(12) UK Patent Application (19) GB (11) 2 129 450 A

(21) Application No **8327709**
(22) Date of filing **17 Oct 1983**
(30) Priority data
(31) **3238375**
(32) **16 Oct 1982**
(33) **Fed. Rep. of Germany (DE)**
(43) Application published
16 May 1984
(51) **INT CL³**
B65H 51/20 63/02 D03D 47/34
(52) Domestic classification
D1F 6
D1C 17
D1D 101 1202 1207 XEC
D1E 175 177 197 4G 4K5 EP F
(56) Documents cited
None
(58) Field of search
D1F
D1E
D1C
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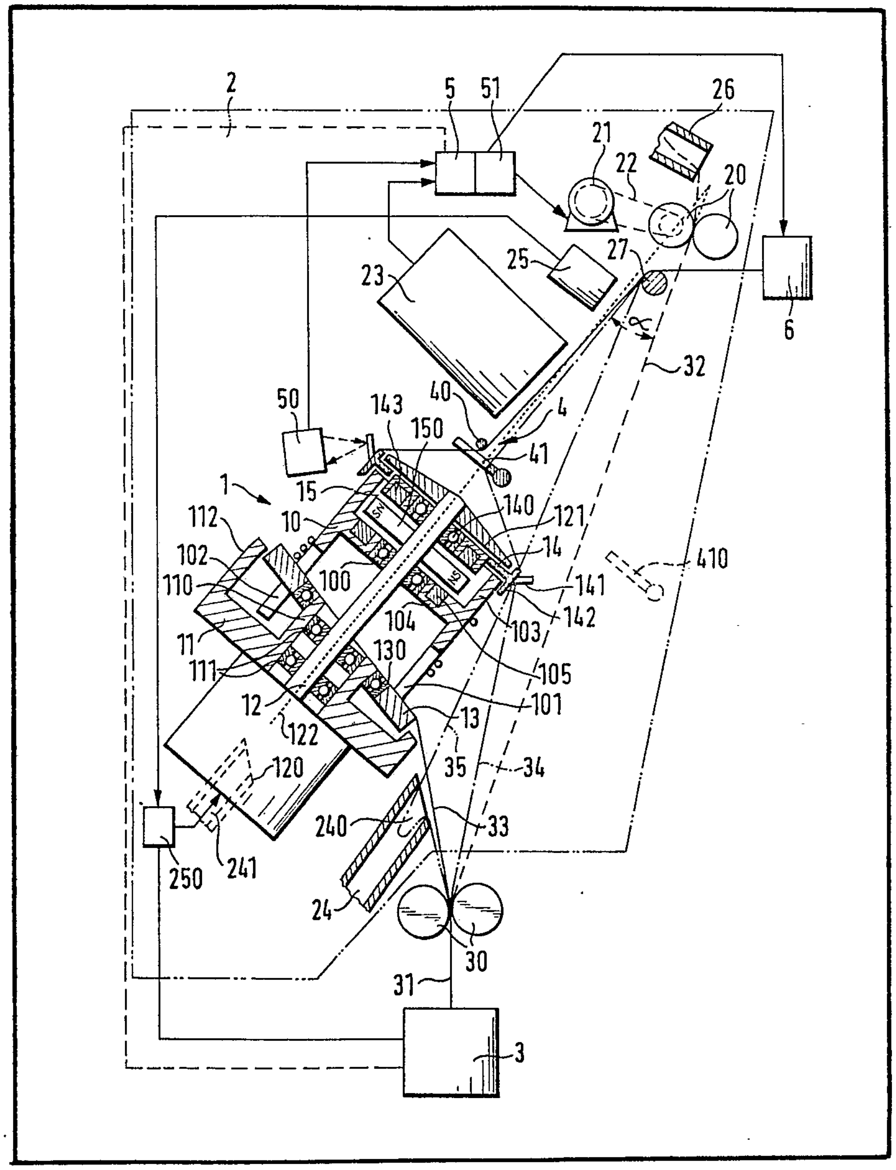
(54) Temporary thread storage device; determining amount of thread therein

(57) The thread 31 is fed tangentially to a storage roll 10 and taken off it by a thread guide 4 arranged in prolongation of its axis against the action of a retaining element. For measuring the thread length stored on the storage roll 10, the storage roll 10 is provided with a thread rotation monitoring device 50 and a device eg a thread connecting device 23 which issues a signal when the direction of rotation of the thread is reversed, both of which devices are connected to a pulse counter 5. This pulse counter 5 is switched from forwards counting to backwards counting or vice versa on a change in the direction of rotation of the thread. As shown the storage roll is provided in an open end spinning device and takes up thread for the spinner 3 while device 23 is making good a thread breakage. Counter 5 counts the turns of thread placed on roll 10, is switched to backwards counting when take-up roll 6 is re-activated, and when the counter arrives at zero, ie no thread left on the roll 10, switches back to its forward counting mode in readiness for the next thread break.



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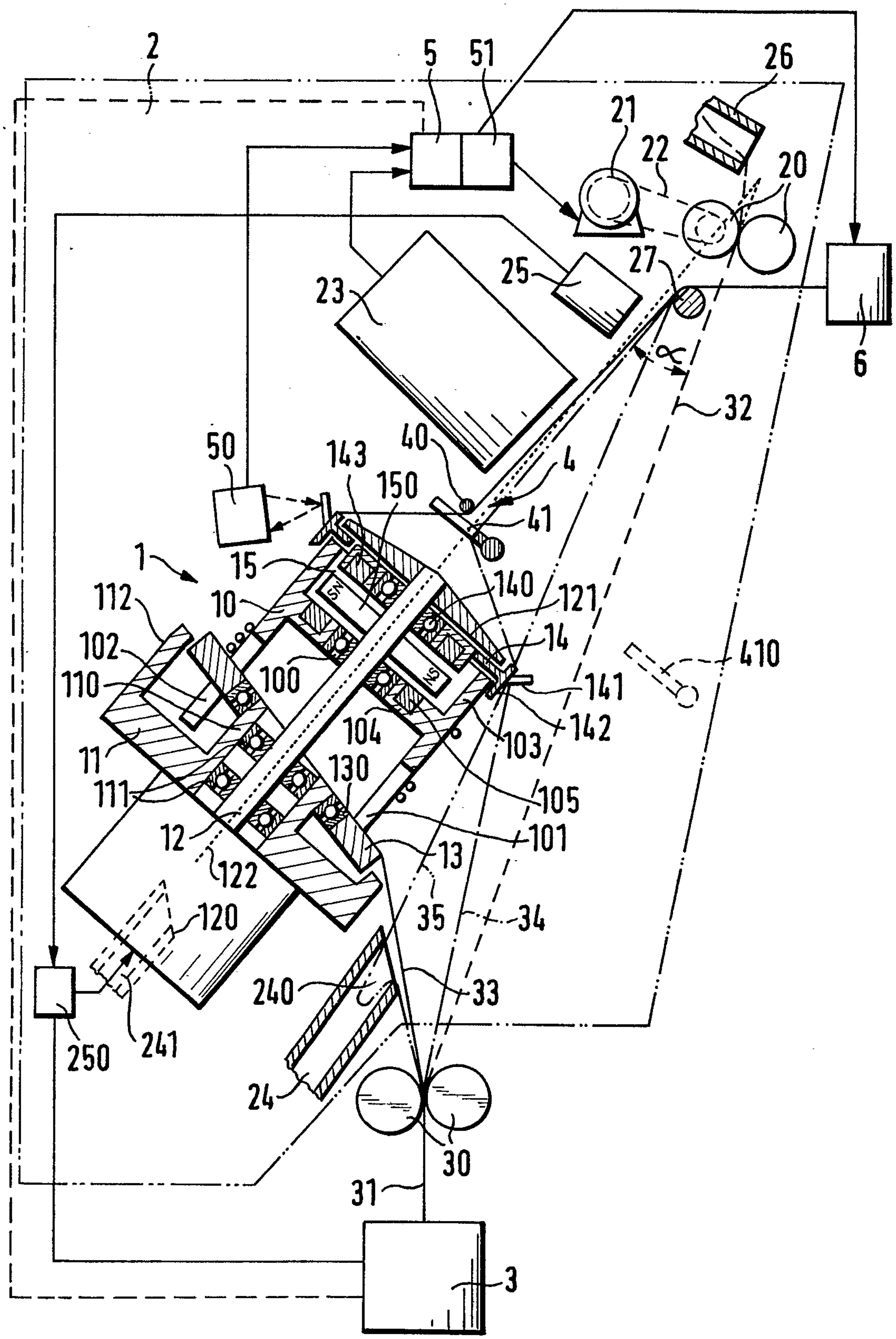

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SPECIFICATION

A device for measuring the thread length stored on a storage roll

The present invention relates to a device for measuring the thread length stored on a storage roll, which is fed tangentially to the storage roll and can be taken off by a thread guide arranged in prolongation of its axis against the action of a retaining element.

In known devices of this type, the reflection of the light from a monitoring device designed as a light barrier is measured (British Patent 1.573.869) or a switch is actuated as a function of the quantity of stored thread by pivoting of the advance ring of the storage roll designed as a switching ring, or by release of a sprung arm due to take-off of the thread supply (British Patent 1.567.617). However, such monitoring devices operate quite inaccurately and exhibit only certain zone widths which the thread supply moves.

The object of the present invention is to provide a device for measuring the thread length stored on a storage roll which operates very precisely and is simple in design.

This object is achieved according to the invention that the storage roll is provided with a thread rotation monitoring device and a device for determining the direction of thread rotation, both of which are connected in terms of control to a pulse counter which can be switched from forwards to backwards counting or vice versa as a function of a change in the direction of thread rotation. At a take-off speed of the thread from the storage roll which coincides with the delivery speed of the thread, the thread does not rotate on the take-off side of the storage roll. If the delivery speed of the thread to the storage roll exceeds the take-off speed of the thread from the storage roll, the thread rotates in the direction of rotation of the storage roll, whereas the thread rotates in the opposite direction to the storage roll when the take-off speed is higher than the delivery speed. The number of thread rotations therefore indicates how much thread is stored on the storage roll. For this reason, the thread rotation monitoring device can determine how often the thread has passed the monitoring position, while the device for determining the direction of rotation of the thread of the thread retaining ring determines whether the thread supply on the storage roll is increasing or decreasing. Depending on the direction of rotation of the thread the pulse counter therefore adds or subtracts the pulses received from the said rotation monitoring device so that the stored number of pulses is in a direct ratio to the stored thread supply.

In principle, the thread rotations can be measured directly. Due to the differing reflection behaviour of the thread and the storage roll, it is possible to determine how often the thread has passed the thread rotation monitoring device, while the direction of rotation of the thread is determined in the conventional way. However, the length of thread stored on the storage roll can be measured more simply and with far fewer sensitive elements if the storage roll bears a thread retaining ring which can be driven elastically relative to the storage roll for slip-free guidance of the thread, which is scanned at least by the thread rotation monitoring device.

The pulse counter is preferably connected in terms of control to the driving mechanism of the take-off device in order to avoid falling below certain minimum quantities or exceeding maximum quantities on the storage roll.

The take-off device is preferably formed by a winding device arranged downstream of the storage roll in the direction of thread travel. In another design of the subject of the invention, the device for determining the direction of rotation of the thread can be formed by a thread-connecting device which is arranged between storage roll and winding device and is connected in terms of control to the driving mechanism of the winding device.

While the thread-connecting device is in operation, the thread must be stationary in its operating region so that the winding device is stationary. A subsequently delivered thread is thus merely wound on the storage roll. Once the thread connecting device has completed its operation, it sets the winding device into operation again, which, owing to its speed which is usually higher than the speed at which the thread is fed to the storage roll owing to the otherwise necessary initial tension, empties the storage roll again. To prevent this emptying operation from taking too long, a control device connected to the pulse counter is advantageously provided for controlling the speed of the winding device as a function of the thread length located on the storage roll.

To avoid overfilling the storage roll, the pulse counter can be connected to a stopping device.

The device according to the invention permits simple and extremely precise measurement of the thread length stored on the storage roll. The accuracy can be increased considerably when using a thread retaining ring, as it is determined essentially by the closeness of the thread retaining device of the thread retaining ring (or markings thereon). This thread retaining ring can comprise closed thread retaining devices or even thread retaining devices which are open radially outwards, as desired, so that the storage roll can be taken into a closed thread course or also out of it again and the moment of the associated control processes can be determined precisely owing to the exact knowledge of the respectively stored thread supply.

Such a device for measuring the fullness of the storage roll has the advantage that it operates independently of the thread speed, the thread thickness, the rotational speeds on the thread store and of the dimensions of the thread store. This also applies independently of the duration of storage. The fullness of the thread store is determined only by the difference in the thread rotations in the two directions of rotation.

The invention is described in more detail below with reference to a drawing which shows diagrammatically the subject of the invention in conjunction with an open end spinning machine shown in section with a thread connecting device.

The thread store 1, and therefore the device for measuring the thread length stored on the thread store 1, can be used on basically any textile machines on which thread stores 1 with a storage roll 10 are used, for example on knitting and hosiery machines and also on weaving machines. However, as the operating conditions on an open end spinning machine are more difficult than on the previously mentioned machines, particularly if the thread store 1 is to be arranged on a movable maintenance device 2, the design and operation of the thread store 1 are described below with reference to an open end spinning machine.

The Figure shows merely the spinning device 3 indicated by a rectangle, a pair of take-off rolls 30 and a winding device 6 of such an open end spinning machine. A thread 31 produced in the spinning device 3 is taken from the spinning device 3 by means of take-off roll pair 30 and is then fed to the winding device 6 where the thread 31 is wound on to a bobbin for forming a bobbin package.

The maintenance device 2 which can travel along the open end spinning machine and can therefore serve a plurality of spinning stations on this machine in succession is brought into the thread course between the pair of take-off rolls 30 and the thread take-up station designed as a winding device 6 for this servicing in known manner. The winding device 6 is provided with a driving device (not shown) which can be controlled by the maintenance device 2. In the embodiment illustrated, the maintenance device 2 also has an auxiliary pair of take-off rolls 20 which are driven by a motor 21 via a belt 22.

The maintenance device 2 has, outside the thread course 32 defined by the pair of take-off rolls 30 of the open end spinning machine and the auxiliary pair of take-off rolls 20 of the maintenance device 2, in succession in the direction of thread travel, the above-mentioned thread store 1 as well as a thread connecting device 23, which can be designed in various ways, for example as a knotting device.

The thread store 1 illustrated has a base 11 with whose aid it is mounted rigidly on the maintenance device 2 or pivotally on a lever or rod linkage. The base 11 in turn has a hub 110 in which a driving shaft 12 is mounted via one or more bearings 111. The above-mentioned storage roll 10 which has catch slots 102 on its feed end 101 facing the base 11 is mounted on the shaft 12 by means of a bearing 100. A thread advance disc 13 meshes with these catch slots 102 and is rotatably mounted on the hub 110 of the base 11 by means of a bearing 130 and is therefore entrained during rotation of the storage roll 10. The thread advance disc 13 is inclined in a known manner to the axis 122 of the storage roll 10 formed by the driving shaft 12 in order to advance the thread in the required manner.

The base 11 has a cylindrical surface 112 which partially surrounds the thread advance disc 13 on its circumference, but which, on the other hand, allows it to project by a sufficient amount beyond the end face of the surface 112 for it to exert the necessary advancing action on the thread.

A rotary driving mechanism 120 is connected to the shaft 12 and is designed as a motor according to the illustration but other driving mechanisms, for example gears which are driven by other driven elements, can also be used. This rotary driving mechanism 120 is borne by the base 11 of the thread store 1. At its free end, the driving shaft 12 bears an end plate 121 which revolves together with the shaft 120 at the same speed.

A retaining element designed as a thread retaining ring 14 is mounted rotatably on the shaft 12 by means of a bearing 140 between the end plate 121 and the storage roll 10. The thread retaining ring 14 covers both the discharge end 103 of the storage roll 10 and the external circumference of the end plate 121 with a short circumferential area 142 in order to avoid the risk of the thread 31 jamming between the thread retaining ring 14 and the storage roll 10 on the one hand and the end plate 121 on the other hand.

The thread retaining ring 14 has on its periphery several thread retaining devices 141, but a single one of these thread retaining devices 141 is sufficient in certain circumstances. The thread retaining device 141 or the thread retaining devices 141 is or are designed to open radially outwards so that the thread 31 can be brought into the contact area of the thread retaining device 141 from the outside.

The bearing 100 on the storage roll 10 is arranged at a distance from its discharge end 103 so that the storage roll 10 surrounds a space 15 with a radial wall 104 together with the thread retaining ring 14. A permanent magnet 150 is arranged on the driving shaft 12 in this space 15 at a distance from the radial wall 104 and also from the thread retaining ring 14. The storage roll 10 bears on the side of its radial wall 104 facing the permanent magnet 150 a hysteresis disc 105, while the thread retaining ring 14 bears on its side facing the permanent magnet 150 a hysteresis disc 143. The two slip couplings designed as hysteresis couplings are therefore driven by the shaft 12 via a single permanent magnet 150.

A thread guide 4 consisting of two thread guide members 40 and 41 which can be moved relative to each other is located in prolongation of the axis 122 of the thread store 1 formed by the driving shaft 12. The thread guide member 40 is held stationarily by the maintenance device 2 while the thread guide member 41 is held movably by the maintenance device 2. The two thread guide members 40 and 41 are bifurcated.

The thread guide member 41 can be moved from a readiness position 410 into the closed position shown by a pivoting drive mechanism (not shown), so that it grips the thread 31 following the thread course 32 and takes it into the shown position in which the thread 31 is enclosed between the thread guide members 40 and 41 and guided.

The storage roll 10 is provided with a thread rotation monitoring device 50 which is connected to a pulse counter 5 to which the thread connecting device 23 is also connected in terms of control. The pulse counter 5 is in turn connected to the motor 21 of the auxiliary pair of take-off rolls 20 in terms of control via a control device 51.

The mouth 240 of a movable suction tube 24 is arranged in the vicinity of the thread course 33 between the take-off roll pair 30 and the thread store 1, while the mouth of a suction tube 26 is arranged in the vicinity of the thread course downstream of the auxiliary pair of take-off rolls 20.

Between the thread connecting device 23 and the auxiliary pair of take-off rolls 20 there is located a thread controller 25 which is connected via a control device 250 to the rotary driving mechanism 120 of the thread store 1 and to a delivery device for supplying a fibre sliver which is to be opened into individual fibres to the spinning device 3. A thread deflecting device 27 is also located between the thread controller 25 and the winding device 6.

The device described constructionally above operates as follows:—

During the normal undisturbed spinning process, the thread 31 produced in the spinning device 3 is taken off the spinning device by the pair of take-off rolls 30 and is fed to the winding device 6. If a thread breakage occurs, the maintenance device 2 is brought in known manner to the respective spinning station where it removes the thread breakage. The partially spun thread 31 is then severed while the winding device 6 is stationary, the thread portion extending to the winding device 6 being supplied via the thread deflecting device 27 to the suction tube 24 which is located in the position 241 and thus keeps this thread portion tensioned. The other thread portion which is continuously delivered through the spinning device 3 is inserted into the auxiliary pair of take-off rolls 20 and fed to the suction tube 26 and there sucked continuously.

The thread store 1 is located with its axis 122 at an acute angle a to the thread course 32, the discharge end 103 being located closer to the thread course 32. The rotary driving mechanism 120 of the thread store 1 drives the storage roll 10 and the thread retaining ring 14 which follows this driving movement without obstruction, via the shaft 12, the permanent magnet 150 and the hysteresis discs 105 and 143. The rotational speed of driving shaft 12, storage roll 10 and thread retaining ring 14 which initially revolve synchronously is selected in such a way that the circumferential speed of the storage roll 10 is higher than the speed at which the thread 31 is taken off the spinning device 3 by the pair of take-off rolls 30.

The thread guide member 41 is now taken from its readiness position 410 into the illustrated closed position in which the thread portion extending to the auxiliary pair of take-off rolls 20 is enclosed between the thread guide members 40 and 41. This thread portion passes into the path of the revolving thread retaining device 141 which is prevented from revolving any more by this thread portion which is held with tension by the auxiliary pair of take-off rolls 20 revolving at the same speed as the pair of take-off rolls 30. However, the storage roll 10 revolves at an unreduced speed. The thread portion is also initially taken off by the auxiliary pair of take-off rolls 20 and discharged through the suction tube 26 following this auxiliary pair of take-off rolls 20.

The other thread portion which extends from the winding device 6 to the mouth 240 of the suction tube 24 is guided in such a way that it does not enter the thread store 1.

The two thread portions to be connected are guided parallel to each other in the same manner just described by the thread deflecting device 27 and the suction tube 24 or by the thread guide 4 and the auxiliary pair of take-off rolls 20, so they can be taken up reliably by the thread connecting device 23 for the thread connection.

Providing the thread connecting device 23 has not yet commenced its work, the thread retaining ring 14 which is elastic, i.e. driven with slippage, of the thread store 1 acts as a thread compensating element. In fact, if the thread tension temporarily slackens somewhat, the thread retaining ring 14 twists in the driving direction 145 and causes a certain looping of the storage roll 10 which is removed again when the thread tension increases again, for example on completion of thread connection.

The thread connecting device 23 then begins its work, so that the thread portions to be connected to each other have to be stopped. The thread connecting device 23 stops the motor 21 via the control device 5 so that the auxiliary pair of take-off rolls 20 is also stopped.

The thread portion still produced by the spinning device 3 and subsequently delivered by the pair of take-off rolls 30 therefore relaxes so that the thread retaining device 141 which had already gripped this thread portion now also begins to revolve. The subsequently delivered thread length therefore reaches the storage roll 10 and is deposited there so that the thread advance disc 13 moves the earlier windings in a known manner from the feed end 101 of the storage roll 10 sufficiently far towards its discharge end 103 for the new windings always to be deposited between the existing windings and the thread advance disc 13.

At the beginning of the storage operation, the storage roll 10 is slowly reduced to the thread delivery speed which is predetermined by the rotational speed of the pair of take-off rolls 30. The thread retaining ring 14 with the thread retaining device 141 also follows this change of speed as only fluctuations on the discharge side of the thread store 1 lead to relative movements between the storage roll 10 and thread retaining ring 14. However, as no thread has been taken off the thread store 1 during thread connection and as the thread guide 4 is located in an extension of the axis 122 of the thread store 1 so that no alterations in tension occur from the thread discharge side of the thread store 1, the thread retaining ring 14 and storage roll 10 revolve in synchronisation. As the location of thread supply to the thread store 1 is a fixed point, the revolutions of the thread retaining ring 14 represent a gauge of the thread supply located on the storage roll 10. The revolutions of the thread retaining ring 14 are therefore used for measuring the quantity of thread stored on the storage roll 10. The storage roll 10 is therefore provided with the thread rotation monitoring device which, in the illustration, essentially contains a light source and a photocell or is designed as an induction scanner. The thread rotation monitoring device therefore determines the passages of the thread retaining device or devices 141 photoelectrically or inductively while the thread connecting device 23 is in operation.

While the thread 31 is stored on the thread store 1, it is possible for an excess of thread, which occurs temporarily at the beginning of operation or at the end of operation of the thread connecting device 23, to be stored by the thread store 1, in which case, the thread retaining ring 14 temporarily advances in the driving direction 145 relative to the storage roll 10, which path is also determined by the thread rotation monitoring device and recorded in the form of pulses by the pulse counter 5.

As the two thread portions extending to the thread store 1 and to the winding device 6 are being connected by the thread connecting device 23, the thread ends extending to the suction tube 24 and to the suction tube 26 are severed and sucked away.

Once the thread connecting device 23 has completed its work, it transmits a corresponding control command via the control device 51 to the winding device 6 which now begins its winding work again. Due to the winding tension, the thread reserve collected on the thread store 1 is taken off. The pulse counter 5 is set to backwards counting as a result of the control pulse emitted to the control device 51 by the thread connecting device 23. The thread connecting device 23 therefore acts as a device for determining the rotational direction of the thread as the thread retaining ring 14 is twisted against the driving direction 145 of the storage roll 10 by the taken off thread 31 as the thread 31 is removed from the storage roll 10 of the thread retaining ring 14. By comparing the pulses emitted during reverse rotation of the thread retaining ring 14 with the number of pulses emitted during the previous rotation in the driving direction 145, it is possible to determine whether the stored thread reserve has been used up or not. Once the pulse counter has reached the value zero again, it switches over so that it will count forwards again during the next storage process.

To prevent the thread reserve from being taken off the storage roll 10 in an uncontrolled fashion, the thread 31 must always be kept under tension. This is effected by the thread retaining ring 14 driven via the permanent magnet 150 and the hysteresis disc 143. It is therefore only possible to remove the thread 31 from the storage roll 10 when tension differences occur in the thread 31 due to differences in the delivery rate to the thread store 1, which is predetermined by the rotational speed of the pair of take-off rolls 30, and the take-off speed from the thread store 1, which is initially determined by the rotational speed of the auxiliary pair of take-off rolls 20 and subsequently by the winding speed of the winding device 6 or by the absence of a take-off when the thread connecting device 23 is in operation. However, the peaks of tension occurring are absorbed immediately by changes in the revolution of the thread retaining ring 14 due to the elastically operating coupling-permanent magnet 150 and hysteresis disc 143. The thread retaining ring 14 with its thread retaining device 141 therefore only permits the quantity of thread corresponding to the actual excess speed of the predetermined take-off speed relative to the delivery speed to leave the storage roll 10.

After emptying the thread store 1, the maintenance device 2 can leave the spinning station and travel to another spinning station to resume its work.

The device described above with reference to a preferred embodiment can be modified in numerous ways depending on its application.

For example, the rotary driving mechanism 120 need not have its own driving motor but the shaft 12 can be driven via suitable gearing by any rotating part of the maintenance device 2, if provided, which is suitable for this purpose or by the machine. Instead of a common permanent magnet 150 for driving the storage roll 10 and the thread retaining ring 14, it is also possible to provide two separate permanent magnets which are spatially separated from each other so that the driving couplings designed as slip couplings are quite independent from each other for the storage roll 10 and the thread retaining ring 14. The necessary torques and outputs of the hysteresis couplings (hysteresis disc 143 and permanent magnet 150 as well as hysteresis disc 104 and permanent magnet 150) should be selected according to the parameters and adjusted if necessary by altering the distance between hysteresis disc 143 or 104 and permanent magnet 150. Separate permanent magnets which are adjustable on the driving shaft 12 for the two hysteresis discs 143 and 104 are particularly advantageous for such a case. It is also possible to provide eddy current or fluid couplings instead of hysteresis couplings, in which case it is also conceivable to provide separate driving mechanisms, for example torque motors, for the storage roll 10 and the thread retaining ring 14.

The thread retaining ring 14 can also be driven via a friction coupling by the storage roll 10, in which case a felt bearing etc., can be used as friction coupling. Driving of the thread retaining ring 14 independently of the storage roll 10, however, has the advantage that drops in thread tension occurring on the side downstream of the thread store 1, based on the thread travel, can also be compensated by the thread retaining ring 14.

The driving mechanism illustrated, however, is particularly advantageous as it is extremely compact, requires no electric lines extending inside the thread store 1 and can even compensate drops in thread tension occurring downstream of the thread store 1.

The thread retaining ring 14 can also be designed in different ways and can be produced from various materials. It is advantageous but not necessary in all cases for the thread catching device(s) 141 to be designed as hooks as particularly quick take-up of the thread 31 by the thread retaining device 141 crossing the thread course 34 is ensured in this way. If a thread retaining device 141 designed as a hook is provided, its groove 144 is open in the rotational direction 145 determined by the rotational direction of the rotary driving mechanism 120, as the thread 31 is thus held particularly securely and guided both during winding onto the thread store 1 and during unwinding from the thread store 1.

If the thread store 1 does not have to be able to be moved into the thread course 32 and out of it again, an individual eyelet or a plurality of eyelets can be used as thread retaining device 141, and the plurality of eyelets can also be formed by the intermediate spaces in a comb ring which is inwardly open and extends with its prongs into the region of the storage roll 10.

It is not absolutely essential to use a thread retaining ring 14 either. If suitable materials are selected for storage roll and thread, with differing reflection behaviour, the thread itself can also be scanned so that the stored thread supply can be recorded by the pulse counter by reference to the directly determined thread rotations in one or other direction and the difference of rotation thus determined.

The device for determining the direction of rotation of the thread can also be designed in various ways. In the design described above it is formed by the thread connecting device 23, as the thread store 1 increases or diminishes the stored thread supply as a function of its operation. However, it is also possible to use the operating condition (rotation or stoppage) of the auxiliary take-off roller pair 20 for this purpose. It is also possible to provide the thread retaining ring 14 or the storage roll 10 with a pair of scanners at the discharge end 103 which determines the direction of rotation of the thread in a manner known per se. Such a scanner pair also permits precise determination of the moment at which the thread changes its rotational direction. The winding device 6 can be connected very gently so that the rotational direction of the thread also changes after a delay relative to the working end of a thread connecting device 23 without errors being able to occur in the value stored by the pulse counter 5.

In particular, if the thread store 1 can be connected to several working stations in succession, for example when mounted on a pivoting arm with whose aid the thread store can be connected to at least two adjacent working stations or even when mounted on a maintenance device 2 travelling past a plurality of working stations, it is advantageous if the thread store 1 is quickly emptied again and can therefore very quickly be taken away from this working station again. For this purpose, the control device 51 shown in Figure 1 is not only capable of switching the motor 21 and the winding device 6 on and off but is also designed as a speed control. This speed control which, as shown, communicates with the pulse counter 5, receives a signal from the thread connecting device 23 when it commences operation, to stop the auxiliary pair of take-off rolls 20 and the winding device 6. The thread rotation monitoring device 50 now records the revolution of the thread retaining ring 14. Once the thread connecting operation is completed this is signalled by the thread connecting device 23 to the control device 51 which now imparts to the winding device the command to take off the thread 31 from the storage roll 10 at a higher speed. Just before the storage roll 10 is completely emptied, the pulse counter 5 transmits the corresponding signal to the control device 51 which now reduces the speed of the winding device 6 which has temporarily been increased, for example, by 30%, to the normal production speed. This takes place in a stepped fashion or continuously in such a way that the stored thread reserve is used up on reaching the normal winding speed.

For example, the control device 51 has a digital/analog converter which converts the number stored by the pulse counter 5 into an analog value. This analog value controls the speed of the winding device, and by suitable design of the control device 51 it is possible to prevent a predetermined peak value from ever being exceeded. This peak value is a set value which therefore characterises the highest winding speed. The actual value which is to be compared with it is produced from the sum of the value characterising the normal winding speed and the analog value derived from the pulse counter 5. If this sum (actual value) is lower than the set value, it determines the speed of the winding device 6, whereas the set value determines the speed of the winding device 6 if this actual value exceeds the set value. A smooth transition from the speed of the winding device 6 to the normal winding speed can be achieved in this way.

The suction tube 24 holds the thread portion extending to the winding device 6 during thread connection. It is also possible for the suction tube 24 to collect the thread portion for this purpose from the winding device 6 or a transfer device which has taken the thread from the winding device 6. During the thread connecting operation, however, or at least at the beginning of this operation when the thread connecting device 23 takes up the thread portion, the mouth 240 of the suction tube 24 assumes the position 241 shown in a broken line, but then travels into the position shown with a solid line in Figure 1. In this position, the suction tube 24 takes up the thread 31 which has been released from the thread store 1 during emptying thereof and now temporarily assumes the thread course 35. This excess thread is also consumed during winding up virtually without any significant tension variations due to the normal winding tension, so that the quality of the windings on the bobbin is not impaired.

If the thread connecting process has failed, this is determined by the thread controller 24. The thread controller 25 immediately stops the supply of thread 31 to the thread store 1 and, for this purpose, is connected in terms of control via the control device 250 to the device for producing (spinning device 3) or for delivering the thread 31 (take-off device for taking off the thread from a bobbin, for example in a yarn-processing or yarn-treating machine). The subsequent delivery of the thread 31 to the thread store 1 is therefore stopped. It is now necessary to free the storage roll 1 from its thread 31 to avoid excessive stored quantities. This can obviously be effected manually. In the embodiment shown, the thread controller 25 is instead connected via the control device 250 additionally to the rotary drive mechanism 120 of the thread store 1. If a thread breakage is recorded downstream of the thread connecting device 23, the subsequent delivery of the thread 31 to the thread store 1 is stopped and at the same time the rotational direction of the storage roll 10 is reversed by reversing the rotational direction of the rotary driving mechanism 120, so that the suction tube 124 can take-off and discharge the thread 31 stored on the storage roll 10 and generally extending to the thread connecting device 23.

The thread store 1 can also be emptied in a different way. For example, the thread guide 4 has a pair of rollers (not shown) with a removable pressure roller which takes the thread from the thread store 1 during the occurrence of a thread breakage and further supplies it to a suction device (not shown).

If a thread breakage occurs, a command is given after emptying the thread store 1 so that the maintenance device 2 can repeat the unsuccessful initial spinning process.

The pulse counter 5 can control various processes, depending in which machine the thread store 1 is used. For example, on reaching a certain value, it can stop a device which is connected to it, for example the delivery device of a winding device 3. This is desirable, for example, if several consecutive attempts to connect the thread 31 using the thread connecting device 23 have failed, as the thread store 1 would otherwise be overfilled. Similarly, it may be necessary to stop a knitting machine once the pulse counter 5 has reached a certain value as this indicates a fault in the thread path.

However, the pulse counter 5 can also be connected in terms of control to the driving mechanism of a take-off device. This is the case in the example described above in which the take-off device is formed by the winding device 6. However, it is also conceivable that this take-off device is formed by a knitting machine or the like or by the thread store 1 itself if it takes off the thread 31 from a supply bobbin and is not supplied by means of a pair of take-off rolls 30. In this case, the driving device 120 is stopped so that the thread store 1 can no longer take up thread.

Other modifications by exchange of elements or by equivalents and combinations hereof fall within the scope of the present invention.

Claims

1. A device for measuring the thread length stored on a storage roll, which is supplied tangentially to the storage roll and can be removed by a thread guide arranged in prolongation of its axis against the action of a retaining element, characterised in that the storage roll is provided with a thread rotation monitoring device and a device for determining the direction of rotation of the thread, both of which are connected in terms of control to a pulse counter which can be switched from forwards to backwards counting or vice versa as a function of a change in the direction of rotation of the thread.

2. A device according to claim 1, characterised in that the storage roll bears a thread retaining ring which can be driven elastically relative to the storage roll for slip-free guidance of the thread which is scanned at least by the thread rotation monitoring device.

3. A device according to claim 1 or 2, characterised in that the pulse counter is connected in terms of control to the driving mechanism of a take-off device.

4. A device according to claim 3, characterised in that the take-off device is formed by a winding device arranged downstream of the storage roll in the direction of thread travel.

5. A device according to claim 4, characterised in that the device for determining the direction of rotation of the thread is formed by a thread-connecting device which is arranged between storage roll and winding device and is connected in terms of control to the driving mechanism of the winding device.

6. A device according to claim 4 or 5, characterised by a control device connected to

the pulse counter for controlling the speed of the winding device as a function of the thread length located on the storage roll.

7. A device according to one or more of claims 1 to 6, characterised in that the pulse counter is connected to a stopping device.

8. A device for measuring the thread length stored on a storage roll constructed substantially as hereinbefore described and with reference to, and as shown in, the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.