

Description

Technical field

[0001] The invention relates to a method for exchanging a wound bobbin for an empty tube at a workstation of a spinning machine which is provided with a drum intermediate storage device of yarn with a rotary drum and an independently driven compensating arm arranged between a spinning unit and a winding device.

Background art

[0002] To separate the yarn production process and the yarn winding process in spinning machines, an intermediate storage device of yarn can be used in which the yarn is stored if the amount of yarn produced is larger than the amount being wound and from which the yarn can be consumed if the winding device needs a greater amount of yarn than is produced by the spinning unit. From literature, known are vacuum and drum intermediate storage devices.

[0003] The vacuum yarn intermediate storage device can be mounted on an attending device, as is the case, for example, in CZ280089, or it is part of a workstation of the machine, for example in CZ304874.

[0004] The vacuum yarn intermediate storage device according to CZ280089 on an attending device serves only to compensate for a yarn loop during spinning-in with the assistance of the attending device and to monitor whether the spinning-in cycle is successful.

[0005] CZ304874 discloses a method for producing a yarn reserve when a wound bobbin is exchanged for an empty tube at a workstation of the spinning machine, especially a semi-automatic open-end spinning machine, in which, after stopping the winding device and interrupting the yarn being spun before the winding device, the spun yarn is sucked into a vacuum doffing nozzle, after exchanging the wound bobbin for an empty tube, the spun yarn is transferred by the doffing nozzle to the winding device, where the yarn is caught by a tooth of a disc of the winding device, thereby interrupting the yarn, the free end of the yarn being sucked into the doffing nozzle, and the winding of the yarn reserve on the tube begins. After transferring the doffing nozzle to the winding device, the doffing nozzle assumes a parking position in which the spun-out yarn is guided outside a traversing device of yarn, the yarn is caught and interrupted by the tooth of the disc of the winding device and a signal is sent to the control unit about the start of the yarn reserve winding, whereby during the yarn reserve winding, the yarn is guided through a rectifier arranged at the workstation and winding the yarn reserve is terminated after a pre-determined time interval by releasing the yarn from the rectifier to the traversing device. The workstation is further provided with a vacuum intermediate storage device of yarn which serves to compensate for the yarn tension during spinning. Thus, the doffing nozzle is another device at

the workstation which increases the price of the machine and can be used only for manual exchange of a bobbin for an empty tube.

[0006] For example, CZ303880 describes a drum intermediate storage device of yarn comprising a driven rotary drum with an independently driven compensating arm whose rotation is controlled according to the rotation of the drum drive in such a manner that during continuous spinning, constant torque is created at the outlet of the storage device to produce the desired yarn tension for winding the yarn on a cross-wound bobbin and during the transition from continuous spinning to transient state, the speed and torque of the compensating rotary arm are controlled at least partially independently of the rotation speed of the drum in accordance with the needs and the development of the transient state. If it is detected by a yarn quality sensor (not shown) that a yarn fault appeared in the yarn reserve on the drum, the yarn reserve can be unwound by means of the rotating arm, including situations when the drum is stationary. When detecting a long defect in the yarn, part of which is already out of the drum and is wound onto the cross-wound bobbin, this part of the defect can be re-wound by the counter-rotating compensating arm and reversed operation of the winding device back from the bobbin to the drum and subsequently removed in the manner described above. Further advantages of the arrangement of the drum intermediate storage device with an independently driven rotary compensating arm and their uses are described in the present invention.

[0007] CZ306369 discloses a rotor spinning machine and a method for resuming spinning at its workstation. A drum intermediate storage device of yarn with a rotary drum and with an independently driven compensating arm constitutes a draw-off mechanism of yarn from a spinning unit. The drum intermediate storage device of yarn can store on its circumference a yarn length corresponding to the maximum length of an assumed yarn defect, to the yarn length needed for subsequent spinning-in and the yarn length necessary during the termination of spinning for stopping the bobbin without a yarn break and is made according to CZ303880.

[0008] A drum intermediate storage device of yarn with a rotary drum and with an independently driven compensating arm is also disclosed in EP1460015A1 and EP2216432A1. In these solutions, on the rotary drum is deposited a yarn reserve which primarily serves to maintain constant tension in the yarn during spinning and winding, whereby EP2216432A1 describes also resumption of spinning, when in a certain step the yarn length required for spinning-in is wound on the rotary drum. EP1460015A1 describes an air jet spinning machine with a drum intermediate storage device of yarn comprising a drum coupled with a drive and a rotating arm which is coupled to a drum from which a torque is transmitted to the arm. Thus, the arm can only rotate when the drum is rotated, and only in the direction of rotation of the drum so that the arm only serves to maintain a constant tension

in the yarn during winding.

[0009] The aim of the present invention is to further improve the use of the drum intermediate storage device and to improve the efficiency of the service operation at a workstation during the exchange of a full bobbin for an empty tube, i.e. shortening the time of the operator action, both in cases where the exchange of the bobbin for the empty tube and capturing the yarn on the tube for yarn reserve formation is performed by the operator or with the assistance of the means of the workstation or with the assistance of the attending device.

Principle of the invention

[0010] The aim of the invention is achieved by a method according to the invention whose principle consists in that before starting yarn reserve formation, the yarn supply in the drum intermediate storage device is increased to the length that corresponds to at least the yarn length necessary for resuming spinning-in and to a yarn length necessary for capturing on the tube and formation of at least two windings of the yarn reserve on the tube and after starting the yarn reserve formation on the tube, at least the initial windings of the yarn reserve on the tube are formed from the yarn supply in the drum intermediate storage device, the yarn reserve being withdrawn from the drum intermediate storage device by an independently driven rotary compensating arm, whereby during the formation of the initial windings of the yarn reserve the spinning-in of the spinning unit is re-started, whereby the yarn for spinning-in is supplied from the rotary drum of the intermediate storage device by means of its reversed operation. In this manner, the need for using auxiliary yarn for spinning-in on the empty tube is eliminated and the process of full bobbin exchange is accelerated.

[0011] In addition, it is advantageous if the initial windings form at least a part of the yarn reserve, preferably the entire yarn reserve.

[0012] According to one alternative of the method, the yarn supply in the intermediate storage device is formed during the exchange of the bobbin for an empty tube, when yarn withdrawal from the intermediate storage device for winding is stopped, without stopping the spinning process. Exchanging the bobbin for an empty tube and capturing the yarn on the tube for yarn reserve formation is performed by the operator or with the assistance of the means of the workstation of the machine or with the assistance of the attending device.

[0013] According to another alternative of the invention, the yarn reserve in the intermediate storage device is formed before interrupting the spinning process to perform the exchange of the bobbin for an empty tube, whereby the length of the yarn reserve is sufficient at least for spinning-in and for formation of at least two initial windings on the tube. In such a case, yarn is unwound by means of the independently driven rotary compensating arm from the drum for yarn reserve formation and simultaneously, by the drum rotating in the counter di-

rection, the yarn end is introduced into the spinning unit for spinning-in purposes. The exchange of the bobbin for an empty tube and capturing the yarn on the tube for yarn reserve formation is performed manually, or by the means of the workstation or by the attending device.

[0014] The advantages of the method according to the invention are as follows. No auxiliary yarn is needed after spinning-in following the exchange of the bobbin for a tube. Spinning may take place even during the bobbin exchange, i.e. the machine efficiency does not decrease, and controlling the torque of the arm enables to tighten the reserve on the tube more firmly. On the other hand, if precise yarn length is required on the produced bobbin, the spinning process can be stopped until the operator or the attending device arrival and, in addition, it is not necessary to use auxiliary yarn for spinning-in.

Description of the drawings

[0015] The method according to the invention will be described at a workstation of an open-end spinning machine, which is schematically represented in accompanying drawings, where Fig. 1 shows a side view of the workstation and Fig. 2 shows a front view of the workstation.

Examples of embodiment

[0016] The method for exchanging a wound bobbin with an empty tube at a workstation of a spinning machine will be explained with reference to an example of a workstation of a rotor spinning machine which is shown in Figs. 1 and 2.

[0017] The workstation comprises a spinning unit **1** to which is supplied a sliver **2** which is transformed into yarn **3** in it. The yarn **3** is withdrawn from the spinning unit **1** by means of a drum intermediate storage device **4** of yarn with a rotary drum **41** and passed on to be wound on a bobbin by an independently driven rotary compensating arm **42** according to CZ306369. On the rotary drum **41** is maintained a required number of windings of yarn **3**, which is through the independently driven rotary compensating arm **42** withdrawn to a winding device **5** of yarn, whereby the yarn is passed through a paraffining device **6** and a traversing device. In the winding device **5** the yarn is wound on a bobbin **51**, which is formed on the tube **511**. The tube **511** may be provided with a yarn catching means in the edge portion of the tube **511** to form yarn **3** reserve, or, if appropriate, the yarn catching means may be part of a disc of the winding arms. The tube **511** is in a known manner detachably mounted in the arms **52** of the winding device **5**. During winding, the tube **511**, or, to be more specific, the bobbin **51** being wound on it, abuts a drive cylinder **53** of the winding device. The drive of the drive cylinder **53** may be central or individual (unit).

[0018] The exchange of the wound bobbin **51** for an empty tube **511** is performed after obtaining a pre-deter-

mined length of the yarn package on the bobbin 51 or obtaining the desired bobbin diameter and can either take place during the operation of the spinning unit or at the stopping operation, namely in three ways: manually, with the assistance of the means of the workstation or the means of the attending device which is movable along the machine and, after stopping, to provide service operation at the workstation requesting the service.

[0019] During the manual exchange of the wound bobbin 51 for an empty tube 511 with a pre-determined yarn length, spinning at the workstation is stopped. Before spinning is stopped, the yarn reserve 3 on the rotary drum 41 of the intermediate storage device 4 is increased above the value that is maintained during normal spinning. The yarn 3 length in the drum intermediate storage device 4 then before stopping spinning corresponds to at least the yarn 3 length required for restarting the spinning-in process and the yarn 3 length required for capturing the yarn 3 on the tube 511 and for the formation of at least two windings of the yarn reserve 3, but preferably the entire yarn 3 reserve on the tube 511. The operator then exchanges the bobbin 51 for an empty tube 511 and catches the yarn 3 end passing through an independently driven rotary compensating arm 42 of the drum intermediate storage device 4 on the tube 511, whereby the yarn 3 is guided to a device for yarn reserve formation. The operator also prepares in a known manner the spinning unit 1 for spinning-in by the means of the workstation, using the yarn 3 wound on the rotary drum 41 of the drum intermediate storage device 4, and puts the workstation into operation. In the winding device 5, winding the yarn 3 reserve is started on the tube 511 and at least several initial windings of the yarn 3 reserve are wound from the yarn 3 unwound from the drum intermediate storage device 4 of yarn by means of the independently driven rotary compensating arm 42. During the formation of the initial windings of the yarn 3 reserve, the spinning unit 1 is spun in again, whereby the yarn 3 required for spinning-in is supplied from the rotary drum 41 of the intermediate storage device 4 by means of its reversed operation, for example according to CZ306369. After the yarn reserve is formed 3 on the tube 511, the yarn 3 is passed on in a known manner to the traversing device and winding the bobbin 51 is started.

[0020] During the exchange of the wound bobbin 51 for a tube 511 by the means of the workstation of the machine, spinning can also be stopped. In this case, the yarn 3 supply in the drum intermediate storage device 4 also increases to the values required for the spinning-in and winding of at least part of the yarn 3 reserve, whereby during the start of the stopping operation of spinning, while in addition, in the drum intermediate storage device 4 is formed a length of yarn 3 needed for controlled stopping of spinning which ensures that the yarn 3 end remains in the spinning unit 1. Prior to the exchange of the bobbin 51, the yarn is interrupted before the winding device 5 by the means 7 for the yarn 3 reserve formation and the yarn 3 end from the drum intermediate storage

device 4 is caught by the means 7 for yarn reserve formation 3 and after the exchange of the bobbin 51 is brought to the tube 511, on which it is captured before or during the start of the winding of the yarn 3 reserve on the bobbin 511 after starting the operation of the workstation for the resumption of spinning and winding. At the beginning of the winding of the yarn 3 reserve, is consumed the yarn 3 withdrawn by means of the independently driven rotary compensating arm 42 from the drum intermediate storage device 4, whereby for spinning-in, the yarn from the rotary drum 41 of the intermediate storage device 4 is used which is supplied by the reversed motion of the rotary drum 41 of the intermediate storage device 4.

[0021] Another possibility is that during the exchange of the bobbin 51 for an empty tube 511 spinning is not interrupted, only the yarn 3 withdrawal from the intermediate storage device 4 for winding is stopped, the yarn 3 being produced during this period is deposited in the intermediate storage device 4 on its rotary drum 41. Before the actual exchange or during the exchange, the yarn 3 is interrupted by the means 7 for yarn reserve formation, or by another means intended for this purpose, and the yarn 3 end from the drum storage device 4 is captured by the means 7 for yarn reserve formation. After the exchange, the yarn 3 end is brought to the tube 511 and captured on the tube 511 or on the capturing disc of the winding device 5, and then follows the start of the winding of the yarn reserve 3 which is withdrawn from the intermediate storage device 4 through the independently driven rotary compensating arm 42.

[0022] The exchange of the wound bobbin 51 for a tube 511 by means of a known unillustrated attending device may also take place when the spinning is stopped, or only when stopping the yarn 3 withdrawal from the intermediate storage device 4, as has been described above.

[0023] In the case of a central drive of the winding devices of one side of the workstations of the machine, the consumption of the yarn reserve from the storage device is controlled by the spinning speed. In the case of an individual drive, the consumption of the yarn reserve from the storage device can be controlled by changing the winding speed and/or by changing the spinning speed.

[0024] For tightening the yarn reserve 3 sufficiently on the tube 511 during the yarn 3 reserve formation by means of increasing the torque of the independently driven rotary compensating arm 42, the force acting on the yarn 3 increases, thereby increasing the yarn 3 tension.

[0025] If the yarn 3 reserve is not formed on the tubes, the yarn 3 from the drum intermediate storage device 4 forms several initial windings on the bobbin 51.

Industrial applicability

[0026] The invention is intended for spinning machines provided with a drum intermediate storage device of yarn with a rotary drum and an independently driven compensating arm on which using the invention enables to ac-

celerate the servicing of the workstation during the exchange of the wound bobbin for an empty tube to eliminate the need for the use of auxiliary yarn to resume the spinning-in of the spinning unit after the bobbin is exchanged with an empty tube.

List of references

[0027]

1	spinning unit	
2	sliver	
3	yarn	
4	drum intermediate storage device of yarn	
41	rotary drum of the drum intermediate storage device of yarn	15
42	independently driven rotary compensating arm	
5	winding device	
51	bobbin	
511	tube	20
52	arms of the winding device	
53	drive cylinder	
6	paraffining device	
7	means for yarn reserve formation	25

Claims

1. A method for exchanging a wound bobbin (51) for an empty tube (511) at a workstation of a spinning machine, the workstation being provided with a rotary drum intermediate storage device (4) of yarn (3) with a rotary drum (41) and an independently driven rotary compensating arm (42) arranged between a spinning unit (1) and a winding device (5), **characterized in that** before starting yarn reserve formation (3), the supply of yarn (3) in the drum intermediate storage device (4) increases to the length corresponding to at least the yarn (3) length required for restarting the spinning-in process and the yarn (3) length required for capturing on the tube (511) and for the formation of at least two windings of yarn (3) reserve on the tube (511) and the start of yarn (3) reserve formation on the tube (511), at least the initial windings of the yarn (3) reserve on the tube (511) are formed from the supply of yarn (3) in the drum intermediate storage device (4), which is withdrawn from the drum intermediate storage device (4) by an independently driven rotary compensating arm (42), whereby during the formation of the initial windings of the yarn (3) reserve, the spinning-in of the spinning unit (1) is re-started, whereby the yarn (3) for spinning-in is supplied from the rotary drum (41) of the intermediate storage device (4) by means of its reversed operation, which results in accelerating the servicing of the machine and eliminating the need for using auxiliary yarn for spinning-in of the spinning unit (1) once again after the exchange of the bobbin

(51) for an empty tube (511).

2. The method according to claim 1, **characterized in that** the initial windings form at least a part of the yarn (3) reserve on the tube (511), preferably the entire yarn (3) reserve.
3. The method according to claim 1 or 2, **characterized in that** the yarn (3) reserve in the intermediate storage device (4) is formed during the exchange of the bobbin (51) for an empty tube (511), when the yarn (3) withdrawal from the intermediate storage device (4) for winding is stopped, without stopping the spinning process.
4. The method according to claim 3, **characterized in that** exchanging the bobbin (51) for an empty tube (511) and capturing the yarn (3) on the tube (511) to form a yarn (3) reserve is performed by the means of the workstation of the machine or by an attending device.
5. The method according to claim 1 or 2, **characterized in that** the yarn (3) reserve in the intermediate storage device (4) is formed before interrupting the spinning process due to the exchange of the bobbin (51).
6. The method according to claim 5, **characterized in that** exchanging the bobbin (51) for an empty tube (511) and capturing the yarn (3) on the tube to form a yarn (3) reserve is performed manually or by the means of the workstation or by the attending device.
7. The method according to any of the preceding claims, **characterized in that** during the formation of the initial windings of the yarn (3) reserve, the spinning-in of the spinning unit (1) is re-started, whereby the yarn (3) for spinning-in is supplied from the rotary drum (41) of the intermediate storage device (4) by means of its reversed operation.

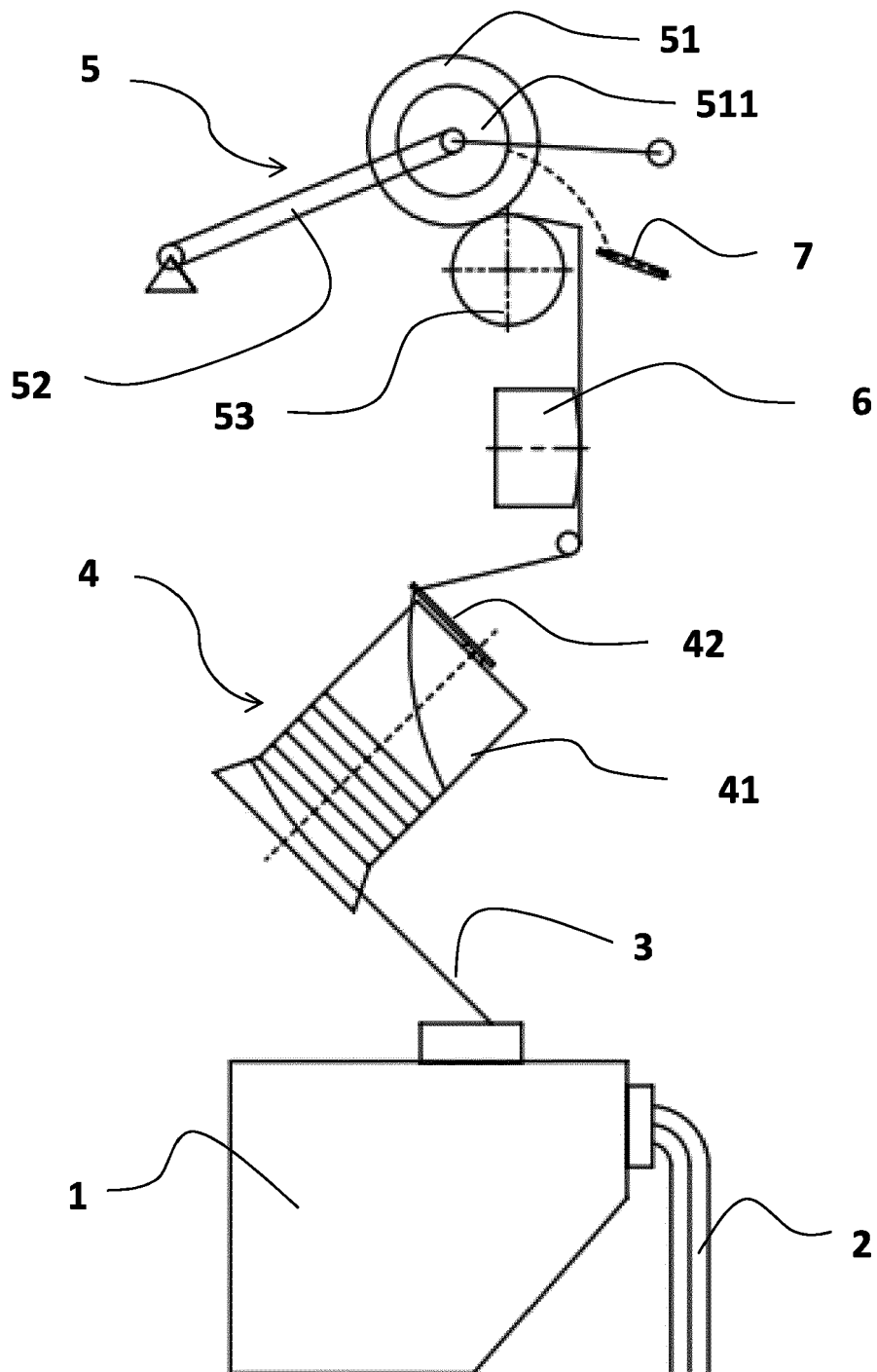


Fig. 1

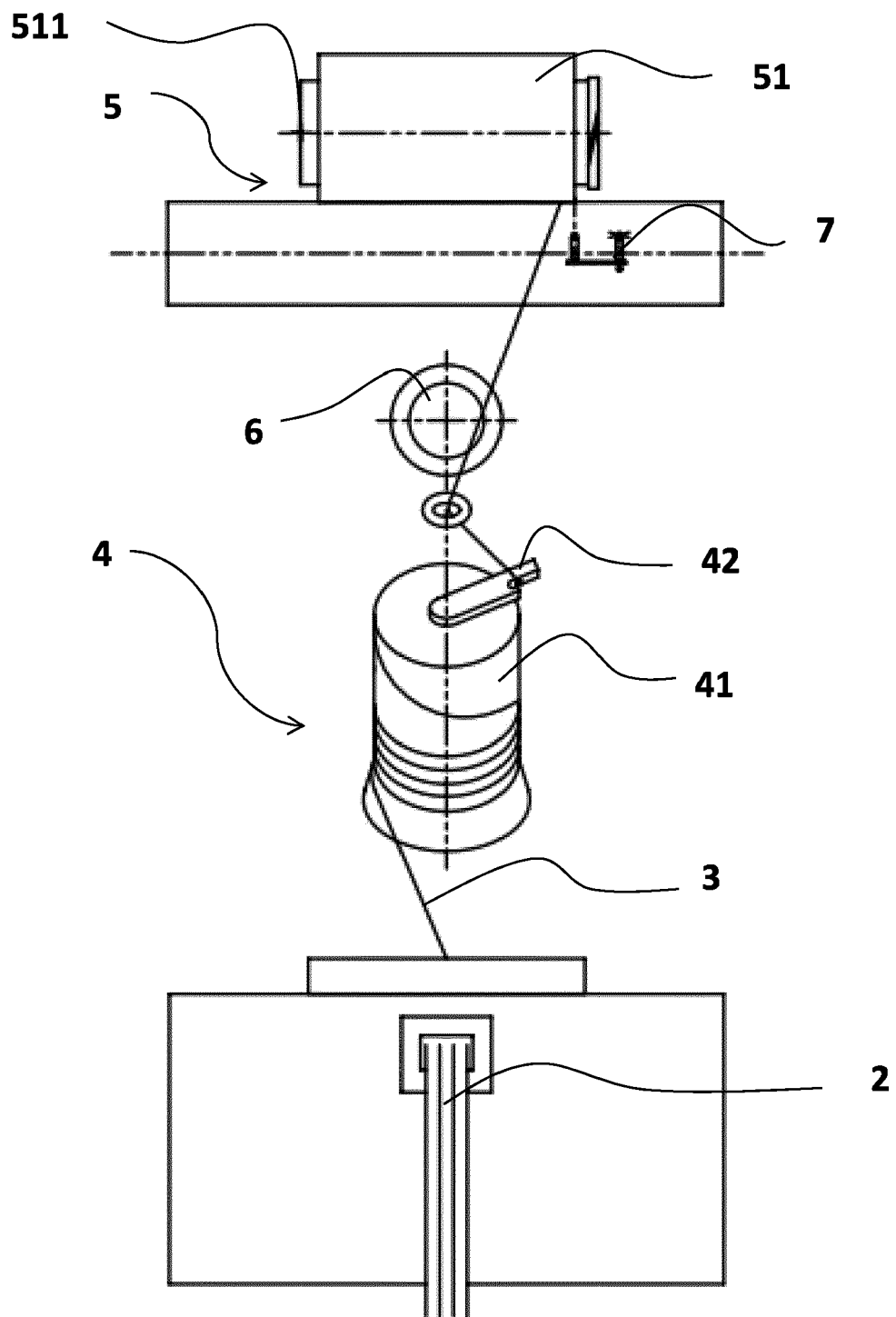


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 2221

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A	DE 10 2016 109216 A1 (RIETER CZ S R O [CZ]) 24 November 2016 (2016-11-24) * paragraph [0018] * * paragraph [0055] * * paragraph [0057] * * paragraph [0064] * * claims 3,14,15 * * figure 1 *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65H
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 April 2019	Examiner Guisan, Thierry
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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