 of radiation and next to it in the area of the lowest sagging of the roving 1 and is oriented towards the roving. The length of the elongated sensor 7 is the same as the length of the elongated source 5 of radiation. The elongated sensor 7 of radiation comprises sensing elements 71 arranged in at least one row, each of which being aligned with a selective amplifier 72, which comprises a parallel resonant circuit with synthetic inductance L_s , which makes it highly resistant to the ambient DC and alternating light. The sensing element 71 thus connected selectively evaluates only the modulated light of its own source 5 of radiation, eliminating the saturation of the sensing elements 71 by strong light due to the principle of impedance characteristics of the resonant circuit, while preserving their reception characteristics such as sensitivity and dynamics. The outputs of the selective amplifiers 72 are connected via a derivatively integrating detector 73 to the evaluation member 74 for processing the signal into information before which sensing elements 71 the roving is situated. In an exemplary embodiment, the evaluation member 74 is composed of a microprocessor. The evaluation member 74 and the superior control system 9 are bi-directionally interconnected by a CAN bus 8, whereby the superior control system 9 can be connected at least to the drive of the draw-off rollers of the roving 1 from the pneumatic device for regulating the speed of the roving 1 withdrawal to ensure the optimal sagging of the roving 1.

[0014] In another exemplary embodiment, the control

system 9 is connected to the winding device 4 of the roving 1 onto a bobbin 41 for regulating the speed of the roving 1 leaving the area of the sagging of the roving 1 to optimize the sagging of the roving 1.

[0015] In yet another exemplary embodiment, the control system 9 is connected to the drive of the draw-off rollers of the roving 1 from the pneumatic device for the regulation of the speed of the roving 1 withdrawal, as well as to the winding device 4 of the roving 1 on a bobbin 41 for the regulation of the speed of both the roving 1 entering the area of the sagging of the roving 1 and the roving 1 leaving the area of the sagging of the roving 1 to optimize the sagging of the roving 1.

[0016] In an example of embodiment, the sensing element 71 is formed by a phototransistor 710, on which the modulated radiation 500 falls and which is powered through inductance, which may be composed of real inductance L , as shown in Fig. 3a, or synthetic inductance L_s , as shown in Fig. 3b.

[0017] However, the use of real inductance L is impossible due to its dimensions, therefore the synthetic inductance L_s , comprising an operational amplifier 70 from whose output the phototransistor 710 is powered, was used. In the embodiment shown in Fig. 3b, the synthetic inductance $L_s = C1 \times R1 \times R2 / 2$.

[0018] The method for monitoring the sagging of a roving 1 consists in that modulated radiation 500 having two different intensities is emitted towards the plane of the sagging of the roving from the elongated source 5 of radiation arranged vertically adjacent to the path of the roving 1 at the point of the lowest sagging, the length of the source 5 of radiation being greater than the presumed maximum sagging of the roving 1. Parallel to the elongated source 5 of radiation is mounted the elongated sensor 7 of radiation comprising radiation-sensitive sensing elements 71 arranged in a row for sensing the modulated radiation 500 reflected from the roving 1. Due to the thickness of the roving the reflected radiation is usually sensed by one to three sensing elements 71. The irradiated sensing element 71 converts the radiation into an electrical signal, which is further processed in the selective amplifier 72 with synthetic inductance L_s , whose selectivity corresponds to the frequency of the radiation modulation, thus ensuring ambient light resistance. Subsequently, this signal is rectified by a derivatively integrating detector 73 and processed by the evaluation member 74 into the information before which radiation-sensitive element 71 the roving is situated. This information is subsequently transmitted through the CAN bus 8 by using another suitable method to the superior control system 9, which afterwards regulates the speed of the roving 1 withdrawal from the pneumatic device 3 or regulates the speed of the roving 1 leaving the area of the sagging of the roving 1 or simultaneously regulates the speed of the roving withdrawal from the pneumatic device 3 as well as the speed of the roving 1 leaving the area of the sagging of the roving 1, all that being always done with the aim of optimizing the sagging of the roving 1.

Industrial applicability

[0019] The invention can be used in high-performance preparatory machines for producing a roving in which the resultant roving contains substantially parallelized fibers across the entire cross-section and only a few fibers on the outer surface of the roving are wound around the roving body, whereby winding takes place in a pneumatic device.

List of references

[0020]

1	roving
2	draw-off rollers of the pneumatic device
3	pneumatic device for winding outer fibers around the roving body
4	winding device of the roving
41	bobbin
5	elongated source of radiation
51	radiator
500	modulated radiation
6	means for generating modulated radiation
7	elongated sensor of radiation
70	operational amplifier
71	sensing elements
710	phototransistor
72	selective amplifiers
73	derivatively integrating detectors
74	evaluation members
8	CAN bus
9	control system
L	real inductance
L _s	synthetic inductance

sensing elements (71), each of which have a selective amplifier (72) assigned to it.

3. The device according to claim 1 or 2, **characterized in that** the selective amplifiers (72) comprise a synthetic inductance resonance circuit (L_s) for selective evaluation of only the modulated radiation of the respective elongated source (5).
4. The device according to claim 3, **characterized in that** the selective amplifiers (72) are connected via derivatively integrating detectors (73) and evaluation members (74) to a control system (9) for the regulation of the speed of the roving (1) entering the area of the sagging of the roving (1).
5. The device according to claim 3, **characterized in that** the selective amplifiers (72) are connected via the derivatively integrating detectors (73) and evaluation members (74) to a control system (9) for the regulation of the speed of the roving (1) leaving the area of the sagging of the roving (1).
6. The device according to claim 3, **characterized in that** the selective amplifiers (72) are connected via the derivatively integrating detectors (73) and evaluation members (74) to a control system (9) for the regulation of the speed of the roving (1) entering the area of the sagging of the roving (1) and also leaving the area of the sagging of the roving (1).
7. The device according to any of claims 4 to 6, **characterized in that** the evaluation members (74) are formed by microprocessors.

Claims

1. A device for monitoring the sagging of a roving (1) before a winding device (4) of a preparatory machine for producing a roving (1), **characterized in that** in the area of the maximum sagging of the roving (1) is arranged a sensor of roving (1), which comprises an elongated source (5) of modulated radiation oriented towards the roving (1) and an elongated sensor (7) of radiation for monitoring the radiation reflected from the roving (1), arranged parallel to the elongated source (5) of radiation, whereby the length of the elongated source (5) of radiation and the length of the elongated sensor (7) of radiation is greater than the presumed maximum sagging of the roving (1).
2. The device according to claim 1, **characterized in that** the elongated source (5) of radiation includes at least one row of radiators (51) and the elongated sensor (7) of radiation includes at least one row of

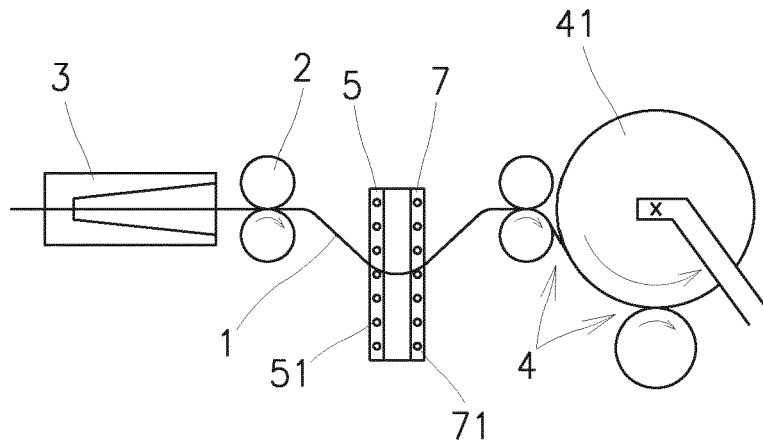


Fig. 1

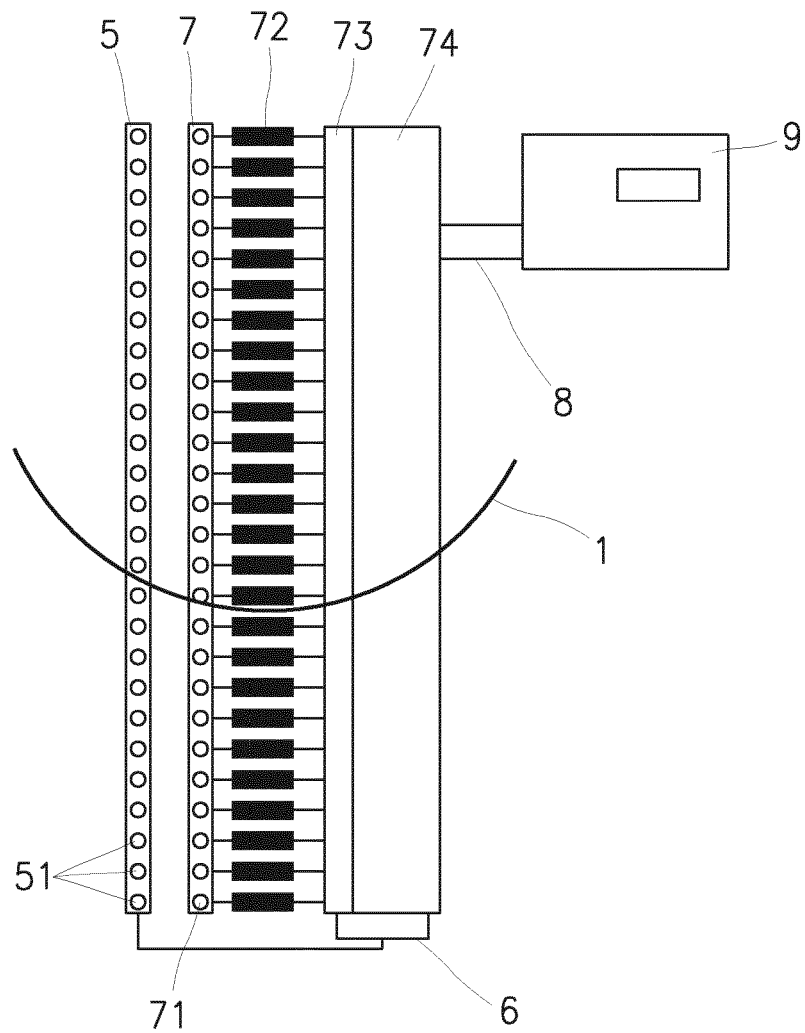


Fig. 2

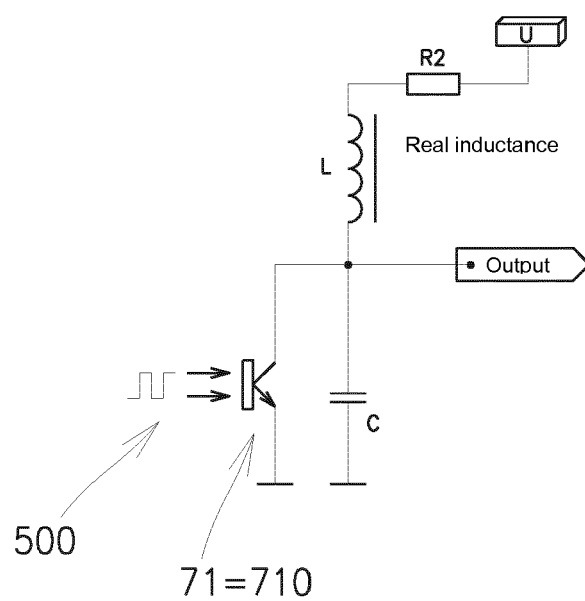


Fig. 3a

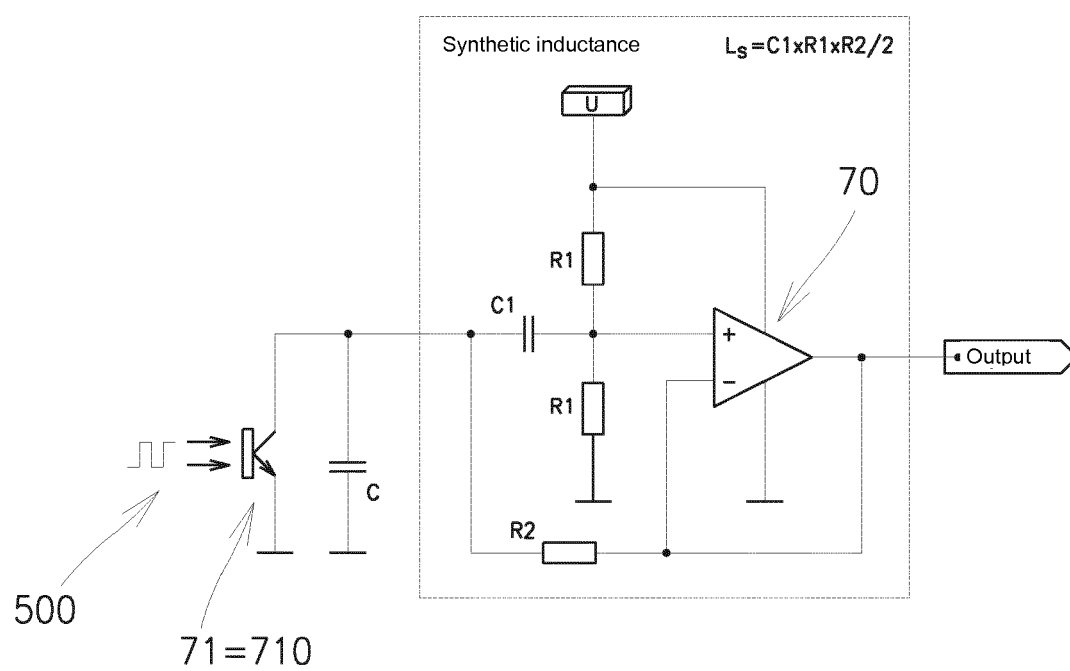


Fig. 3b



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Application Number
EP 17 20 1863

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Place of search Munich		Date of completion of the search 29 March 2018	Examiner Todarello, Giovanni
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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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